Chapter V

ANIMATORY MODELS FROM ANALYSIS OF MUSIC INTERSECTING OTHER DISCIPLINES AND SITUATIONS
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This chapter presents the results of the model-construction achieved through the intersection of the components and concepts relating to music with those drawn from other disciplines and education. Models arising from the most intricate analysis and those close to a philosophic synthesis are placed towards the close.

1. MODELS FROM MUSIC AND RHYTHM

(a) General:

Human rhythm is part of the rhythm embedded in all nature. The human body is keeping perfect time in the form of pulse-beats and breathing which proceed at the unconscious level. Breathing can be controlled consciously to some extent. The most precious source for formal and nonformal education is the rhythm, which a child can make consciously by clapping the hands, tapping the feet and so forth. The Indian musical term for rhythm, tāl or tāja is derived by some from the palm of the hand and hence hand-clapping. Tamil scholars derive it from 'tāl' = 'below', 'foot', hence 'stamping the foot' to keep time.

Indian mythology considers the universe to have come into being out of the rhythm of Lord Śiva's little drum (tuṇḍ). Many tribals express themselves through complex patterns in their drums. It is primal energy unleashed, motion controlled.
Among many perceptive analyses given by Machlis (pp. 24-33), the following extracts may be of particular interest in building up the models for this study:

Rhythm springs from the need for order inherent in the human mind. Upon the tick-tock of the clock or the clacking of train wheels we automatically impose a pattern. We hear the sounds as a regular pulsation of strong and weak beats. In brief, we organise our perception of time by means of rhythm. The ancients discerned in rhythm the creative principle of the universe, manifested alike in the regular movement of planets, the cycle of seasons and tides ... life and death....This universe was art; and its controlling principle was rhythm.

Rhythm is revealed in other arts too - in the symmetrical proportions of architecture, balanced groupings in painting and sculpture, dance patterns, poetic meters. But the richest expression of rhythm is found in music. Hence the case is made out for using rhythm as an essential principle in education.

Growth has its own rhythm. The Individual growth rhythm is part of a larger rhythm of nature evidenced in the biological clocks, the seasons and so on. Cognitive development rhythms have already been adopted pedagogically by genetic epistemologists/developmental psychologists and exponents of curricular rhythms. (Piaget, Bruner, Whitehead and others.)

Aronoff (pp.7-8) makes out a case recalling Bruner's enactive, iconic symbolic model in education and adds that the enactive and iconic modes of cognition are the very ways in which a growing child knows music. She recalls that even in the teaching of music this had been forgotten and premature verbal teaching was given instead of teaching music. Jacques Dalcroze (1900) noticed this practice in the Conservatories of music in Europe and recommended a drastic reorganisation. He went further and developed the school of eurythmics, by which children will learn...
through rhythmic movements, followed by visual stimuli ending up with symbols. Thus Dalcroze anticipate Bruner by six decades. Other music educators such as Mursell and Lanfer have also emphasised the importance of enactive and iconic modes of cognitive growth in music. Hence the case is made for music being a natural mode of developing the enactive-iconic-symbolic sequence. Music offers scope for 'Romance' mode of approaching new knowledge. (Vide Manuel, 1999). Music teachers who introduce the subject by making them read the notes straightaway or force them to keep teacher-imposed time before they have identified their own natural rhythm do great harm. The sequence of Romance-Precision-Generalisation should be carried to other subjects too.

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<tr>
<th>Model</th>
<th>Collateral support</th>
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<tr>
<td>Rhythm is primordial and natural</td>
<td>Mythology as well as scientific evidence</td>
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<tr>
<td>The opening of not only music, but any subject should be 'romantic', emphasising the novelty, wonder and enjoyment aspect. Precision, and generalisation should come later, at the proper time</td>
<td>Episodes from musicians and creative music schools – vide Chapter VI</td>
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<tr>
<td>The rhythm of sensori-motor, intuitive, concrete operational and formal operational - advanced by Piaget and that of enactive-iconic-symbolic, advanced by Bruner is inbuilt in music. One should start with the natural rhythms. The spirit of <em>eurhythmics</em> should be revived not only in music education, but in all early childhood education.</td>
<td>The contribution of Dalcroze (1900), and of Mursell and Lanfer (summarised by Frances Aronof) Evidence from creative schools (Ch VI) More elaborate models follow</td>
</tr>
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(b) Animation as an intrinsic value: Rhythmic activities and singing are valuable in themselves even if they accomplish nothing else, in that they wake up the "sleeping school" and "the sleeping children". Being happy and active is an intrinsic
value. The case for this has been made out in Chapter I and in some reviews (Chapter II).

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<tr>
<td>Rhythmical activities and joyful singing can be a powerful way of animating the dead atmosphere of the formal school,</td>
<td>Th case made out by Rousseau against the deadening atmosphere of the school. French Animation models from Culture groups and culture ministry. Other experiences like the Singing school (USA) (Vide Ch. I &amp; II) Further evidence : DPEP and other episodes Vide Ch VI</td>
</tr>
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</table>

(c) **Triggering peak experiences**: But rhythmic activities can do much more than ‘waking people up’. They can help pupils achieve more than what they do in the ordinary climate of the school. Maslow has argued (in Tanglewood Conference, cited in Kabalevsky ed. 1974) that in the ordinary school routine, children release only 10 to 20 % of their potentials. But in the state of ‘peak experiences’, they can achieve much closer to their full potential. Rhythmic activities are powerful stimulants for triggering peak experiences.

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<td>Rhythmical activities can trigger ‘peak experiences’ in children. Working in the state of peak experiences, children can achieve several times more than they do in the ordinary routine climate. But in order to realise this achievement multiplication objective it would be necessary to design an inbuilt structure underneath the overt atmosphere of activity and joy.</td>
<td>Maslow’s theory (<em>vide supra</em>) Support from the works of Kodaly and his followers in Hungary and elsewhere, the effect of Orff rhythms, Manuel adaptations in India (Ch I &amp; II) This is possibly a gap zone in DPEP : check.</td>
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(d) Animation through creative movement education

It would be interesting to explore how the educative rhythmic activities can be triggered. Gladys Fleming (Creativity and Rhythmic Movement, pp.4-5) identifies dancing as a natural method for children to develop creative rhythm. Rhythm is the regular recurrence of patterns of movements in dance and patterns of sounds in music. Dance comes from the combination of rhythm and movement. Music comes from the combination of rhythm and sound.

Movement and children are synonymous. The school should offer meaningful opportunities to boys and girls to move. Fleming defines 'dance' in the educational context:

"I have something inside me. I'll show it to you. Watch me move." This is dance. It is a sort of ... different language which everyone in the world can speak and think... When we have something to 'say', we sometimes talk with our bodies and muscles instead of our mouths ... This is dance.

Children are endowed with the ability to move, with creativity and rhythm. All needed is to bring these to the surface – sensing, responding, self-acceptance, self-respect, self-understanding, awareness of self in relation to space, to others, to things, to the world. Sensing one's rhythm is a way of feeling of being in tune with oneself. When we recognise the physical child and help him/her to discover, identify and accept, good feeling about self emerges. Every child has a rhythm and body language unique to himself.

As children become familiar with their bodies, they discover that they can manipulate them in many ways. What makes certain parts stretch, bend, twist and
swing? What enables other parts to bounce, push, pull etc? How can we transfer body weight up, down, over, under, transfer large and small weights - through space, in time – with degrees of force – to balance, to defy gravity, to sense degrees of speed, to adjust and even control space and force. Young people need help in understanding and keeping their bodies in tune (ibid. p.20).

*Movement is a form of communication.* It is a universal language. Questioning, transacting, sensing, responding, experimenting, using discoveries in aesthetic ways.

*Movement is a way of Learning:* identification, building vocabulary, making associations, conceptualisation, problem-solving, analysing, organising, making judgements, expressing ideas, making response, adjusting, adapting, altering. Children have a type of movement quotient, or movement intelligence. They tend to identify themselves in space.

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<tr>
<td>Creative movement, combined with music, is an excellent way of discovering the self and realising objectives of language and communication. Sensing one’s rhythm is a way of feeling of being in tune with oneself. The unique body language which each child can be discovered by the teacher and accepted, helping the child to discover, identify and accept himself physically, at first, with the larger self emerging in due course. As children become familiar with their bodies, they discover that they can manipulate them in many ways. What makes certain parts stretch, bend, twist and swing? What enables other parts to bounce, push, pull etc? How can we transfer body weight up, down, over, under, transfer large and small weights –</td>
<td>Gladys Fleming in <em>Creativity and Rhythmic Movement: Boys and Girls Dancing</em> has given an excellent analysis. These can be seen as enactive foundation of learning and as a basis for triggering peak experiences. [This analysis combined with collateral analysis of music lends itself to</td>
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through space, in time – with degrees of force – to balance, to defy gravity, to sense degrees of speed, to adjust and even control space and force. Young people need help in understanding and keeping their bodies in tune (ibid, p.20).

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developing episodes for testing]
Fleming has given a large number of songs matching actions:
Locomotor motion: walking, jumping, hopping, running and leaping
Non-locomotor motion: bending and stretching, swinging, pushing & pulling, twisting and turning, bouncing, shaking.

Collections from other sources (Manuel, 1992, as well as the investigator) are set out for testing (Ch VI)

(e) Invitation to inner animation – intellectual and spiritual

[From this point onwards models developed primarily in music and allied arts are attempted to be transferred ‘extragenerically’ (=outside music), to the general pedagogic/educational context.]

(a) The model of building in a deep structure inside music which could stimulate the listener unconsciously or consciously, or send him/her invitations to go beyond the surface stimulations of music and enter the depths where ‘music as mathematics in motion’ and several other intellectual learning experiences are hidden should be examined. The child playing or listening to music with these inbuilt structures may be doing the mathematics unconsciously, and build his mental structures and may come to a stage when the inner mathematical and other structures will reveal themselves to him. The role of the teacher and the module writer is to build in
these hidden structures underneath the surface music or other interesting surface experiences which may even be labelled as 'learning experiences'. In actuality the deeper learning experiences are effected, not when the teacher records it as such in his lesson plan, but when the pupils open up to enter this mental territory, and play, operate, investigate, and make it his/her own.

The condition is that the module or the lesson plan (along with the learning materials) should have been written in such a way as to provide opportunity for such deep entry and progressive discoveries. In Chapter IV, reference was made to the *sapta tāla gīta* which was purportedly written in *druva tāla* (unit 14) but lent itself to keep time in other - *maïya* = 10, *jhampa*=10 (another variation), *tripuṣa* =7, *rūpaka* =6, *aṇa* = 14 (another variation), *ekā* =4. The total 420 aksharas in which it is composed is actually the L.C.M. Even the bhakti poets have composed their pieces in such a way that an enormous amount of mathematics and beauties of language are embedded in them. The sonata and fugue forms are also masterpieces of inbuilt hidden structures, of music, mathematics, drama, tension building and release and invitation to enact the drama in one's own self-development. In Chapter II Kodaly's model was reviewed showing how the imagination of a composer could be applied to educational problems. He involved himself in the duty of training school music teachers. He wrote easy choral works for children. Several other reviews (Budik, Sarai and others indicate the care with which musical experiences and puzzles are used to invite children to enter into deep intellectual territory).
(b) There is another invitation in music deeper than intellectual exploration. It is an invitation for self-examination, reflection, to enact the drama in one's own self and discover the deeper self. Animation now reaches a third layer, intimately related to the Latin 'anima'. (Acknowledgement: This third possibility was suggested by Prof Reuven Kahane of Hebrew University, Israel, who is on an Exchange Programme in Trivandrum). The Bhakti poets who are masters of musical, mathematical, literary and other intellectual skills and who have loaded their compositions with such 'learning experiences' finally make it clear that these second level experiences are useless if music has not been able to trigger the soul's deepest realisation. This is illustrated in Thyagaraja's poem which begins with, *Sangita gnānamu bhakti vinā* (What is the use of one's knowledge of music, if one has not realised devotion?).

In various other works, salvation, self-realisation etc are used.

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<tr>
<th>Musical Model</th>
<th>Extrageneric Pedagogic Model</th>
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<tr>
<td>(a) Animation level 2: Analysing the deeper intellectual components hidden in the rich musical pieces – Indian and Western. Special analysis of Indian innovators of music who present not the 'product', but the invitation and the process – Violinist B.Sasikumar, J.Venkataraman.</td>
<td>Checking whether musical pieces, or calculated music introduced into literary pieces could help to recognise deeper intellectual objectives and realise them. Reanalysing some pedagogic innovations – Montessori, Dienes, Schwab and others.</td>
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<tr>
<td>(b) Analysing music as a model for the theory of “invitation to Inquiry” – from various intellectual disciplines.</td>
<td>Re-examining Manuel's expositions of expression theories and 'invitation theories' from literature in the context of music.</td>
</tr>
<tr>
<td>(c) Animation level 3: Music as 'animating' the 'inert' soul helping to stimulate the deepest self realisation. This is passing beyond the first stage of simple physical enjoyment or even the second intellectual discoveries and proceeding to the deepest self-realisation aspects. [Ideas triggered in early April by Prof Reuven Kahane, Israel.]</td>
<td>Ré-examining Manuel's multiple educoliterary analysis (especially those relating to covert simile and overtones) in terms of Reuven Kahane model. Rereanalysing bhakti literature – texts which seem to be 'love literature' on the surface. &quot;The Song of Solomon&quot;, The poems of Andal, Meera, and other 'erotic' bhakti poets. Self-realisation of the highest commitment even in terms of secular contexts – polyaisthesis.</td>
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(f) Classification and Progression of Rhythms

Vasantha (1998) has analysed rhythm and its optimum progression in various ways taking the cue from Ellison and others. Rhythm is an inseparable part of music. Ellison identifies three kinds of rhythm present in all music: basic rhythm, melodic rhythm and phrase rhythm.

The basic rhythm is the underlying pulsation felt in all music. It is the toe-tapping rhythm. The melodic rhythm refers to the rhythm in which the specific tones of the melody follow each other. It may be linked to the rhythm of the words in prose. The phrase rhythm labels the succession of more or less complete musical ideas and is the basis of form in music.

Ellison also suggests another classification: formal rhythm, informal rhythm and creative rhythm. Formal rhythm, pre-determined by the teacher, informal rhythm suggested by the context, creative rhythm, the outcome of children's free reaction to music. Here music follows the movement. Children are encouraged to react to music as they feel it and express their dynamic reaction.

Rhythm and movement help the whole group to fall into unison. But a child must find his individual rhythm before falling into a group rhythm. The various locomotor and non-locomotor movements analysed by Fleming (vide supra), fitted into the early music education of children, will yield valuable results.

Dance helps children to move in unison. But Ellison suggests that children need to respond to their own rhythm before they can be expected to adapt to another or to a group movement – no structured dance before effective movement and rhythm skills.
Vasantha has suggested that it would be more practical if the dance-type *gati* forms with their vocal rhythm are presented early: *Tisram* (takita), *Chatusram* (taka timi), *Khan̄am* (taka takita), *Mesram* (taki̲ta takatimi), *Sankir̄am* (taka taki̲ta takatimi). At present, the thirty five *tāla alankāras* are taught as formal exercises in music lessons. The *gati* variations which yield $35 \times 7 = 175$ come incidentally in certain compositions *Gatis* do come early in dance lessons. Vasanta feels that if the rhythmic *gatis* are introduced at the early stages lessons would be more interesting. The musico-mathematical possibilities of *gatis* is greater than even those of the Kodaly rhythms used by Pierre Perron adapted for French-speaking Canadian children in a programme entitled, *Faisons de la Musique* (Let us make music). Some of the exercises used for training leading to mathematical and reading readiness are:

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<th>2</th>
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<tr>
<td>ta</td>
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<td>1 2 3 4</td>
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<tr>
<td>ta</td>
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8 crotchetts (4 in a bar)

| ti ti ta ti ti ta ti ti ta |

quaver and crotchet

| ti ka tika ta ti ka tika ta ti ka tika ta |

Semiquaver and crotchet

| toe toe toeoe |

minim and semibreve
The Indian *gatis* help not only in working with common time -- dividing by 2, 4 8 etc., but work with complicated rhythms based on 5, 7 and 9. Hungarian folk music has some of these, but the Canadian adaptation does not bring these out. Traditional music lessons open with the more complex *tālas* like *Dhruva* (4+2+4+4=14). If we begin with easier *tālas* like *eka* (=4), children would find it easier.

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<tr>
<th>Musical Model: Support</th>
<th>Extragenic pedagogic models</th>
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<tr>
<td>Rhythm classification (Ellison): <em>Basic, melodic and phrase rhythms</em>;</td>
<td>These classifications apply to all subjects. Every subject has a basic rhythm -- e.g. the way in which key concepts are focussed. It is possible to identify useful melodic rhythm in good teachers’ expositions. Some teachers may have a <em>pedagogic melody</em> which children might use as clues to respond giving an impression of having learnt. The phrase rhythms are most important. They have to be identified in different subjects for promoting learning.</td>
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<td><em>Formal</em> (teacher-imposed), <em>nonformal</em> (context-induced), and <em>creative</em> (children’s own) rhythms.</td>
<td>The formal school learning suffers enormously because of formal, teacher-imposed rhythm in everything -- administration, presentation of subject-matter, ‘covering the portions’. The problem is further complicated by super-bodies directing the teacher how to rush through and cover the portions in ‘lock-step’. Context-based rhythms should be discovered through social-environmental transactions and children’s creative transactions discovered through free participant observation.</td>
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<tr>
<td>Rhythmic movement and dance help children to <em>move in unison</em>. But children must be helped to find their individual rhythm before fitting into the group rhythm. <em>(Ellison, Fleming)</em></td>
<td>Unison is not observed in most schools where it can and should be observed, e.g. group songs, National anthem.</td>
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<tr>
<td>Kodaly rhythms (French Canadian adaptations help in mathematics and reading readiness) <em>(Kodaly, Perron)</em></td>
<td>Some lock-step procedures now used in class would be helped by some kind of rhythmic conducting.</td>
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</table>
If *gatis* are introduced before teaching formal *taḷas*, and the *taḷas* are arranged in simple to complex order, music learning will be more interesting and easier. (Vasantha)

In learning new items, the pupils' individual rhythm has to be found out and respected. This can best be done in small groups.  

The rhythms of Whitehead, Bruner et al will also be relevant (Vide Manuel, 1999).

(g) Models from analysis of *tāla*

(i) *Eṇuppu/graṇha* (Starting on beat, before or after):

Western musicians are aware of the distinction between starting a song 'on the beat' (i.e. at the first note of the bar, and 'off beat'. Indian musicians make a three-fold distinction: 1. Starting on the beat (*sama eṇuppu/sama graṇha*). 2. Starting after the beat (*anagata eṇuppu/graṇha*). 3. Starting before the beat (*atiṇa eṇuppu/graṇha*).

When pictorially represented, *atiṇa eṇuppu* also might look like starting after the beat, in fact very much after the beat, towards the close of the previous bar. So in order to understand *atiṇa eṇuppu* (of someone who has stated 'before time' one has to reconstruct mentally the previous bar and where he has entered.

(ii) *Variations in laya* (tempo)

Apart from the rhythm and meter, the speed with which one sings also counts.

Indian music counts three phases of tempo: *vilambita laya* (slow), *madhyama laya* (medium), and *ḍṛula laya* (quick). The basic tempo is kept constant and the pace is exactly doubled or quadrupled to get the faster tempos.

The tempo variations in Western music are of greater complexity, ranging from *Largo* (very slow) to *Fresco* (very quick) and *Prestissimo* (as quick as possible).
Detailed statements of these are made in chapter IV. These have greater carry-over value when we attempt to apply the model to fluctuations in the ordinary classroom, with the teacher taking the role of a conductor. Of particular importance is the concept of *accelerando* (gradually getting faster) and *ritardando* (Holding back, gradually getting slower). The 'extrageneric models' for ordinary classroom practice are to be drawn out.

(iii) Music is one of the basic components which unify Indian music. The Sanskrit phrase, "Śrutāḥ Mātah Layāḥ Pitāḥ" signifies the value of rhythm in music. In life too, especially in the playing field, if something goes wrong we say, 'He has lost his rhythm. The corresponding Malayalam phrase *tālam tettuka* has an even broader connotation extending up to moral lapses. Hence it would be interesting to examine whether rhythmic models can be applied to check whether the pathology of the school can be diagnosed in terms of 'loss of rhythm', and whether the remedial treatment too can be given in rhythmic terms. Indian music which is able to find complex patterns to analyse apparently a-rhythmic combinations, and Western music which can tolerate and use wide variations of tempo, might offer a diagnostic-remedial repertoire, which is worth analysing in context.

(iv) Both Western music and Indian music experts agree that musical meter is different from the time kept by the metronome, though this instrument may be useful at the practice stage and for broad guidance.
### Musical Model

1. The three variations in starting:
   - **on the beat** *(sama eduppu)*
   - **after the beat** *(anāgala eduppu)*
   - **before the beat** *(atita eduppu)*

2. The variations in tempo.
   - **Total doubling and quadrupling** in Indian music.
   - **Gradual increase of speed** *(accelerando)* and **gradual slowing down of pace** *(ritardando)*

3. Taking the analogy of "Paradise Lost" and "Paradise Regained", the school now stands in the position of 'Rhythm Lost'. It can be regained only by the understanding teacher taking the garb of the 'Son of Music', losing his rhythm for the moment, taking up the burden of the a-rhythms of the pupils, gradually building acceptable rhythms and finally the standard rhythms.

### Extrageneric Pedagogic Model

- **In school rhythm**, teachers usually seem to expect *sama eduppu*, everyone going lock-step to the teacher-forced beats.
- **If a weak pupil is late in entering**, can the teacher first count the time from where he starts, gradually train him to enter on time, train pupils who enter late on any count to omit the 'lost portions' and catch up in the middle. If someone seems to join before time, is he a gifted pupil? Or is he very late in the previous bar? Can the school analyse all these possibilities and set up a rhythm out of 'off beat' entries?

- **The Indian style** of straightaway going into the double and quadruple speed is possible for the trained musician, but not for the ordinary pupil either in singing or in the pace of learning other subjects. The **Western practice of gradual increase in speed** is not only practicable, but a necessity. In learning many complicated concepts, the first steps might take time. As he gains mastery, the pupil will pick up speed. The *accelerando* will be decided by the pupil.

- Some teachers, in their presentation maintain the same pace irrespective of the difficulty level of the concept presented. A good teacher who has mastered the art and science of teaching knows when to slow down, how far, and when to pick up speed. When children have mastered the lesson to some extent the teacher can conduct the whole group, maintaining uniform as well as varied tempo.

- **The school has a time-table rhythm**, an annual calendar, monthly tests, terminal tests, rhythm of coaching for the examination. While all these seem to be keeping an apparent rhythm, discerning observers will know that true educational rhythm is lacking. It will be obvious in a weak or average school, where the majority of pupils are far below the prerequisite level needed to cope with the lessons and are continually 'retarding'. The teacher who has the task of 'covering the portions', keeps his time, leaving these children mentally behind. The schools which are producing high results are also maintaining only result rhythm, and some specialise in 'grinding rhythms'. Genuine educational rhythm is lacking there too.
The problem of external rhythm-setters promoting wrong rhythms sacrificing truly educational rhythms at the altar of 'result-producing rhythm'. Saving the doctrinaire priest is a more difficult task than redeeming a sinner.

The situation is complicated by well-meaning circulars from the educational administration and from teacher’s Academic councils, which set up a rhythm to control examination preparation efficiency. This prevents a competent, sympathetic teacher from practising a 'ritardando' to keep pace with the weak students. Had he/she been allowed to do so, he would have brought them to the normal speed and finally helped them to make up with a final accelerando. This flexible model may be tried at first in the most disadvantaged schools given up as 'lost' and then extended to others.

(4) There is a difference between the tempo kept by the metronome and that maintained by the singers and the conductor, though the instrument may serve as an external guide. A conductor who guides lock-step with a metronome will land in disaster.

The time-schedule prescribed by the Department and other controlling agencies can at best be compared to a metronome, keeping time externally. Musical time has to be kept internally by the singer and the 'internal' music conductor – the pupils and then the teacher. The administrative 'metronome' is justified on the argument that some teachers and institutions will abuse their freedom. But an administrative rhythm maintained entirely by authoritative 'metronome' is "schooling rhythm gained" but "educational rhythm lost". Keeping in mind education as well as administrative safety it might be a worthwhile exercise to allow at least those schools which have shown ability to conduct learning effectively to switch off the metronome occasionally and gradually increase the switching off time.
2. ANALOGICAL MODELS FROM OTHER COMPONENTS OF MUSIC

Apart from rhythm components, there are several other components and concepts in music which can provide analogical models for pedagogical practice. At present most of the educational conceptualisations for learning, motivation etc are taken from psychology. A few ideas are taken from sociology. Of late economics and managerial sciences also have made some contributions. It would be interesting to draw ideas from musical conceptualisations.

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| a. Setting the sruti / tuning the instrument: The first thing that any musician, Western or Indian does before singing or playing an instrument in a formal setting is to identify the key and tune the instruments. This can be dispensed with in the case of spontaneous singing. Both Western and Indian musicians spend a lot of time on setting. Precise setting of a number of instruments, especially strings, is important in the Western repertoire because even the slightest out of tune instrument will produce jarring effects in harmony. Much of the setting is done before the performance, and only emergency touches and last minute adjustments are made in the concert hall. In Indian music, the drone, usually S-P (tonic and dominant) is set up producing a series of overtones which have relevance in melodic music. This is done on the stage and the string and percussion instruments are also set on the stage. Westerners unaccustomed to Indian ways consider this a waste of time. Only in life we very often use the phrase ‘out of tune’, ‘in tune with’ in many social situations. The principle can be extended to the classroom situation and even used deliberately as a model. In the beginning of the lesson we talk of motivation, rapport etc. Piagetians even use the language of ‘equilibration-dis-equilibration’. It would be interesting the tuning or sruti-setting metaphor in this context. Much setting (in the sense of teacher preparation for multiple situations) will have to be done before the class. The ‘tuning’ which an unprepared teacher does de novo in the class cannot be justified in terms of the Indian practice of starting the setting on the stage. A prepared teacher may yet tune afresh in the class to get the pupil to tune in- a kind of process approach. There are multiple factors in tuning – tuning to the bridge the previous knowledge and present objective, tuning between where the teacher is and where the pupil is. The optimal sruti needs to be taken to ensure that as many as possible of these tuning elements (*Einstimmungs- element*– Vide infra (Coker) will be considered.) In attempting to achieve targets, tuning
later they realize that this too is part of the performance.
In group singing, especially in singing the national anthem, the sruti is often set high so that when we come to the second part, the high tessitura brings high strain, and the final Jayake on upper S, instead of being a triumphant climax ends in an anticlimax. Some groups even change to a lower sruti at that point producing the most comic effect, admitting defeat, instead of proclaiming victory – which Tagore really intended. Some schools go along merrily in out-of-tune singing. Many avoid the situation by asking only two or three students to sing on the mike. All these aberrations go unnoticed in the setting where the school is meant to produce examination results. In any case Jayake signals end of the school day and pupils go home happily.

b. 'Stringing high' and 'stringing low'.
The Western violins are usually set at a high pitch, as compared to Indian standards. The brother of the composer Muthuswamy Dikshitar adapted the violin for playing Indian music with some modifications. Indian violinists set the violin very low, sometimes four or five notes lower than their Western counterparts, and yet produce great music. Some of the nuances of Indian melodic can perhaps be produced better in a lower setting. It is perhaps easier for the accompanying violinist to listen to the singer and 'play second fiddle' when the violin is set low. But there are Indian violin maestros who can afford to set it high and produce typical Indian effects. M.S. Anantharaman sets it close to Western pitch in accompanying Radha and Jeyalakshmi, producing Indian nuances, and without to the teacher, who is himself set to the curricular expectations is the norm. But when most pupils are 'singing out of tune', especially in a school with high concentration of disadvantaged pupils, it would be necessary that the teacher will have to set himself to the 'modal' sruti of the pupils. In teaching very young children also, this point is important. Gradually pupil may be trained to set to some standard sruti. The practice in Western music of singing different songs for different srutis, considering the range and tessitura of each, may also be a good practice to be adopted in teaching different subjects at different levels.

Teachers who want to accomplish results tend to introduce 'high-strung' modes in the class-rooms. Just as a high-strung violin played inartistically, can produce loud notes, which need not necessarily be musical, such teachers produce highly 'non-educative' or even 'anti-educative' effects while producing 'results'. The practices of the violin schools of Spohr, Kreutzer, Kaiser and others, with connectors by Edgar Haddock and other bridge schools may offer suggestions for producing celestial effects in the school setting even under high strung conditions.

The teacher must set his violin to the pitch of the student. The case for high-strung settings has just been discussed. In low-strung settings, it is possible for the teacher and pupil to listen to each other, but then it requires great skill to draw out the tone.

Mahatma Gandhi's definition of education as the "drawing out of the best in child and man" is easily quoted,
drowning the vocal artistes, and in fact effecting a ‘trilogue’ with them. (Most artists simply follow the artist. Some really enter into a dialogue.). M.S. Gopalakrishnan, the brother of Anantharaman can produce celestial effects of South Indian and Hindusthani music keeping the setting high. He can also play Western classical pieces such as those of Kreisler with double-stopping, even while keeping the setting low. In solo playing he seems to prefer a middle position, setting the A string in For E.

Some insights are available from the Geronte’s Diary being then experiments of a novice attempting to practice all three systems trying the high, low and medial setting alternately. The artistic effects never emerged, but some valuable scientific analysis did emerge. Low setting definitely helps to produce some Indian nuances, without doing much damage to the fingers. It helps to listen to the target model better. But in changing the setting pitch differently, there are difficulties in getting the tone out of the violin. The problem is not simply to draw the bow across the strings. The danger of ‘pressing’ the bow on to the string to get louder tone should be avoided. The problem is to ‘draw the tone out of the violin’. This implies adjusting the pressure of the bow on the string delicately to suit different tension levels, and always drawing out (instead of pushing in) the tone. How the school of Parur Sundaram Iyer (father of M.S. Gopalakrishnan and Anantharaman) do this for three different systems of music at varied subt levels may be analysed to shed insights into ordinary teaching practice at ‘high tension’ as well as ‘low tension’ always producing pleasing music.

but seldom practised. It is a complex science and fine art to draw out the best in the child. Yehudi Meuhin said after listening to the blind prodigy violinist Dwaram Venkataswami Naidu: “He draws his bow across the heart-strings of humanity”.

The question is can the teacher play positively on the heart-strings on the children. In actuality there a hundreds of heart-rending episodes happening in the high-strung educational setting which go unnoticed. The first problem is to sensitise oneself to these issues and as an interim measure lower the tension. But high achievement could be correlated with some high tension. So long as the tension leads to music and real education rather than mental tension, it is to be welcomed and harnessed. It will be seen later that musical design involves creating tension and releasing it.
Ragamalika (garland of ragas) is a technique used in Indian music to create varieties. But then there are rules as to how to pass from one raga to another and finally return to the basic raga without abruptness. Usually a small bridge is added to effect the transition smoothly.

The school-routine is marked by "gong-regulated periods and book-regulated subjects." A bell rings and suddenly the entire 'raga' changes in the class. The result is that pupils do not really sing any raga. They simply read through the portions or listen to teachers reciting without really singing. Can each subject lesson be treated as a raga, and pupils and teachers trained to sing it according to the relevant scales, and when the raga changes with the bell, is it feasible to introduce a small bridge to pass smoothly from one raga to another?

3. MUSICAL RHYTHM: POETIC METER: MATHEMATICS CONVERGENCES

This section attempts to present some episodic materials combining the rhythmic animation principles stated above (Levels 1 & 2) in their applications in poetic meter and mathematics. Some of the models and episodes were originally worked out by Manuel et al (1990, 1992). They were tried out in this study from the specific points of view of the analysis developed herein.

(a) Elementary Arithmetic on Children's Rhythm

Several episodes were developed by Manuel at CERID (Centre for Educational Research, Innovation and Development), Mitraniketan, in collaboration with teachers and tried out with young children. One of the simplest, intended to develop enactive-iconic mathematics with lower primary children starting from class 1 started with the premise that children reciting or singing a rhythmic poem were actually doing enactive mathematics. Teachers, later or sometimes even earlier, impose symbolic mathematics on them, which they recite and memorise, without
either 'operations' or even intuitive understanding. If the poems are written in proper lay-out and secants are pasted to give visual form to the fleeting enactive mathematics, the Brunerian enactive-iconic levels of the mathematical concepts get accomplished. Children may be overtly singing or chanting rhythmically, but there would be inner working of mathematics without formal teaching (as explained earlier in 1 (e) Invitation to inner animation – intellectual and spiritual). Actually the intellectual concept formation is in focus at this level. The concepts will be constructed by the pupils themselves as and when they are able to build the relevant schema (à la Piaget). The singing provides opportunity for joyful repetition while the iconic structures are sending out invitations to arithmetic. One typical song set out in iconic form is as follows:

<table>
<thead>
<tr>
<th>Poem:</th>
<th>onnānām</th>
<th>kun-nilē</th>
<th>o-raḍi</th>
<th>maṇḍilē</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal rhythm:</td>
<td>ta ki ṭa</td>
<td>ta ki ṭa</td>
<td>ta ki ṭa</td>
<td>ta ki ṭa</td>
</tr>
<tr>
<td>Secant (iconic):</td>
<td>✗ ✗ ✗</td>
<td>✗ ✗ ✗</td>
<td>✗ ✗ ✗</td>
<td>✗ ✗ ✗</td>
</tr>
<tr>
<td>Poem:</td>
<td>o-ṛa- yī</td>
<td>raṁ ki ṭi</td>
<td>ḫudvačhi</td>
<td>chū</td>
</tr>
<tr>
<td>Verbal rhythm:</td>
<td>ta ki ṭa</td>
<td>ta ki ṭa</td>
<td>ta ki ṭa</td>
<td>tom,</td>
</tr>
<tr>
<td>Secant (iconic):</td>
<td>✗ ✗ ✗</td>
<td>✗ ✗ ✗</td>
<td>✗ ✗ ✗</td>
<td>✗ ✗ ✗</td>
</tr>
<tr>
<td>Number count</td>
<td>1 2 3</td>
<td>1 2 3</td>
<td>1 2 3</td>
<td>1 2 3</td>
</tr>
</tbody>
</table>

This can be treated as simple counting of 1 2 3. But it is more than that. The 1 2 3s get repeated in a pattern. They form a group, three short letters forming a bigger unit. This will be later identified as a metric foot or gaṇam. Just now that term will not be used, but children will get a feel of it, and an intuitive sense of it. This learning experience is accentuated by one group of children making a hand clap at the beginning of each gaṇam. Another group of children tap with the finger for every akshara. Children note that for every clap, there are 3 finger taps. The mode
of making the rhythm can be changed, substituting a clap by a tap on the big drum and the finger tap by a tap on the little drum or sticks, and so on.

The mathematical intuition developed is:

one $\downarrow$ = three $\ast$, or still better, iconically, $\downarrow$ = $\ast \ast \ast$

Reciting a line of the poem amounts to saying arithmetically that $4 \times 3 = 12$. This symbolic form should not be prematurely introduced. Very young children will not comprehend ‘12’ as twelve or ‘ten-two’, but just as one, two. But the intuition for the multiplication has been enactively built even in the recitation and the tapping. The symbolic form should come only after children have intuitively mastered the process. It would be ideal to introduce ‘12 (twelve)’ symbol after concrete operational equilibrium has set in and the digit sense is developed. Meanwhile iconic games can help, and in any case will not do any harm:

$\downarrow$ = $\ast \ast \ast$

$\downarrow\downarrow$ = $\ast \ast \ast \ast \ast$

$\downarrow\downarrow\downarrow$ = $\ast \ast \ast \ast \ast \ast \ast$

$\downarrow\downarrow\downarrow\downarrow$ = $\ast \ast \ast \ast \ast \ast \ast \ast \ast \ast$

It will be noted that in 12 (twelve), the digit value of ten for the first ‘one’ represents a complex schema, which the child builds at his own pace. Premature imposition of the digital value without a sense of modern pedagogy does more harm than good. Most primary school texts in India including the present one in Kerala fail to reflect modern pedagogy in this respect. The schools in U.K. have devised special apparatus to help pupils to gradually perceive the ten stars in the last iconic step given above as ‘one’ of a larger set.
It would be ideal if musical animation models could be made to serve that purpose.

But then much of the songs and rhythms offered to children involve grouping by twos, threes or fours. Grouping by twos and further dividing one or both of the units by two – the enchanting *tarangiṇi* or *ājan tūjāl* metre is a favourite in Kerala. Let us see an enchanting rhythm in this meter, the famous *māssī* song given in the text for Class 1. The full line is divided into four *gaṇams* of two beats, the second being further divided into two smaller units, producing what would later be called *Bha gaṇam* (corresponding to the Greek/Latin dactylic meter). When *māssī* replies, one *gaṇam* has both components divided into two, providing a *tařī́ja* effect depicting children’s unfettered movement. The second line in each verse has only two *gaṇams* + one long letter which can be prolonged to four full beats and cover the last two *gaṇams*. It is an excellent example for 2- or 4-base mathematics and for pre-addition/subtraction (through the gap filling in line 2) and for pre-fraction intuitions. (Caution! It should not be used formally for teaching these operations.)

Let us see the poem in its iconic lay out:

(Note: In number counting, 1,2 will be given full beat value; ‘2 and’, and in the last line ‘1 and’ will be counted fast, together making up one beat.)

<table>
<thead>
<tr>
<th>Poem:</th>
<th>Verbal rhythm:</th>
<th>Secant (iconic):</th>
</tr>
</thead>
<tbody>
<tr>
<td>tappi-t lōmtōm</td>
<td>tap- pi na-tōm kījā</td>
<td>takkunna-tōm kījā</td>
</tr>
<tr>
<td>tentinu tōm kījā</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number count</th>
<th>1 2</th>
<th>1 2 and</th>
<th>1 2 and</th>
<th>1 2 and</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poem:</td>
<td>tak kījā</td>
<td>mut- tas-tōm tōm</td>
<td>si- --</td>
<td>----</td>
</tr>
<tr>
<td>Verbal rhythm:</td>
<td>tōm kījā</td>
<td>tōm tōm</td>
<td>tōm--</td>
<td>----</td>
</tr>
<tr>
<td>Secant (iconic):</td>
<td>1 2 and</td>
<td>1 2</td>
<td>1 2</td>
<td>1 2</td>
</tr>
</tbody>
</table>
(b) **Rhythms that can help to introduce a Ten-base Sense**

Though this is an enchanting meter it helps in 2, 4, 8 multiplication division mathematics only. We are using ten-base number system. This meter does not help for this purpose. There is an enchanting *Khanḍa gati* meter (taka takiṭa) in which poet Madhusudanan Nair has recorded many sprightly songs. These songs will naturally give the ten base. Since no song in this meter has been found in the primary school texts the line pattern given below shown only verbal rhythm, secant and number count:

(Note: In counting for poetic meter 1 2 3 4 5 will be periodically repeated. In the special case of using *Khanḍa gati* meter for introducing 10-base number system, two such pentaplet *ganams* are paired to get ten. To take the logic of ten to higher degrees, it is possible to compose *dendragani* poems which can yield 10 x 10 and even beyond)

<table>
<thead>
<tr>
<th>Verbal rhythm</th>
<th>taka takiṭa</th>
<th>taka takiṭa</th>
<th>taka takiṭa</th>
<th>taka takiṭa</th>
<th>taka takiṭa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secant</td>
<td>* * * * * *</td>
<td>* * * * *</td>
<td>* * * * *</td>
<td>* * * * *</td>
<td>* * * * *</td>
</tr>
<tr>
<td>Number count</td>
<td>1 2 3 4 5</td>
<td>6 7 8 9 0</td>
<td>1 2 3 4 5</td>
<td>6 7 8 9 0</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

Within the Class 1 text itself, there is a drumming poem which normally would be treated as triple time by prolonging the last vowel (only line 1 is shown):
But South Indian music has tripura tālam the commonest form of which has the count 3+2+2. Since the four ganams of the poem has letters 3,3,2 and 2, it is possible to sing it to that value and lead to 10-base.

This matches perfectly with the letters of the poem and produces ten. But it is less rhythmical than the triple time form given earlier. This form may be impossible in Western-oriented training. It is possible for Indian children. Young children learn even more complicated tālas. This may be examined as a model. But the simple solution is to introduce easy ḫaṅja gati poems in Class I.

(c) Rhythms in Māppillā Pāṭṭu

Māppillā Pāṭṭus are songs originally associated with the Muslims of North Kerala. Now they have become absorbed into the total culture of Kerala. These are strongly accented songs with powerful hand-clapping to keep time. Some songs set in the common 4/4 time lend themselves to division up to the level of one-eighths and one-sixteenths. Sometimes a single syllable, usually the end one, is prolonged up to two or four bars, building in further mathematical properties. Triple time
intersected with four bars in a line with layam variations added give new possibilities. Sometimes 5/4 time or khanta gati is used with the ten-base suggestion already analysed. But one Characteristic meter in Māppilā Pāṭṭu is the 7/4 time or misra gati. Some songs in this meter use range of only three or four notes. Three Māppilā Pāṭṭu songs are given below with elementary iconic forms presented through secants.

The first is the typical ‘backwater song’ which has been current for decades—perhaps centuries—and represents not only Muslim culture but also Kerala culture: (The stripes and stars model developed by Manuel, Firoz, Safia and Alex are used to bring out the rhythm and mathematics. The ‘stripes’ are helpful to represent different time signatures: \( \frac{1}{1} = 1; \frac{1}{2} = 2; \frac{1}{4} = 4 \). The stars are used to maintain the steady 7/4 time signature, more expediently counted as 3+4/4

\[
\begin{array}{|c|c|c|c|}
\hline
\text{kāyalarikatti} & \text{valayeriṇṇappam} & \text{valakilukkiya} & \text{sundari} \\
\hline
\text{******} & \text{******} & \text{*******} & \text{*******} \\
\hline
\text{perṇu ketṭinu} & \text{kuriyedukkumpāl} & \text{oru na-rukkinu} & \text{cērkkāṇē} \\
\hline
\text{******} & \text{*******} & \text{*******} & \text{*******} \\
\hline
\end{array}
\]

The theme of the song appears to be erotic on the surface, but it is loaded with deep hidden meaning, love’s longing, especially set in the coastal area (with migrant lovers making love to girls of the coastal area, and then crossing the seas to earn wealth, leaving the girls in distress and doubt whether the lover would come back) – this distress actually sends out invitation for the person to move to the
higher spiritual plane. In classical Tamil literature many Buddhistic and Jains saints have composed poems of the neital (coastal area) theme. These aspects are analysed in Manuel and it is beyond the scope of the rhythm discussion to analyse these aspects in depth here.

Another interesting song set in 3/4 meter, at one segment passing on to 6/8 rhythm is of great interest in correlating ideas relevant for social studies. It refers to the good reception which a Malayalee returning from the Gulf countries in the days of opulence and the poor treatment meted out to him when the income from abroad dwindled owing to the 'Gulf Crisis'.

Part I: During the period of prosperity with income from Gulf countries:

Time 3/4: Moderato

<table>
<thead>
<tr>
<th>munpu ḍān</th>
<th>gulfinna</th>
<th>vādikku</th>
<th>vannappam</th>
</tr>
</thead>
<tbody>
<tr>
<td>munnilum</td>
<td>pinnilum</td>
<td>ā--</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>lu</td>
</tr>
<tr>
<td>muttāya</td>
<td>ketyākum</td>
<td>kulṭu ku</td>
<td>dumbakārk</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ennōde</td>
<td>snehallin</td>
<td>hā--</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>lu</td>
</tr>
</tbody>
</table>

Part II: After the loss of job opportunity in the Gulf

Time 6/8: Agitato

<table>
<thead>
<tr>
<th>peṭṭennorunālen</th>
<th>jōyum nashtappeti</th>
<th>ingu tiricchu van-</th>
<th>nu</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>peṭṭummaKKumpottu</td>
<td>kutyākum ketyākum</td>
<td>enne veruppāni-</td>
<td>nnu</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>utṭa suhrruttukkal</td>
<td>ennekkānunneram</td>
<td>mārinya- kanniḷun-</td>
<td>nu</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
An excellent example of 'off-beat' start which offers opportunities for incidental additions and subtractions is given below:

<table>
<thead>
<tr>
<th>ya nabisa</th>
<th>la malekum</th>
<th>ya:hi Muhammad</th>
<th>yasire</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Rhythm Patterns" /></td>
<td><img src="image" alt="Rhythm Patterns" /></td>
<td><img src="image" alt="Rhythm Patterns" /></td>
<td><img src="image" alt="Rhythm Patterns" /></td>
</tr>
</tbody>
</table>

(d) Transition to Higher Levels: Applying Rhythmic Maths in Prosody

It will be interesting to examine some poetic meter: musical rhythm: mathematics covergences relevant for the higher classes. As part of a project, Manuel and Sridevi (In Manuel, 1990) prepared an enactive-iconic symbolic model for helping high school pupils to understand Malayalam-Sanskrit Vrittamanjari (prosody) rules.

<table>
<thead>
<tr>
<th>symbol</th>
<th>name</th>
<th>pattern</th>
<th>translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>🕍</td>
<td>Ma</td>
<td>-- -- --</td>
<td>toṁ toṁ toṁ</td>
</tr>
<tr>
<td>🕍</td>
<td>Bha</td>
<td>-- v v</td>
<td>toṁ ki ja</td>
</tr>
<tr>
<td>🕍</td>
<td>Ja</td>
<td>v - v</td>
<td>ta toṁ ta</td>
</tr>
<tr>
<td>🕍</td>
<td>Sa</td>
<td>v v --</td>
<td>ti ka toṁ</td>
</tr>
<tr>
<td>🕍</td>
<td>Na</td>
<td>v v v</td>
<td>ta ki ja</td>
</tr>
<tr>
<td>🕍</td>
<td>Ya</td>
<td>v -- --</td>
<td>ta toṁ toṁ</td>
</tr>
<tr>
<td>🕍</td>
<td>Ra</td>
<td>-- v --</td>
<td>toṁ la toṁ</td>
</tr>
<tr>
<td>🕍</td>
<td>Ta</td>
<td>-- v</td>
<td>toṁ toṁ ta</td>
</tr>
</tbody>
</table>

The iconic forms can be presented in the prosodic convention given above or made more attractive through setting secants or even though displays organised by children in uniform. Two children locking their hands and standing close would be considered *guţu* (·). One child standing alone will be *laghu* (v).
The enactive form etc. look like words but they have no verbal meaning. Only the sound effect as uttered or tapped, beaten on the drum, blown on the trumpet or danced to produce long and short forms count. When children themselves are arranged in a parade, display poetic lines, the vrttam form will be enactive for the performing children. For the observing children it will be iconic form.

So far the enactive and iconic form are defined for ganams. But out of this whole lines can be formed combining the ganams and the part ganams at the end of the line la ga etc. e.g.: Vasantatilakam.

Chollam Va santhathi lakam Ta Bha Jam Ja Gam Gam
- - v - v v v - v v - v - -
tom tom ta tom ki ta ta tom ta ta tom ta tom tom Ta Bha Ja Ja Ga Ga

- The last row states the symbolic ganam (metrical foot) names. The third row represents enactive verbal utterance rhythm. The second row is the iconic representation. The first row is the poetic line.

Similarly other vrttams like Indravajra, upendravajra, kusumamaniyari, sarddula vikri etc were scattered on enactive-iconic symbolic lines and learnt through clapping, tapping etc and getting a sense of the gestalt of the vrttam 'felt in the blood' and gently led to the symbolic form.

For the lower classes the rhythms are not limited to the eight Sanskrit ganams. Even two letter (-v) or (v-) and four letter (v v v v) or even five letter ganams (v v v v v) forms can be clapped and
trapped by the children. Sanskrit prosody is dominated by the three letter gaṇam model, but plenty of poems, especially the Drāviḍa Vṛttams and simple children's poems go beyond these conventions. The enactive and iconic form analysis in the study will cover gaṇam symbols.

Rhythm releases our motor reflexes even when we do not respond with overt physical movement. The rhythm is felt inside as a kind of ideal motion. Wordsworth might lie pensive on his couch. But he could feel his heart dancing with the daffodils. The Indian rasika listening to music may express his empathy with the performer's rhythm through an overt beating of the tāla. But the average Western connoisseur and perceptive Indians of the class of Narasimha Rao may sit still in the chair, but their heart would dance with the music.

4. CREATIVITY IN SPECIAL FORMS IN MUSIC AND MOVEMENT

(a) Creativity through Movement, Rhythm and other Dimensions of Music

It would be expedient to start with the creativity dimensions discussed by Fleming (op.cit.pp.24-25), who considers dance as creative movement. Creativity is that quality of living which helps in the discovery of new possibilities, new associations, new relationships.

It is active rather than passive, exciting rather than dull, way of looking at things, thinking, seeing, behaving ... It is the imagination at work, and an inner urge that stimulates or triggers one to action. This involves making choices and taking chances, not knowing the outcome..., things that the child does for the first time in his life, in a way new to him, ... original interpretation, uniqueness of expression.
Creative power develops with discovery and exploration. Music offers opportunities for such exploration without any financial outlay and without material input. Children experience the thrill of vibrant expenditure of energy and elation of complete satisfaction at harmony with oneself. As children use their creative powers, they develop a greater awareness of the world around them. They respond more perceptively to what they see, feel and hear. New alternatives or relationships are found as they reconstruct the old. Creativity is going beyond what is known or sensed at the moment. *(ibid. p.25)*

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<tr>
<th>Creativity is triggered through rhythm and movement. It helps in the discovery of new possibilities, new associations, new relationships. It develops new awareness of the self and of the world around. Creativity denotes action – involving, trying, seeking extending, thinking, learning, identifying, risking, choosing, judging. It includes imagining, discovering, originating, organising and evaluating. It denotes progressing – going ahead, going beyond, trying another way, becoming more aware, looking for alternatives. It involves feeling – of satisfaction, accomplishment, disappointment, frustration, spontaneity, enthusiasm. Creative process – requires immersion or complete involvement of the individual. Music and movement offer possibilities for developing all these with negligible inputs – financial and material input.</th>
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<td>In order to encourage creativity the teacher should emphasise what is happening to children than on what they may produce. He should free rather than capture, bolster rather than criticise, encourage rather than deter, uncork rather than bottle up. Children open up when adults are willing to be open and flexible. The teacher should start with children as they are. He should open doors, initiate discussion, encourage ideas as well as activity. Some golden rules are:</td>
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<tr>
<td>Do not seek a blueprint.</td>
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<td>Anticipate success, not failure</td>
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<tr>
<td>Invade the child’s world.</td>
</tr>
<tr>
<td>Do not drag him into the adult’s world.</td>
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<tr>
<td>Help children lift themselves out of the ordinary.</td>
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<tr>
<td>Do not do it for them.</td>
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(b) Musical Eureka: "Received Creativity"

Earlier in this chapter reference was made to Animation Level 2 analysed at a
deeper, more conceptual plane, something which touches the head and heart,
rather than the sensations and kinaesthetic movement alone. This level of
animation is less visible, but it relates to drawing out the deeper objectives of
education. Reference was also made to animation Level 3 touching spiritual
development and self-realisation. A doubt may arise whether these deeper
conceptual models can be called 'animation'. A careful analysis of enjoyment of
classical music will make the point clear. The formal analysis and enjoyment of the
deeper structures is presented later in this chapter. But an incident of deeper
appreciation of classical music which appeared in the TV channel in October 1999,
and which was analysed by the investigator and a panel of discussants brought it
out vividly:

The Sai Baba Centre at Puttaparthi had arranged a concert for the Cause of
International Understanding through music. The Bombay Brothers who have
mastered the Western violin technique, combining it with the intricacies of the Indian
ragas, bhavas, talas, and nuances, were performing. A very large audience of men
and women were listening. As is wont in the Indian listening groups, most of the
members of the audience were overtly tapping the tala, and expressing their
appreciation continually by enthusiastic nodding of the head and other gestures. Sri
P.V. Nasimha Rao, former Prime-Minister, was the chief guest, sitting by the side of
Sai Baba. But his face was very serious, and even glum. One discussant member
commented that his overt response was the opposite of animation, and was such
that could even discourage minor artistes. But as the concert proceeded,
Narasimha Rao’s eye gleamed with every nuance, and when the climax points were
reached, illuminations sparkled, obviously reflecting the union of the head and
heart of the listener with the highest that the artist was presenting. Rao’s hands
never seemed to play an overt role, but his eyes gleamed with delight, reflecting
intellectual, emotional and spiritual realisation though music, which the photographer
did not fail to show in close-up. One such understanding illumination of the eye was
worth more than a thousand tala taps and nods of the head, some of which could
have been just mechanical or even calculated encouraging behaviour.

The sudden illumination reflected in Narasimha Rao’s eyes is a kind of musical
animation comparable to the eureka experience of the scientist. This eureka
experience is not only that of the creator, but extends to the reconstructive receiver too. The episode of Narasimha Rao’s visible flashes of enjoyment of the violin concert of the Bombay Brothers not only presents a perfect exemplar of the deeper model of animation, but lends itself to a major model of musical animation of the higher level. Rao comes in as a handy example because, in him the general visage of seriousness serves as a ground against which the flashes of ecstasy realised through music stand out in sharp contrast.

The creative flashes initiated by the musicians and reconstructed in the mind and heart of several of the listeners, can be seen as a special model of creativity in the artist’s presentation which is reciprocated by a creative resonance in a large number of listeners. This phenomenon can be seen in Western as well as in Indian music performances of the highest class. The Carnatic violin maestro M.S. Gopalakrishnan’s solo performances on the violin, with a repertoire of Carnatic, Hindustani and Western tonalities, sometimes take yogic dimensions and transport the discerning audience to a similar state. Another master of the violin, Kunnakudi Vaidyanathan, talks not only with his violin, but also with his audience (even a large one), through his facial gestures as well as through a medley of well-known folk songs or film tunes illustrating the raga on hand, or even through sonal gimmicks to awake the uninitiated listener. Early in the last century Albert Einstein the mathematician physicist who had formulated the theory of relativity was listening to the performance of the boy prodigy Yehudi Menuhin and could see therein the meeting of the finite and infinite worlds. At the end of the concert he embraced the boy and said, “Now I know that God exists”.

*Animatory Models from Analysis of Music...*
Apart from the tonal nuances which an instrument like the violin could evoke, Indian classical music has a peculiar feature – that all performance has to be creative. In Western music also there is a great deal of improvisation, but then the master composer puts his creations and innovations in writing. The performer has to follow this script. A virtuoso performer may yet introduce his interpretations and innovations within this framework. But in Indian music, every good performer is also a composer. The framework of the musical composition with its sāhitya, melodic pattern within the framework of the rāga and tāla is handed over in tradition. But within this frame the performer is expected to make his creations and innovations. Some of the best innovations showing the distinct colour of the raga, or of the kriti (composition) in its intersection with the theme, mood etc. may come up suddenly as the performer works up the progressions on the stage. The new feature emerges as a eureka experience. Members of the audience are also expected to ‘listen creatively’. The discerning members of the audience who have been following the performer mentally through the known steps of the progression catch up the innovation as it emerges and applaud.

This practice has an important ‘extrageneric’ application (application outside the genres of music itself) into the field of education. Once it was thought that discovery and creativity come in a flash in rare moments to very great scientists or poets. Formal education in school and college is concerned with transmitting the product of this creativity or discovery. Very often some of the greatest of the discoveries, stated in the product form, tend to ‘hide the process’. When it is transmitted thus, the learning process takes the form of dull routine or of rote
memorisation of difficult concepts, especially where the teachers themselves do not have a mastery of the emerged discovery. Even among teachers who seem to fully understand the concepts emerging from the discovery, only a very small percentage may be able to reconstruct the process and the eureka experience in the learner. Some teachers do tell the stories about Kekulé’s discovery of the structure of benzene, Archimedes rushing out of the bathtub shouting “Eureka”, Newton’s intellect awakened by the falling of the apple. The story is followed by the prosaic teaching of science. Seldom do teachers present the history of scientific discoveries in such a way that the listening students may reconstruct the discovery, and in fact make a ‘rediscovery’.

Many innovative science educators have felt this gap. At the dawn of this century, Armstrong, one of Her Majesty’s Inspectors in England formulated the Heuristic Method or the Method of Discovery, putting children in the position of discoverers. It did not become a mass movement. During the post-Sputnik period the interest in discovery approaches has been aroused again. Many of the Nuffield approaches come close to placing children in the investigator’s role. Many Piagetians and Brunerians are committed to the discovery approach. Stated simply, if children are allowed to work at enactive-iconic levels or at intuitive or concrete operational level, before imposing verbal formulations, or demanding formal operation, the chances of children themselves making the discovery will be greater. Understanding of many basic concepts come as discovery in this structured play with the concrete, and then only the verbal formulations are given. Models of Inquiry such as those of Suchman and Schwab have also attracted educational researchers. But when confined to sophisticated psychometric designs, the
'precision' and 'generalisation' stages in the conquest of knowledge are imposed before the 'romance' stage is given adequate play. Hence discovery as such has less chance of emerging in this form than is the case when teachers freely allow children to do the explorations in a stimulating environment, taking just the basic ideas floated by the inquiry-promoters.

The additional input emerging from the present music education analysis is this: The process of a South Indian singer (preferably gifted children) doing free explorations in alapana, or kalpana swarams, with the sudden emergence of new features is taken as a model of exploring the context of the eureka experience and promoting creativity. Analogical models of progressively structured, yet free play with the possibility of discovery emerging can be organised in other fields – mathematical, scientific play, word games, composition games in language etc. Guided discovery and teacher-presentation of the creative history of science can also be presented in the model of a creative singer in Carnatic music entering the problem area, exploring a chosen raga and its progressions, yet always attempting variations, and creative probes – suddenly landing in the realisation something not so far done. The discerning members of the audience also join in the discovery. Aspects of exploration in science, mathematics and literature can be presented before the pupils revealing the processes, the hard preparatory work, the tentative attempts, the overtly non-productive 'incubation' period, and the sudden emergence of the new hypothesis. The students empathetically following the creative process - presenting teacher may be in the position of the receptive yet creative audience, sharing the discovery that has been 'discovered' before. There is a big difference between learning the products of discovery as facts and
'mentally and musically moving' on the track of the discoverer. Here we can analyse the process on the basic principles underlined by Piaget, Bruner, Schwab, or Schман. For understanding teacher-initiated creativity 'received' by the student, even Ausubel can be given a musical 'variation'. Ausubel believes in verbal presentation with advanced organisers and in reception learning by the students. In meaningful learning this reception learning is not passive, but active. But Ausubel still remains cognitive. If we add elements of Maslow's 'peak experiences' which could be triggered by rhythmic activities, and also supplement the simple advance organisers by what the Chemistry educator Alexandra Kornhauser calls patterns, we may be landing at a model of 'received creativity' and a musical eureka' even in subjects other than music. The exploratory 'subject concerts' need not be given only by the teacher. The model of Tolstoy's creative composition was adapted by the Soviet music enlightener Yavorsky, where the joint compositions by teacher and pupils were designed to stimulate creativity. Pairs or small groups of pupils can work at such creative endeavours, with teacher shifting to the role of guide, from that of initiator.

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<th>Musical model</th>
<th>Extrageneric pedagogic model</th>
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<td><strong>Model of 'Musical Eureka: Received Creativity' in Indian music concerts:</strong> The performer is expected not merely to reproduce the given compositions, but to 'recreate' it, adding innovations at every stage. It is most obvious at the stage of rāga dīlāpana, tāna and kalpana swara, but even in the singing of the sāhitya, sangatis (step-wide variations) are added in most phrases. The listener is expected not merely to hear and nod, but to enter into the rāga and bhāva, and make the musical discoveries.</td>
<td>Pedagogically this is comparable to the 'guided discovery' model. There are several models of discovery such as Armstrong's Heuristic Method, Schман Inquiry Model, Schwab's Biological Inquiry Model, Several investigatory approaches applying Brunerian Piagetian constructs. There is a creative dimension in all these, particularly at the hypothesis formation aspect. Several approaches emphasising creativity in itself (Torrance, Passi, Raina) have also been attempted.</td>
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afresh. It is a kind of 'received creativity'. Some members of the audience signal the rediscovery of musical eureka by powerful nods, vocal responses of 'aha', 'vah' and the like. Some vociferous admirers may be only 'acting' - to encourage the artist. But some deep connoisseurs like Narasimha Rao might be getting a 'received creativity' comparable to that of the artiste, though their overt responses may be subdued, occasionally revealed by a flash of the eye, caught by an alert photographer.

M.S. Gopalakrishnan’s yogic solo model, talking to the Muses or with infinity and Kunnakudi Vaidyanathan couching his innovations in the language which the audience will understand, sometimes even ‘descending’ to their level in order to help them to ‘ascend’ present contrasting pictures.

These two present different models for education

Ausubel’s ‘reception learning’, adding that reception can be active can also be related to ‘received creativity’. Since very young pupil cannot discover in the same way as the scientist, he needs a lot of help even to be put on the track of discovery. Some exponents therefore talk of ‘Guided discovery’ method. The musical analogy of the creativity of the performing artist evoking creativity in the listener can offer cues for guided discovery approaches in education.

The Gopalakrishnan model is relevant for the ‘received creativity’ of the superior motivated students. The teacher need not ‘come down’. His creative playing just sends down invitations. Those who are ready, will enter and join the teacher’s creativity. Vaidyanathan model expects the guided Discovery teacher to go down to the level of the pupil and invite them to discover and create.

(c) Terza Suono : Creation contributed by ‘piano’ in the inner ear

Anfilov (pp.112-120) has described a phenomenon which occurred when Tartini, the Italian violin maestro, was playing double stops, bowing two strings together. Then he was surprised to hear a third, lower sound called terzi suoni. This could not be explained in terms of overtones physically produced in the instrument itself by vibrations produced in the air columns of simple multiples of the notes actually sounded. The phenomenon was finally explained by Helmholtz as contributed by the listener’s ‘piano’ carried in the body. In the inner ear he was looking for and found a tiny semblance of the piano with 20000 “strings”, nerve terminals in the form of small hairs differing in length, a string for each frequency of the sound
wave. This live resonator analyzer, called the basilar membrane is hidden in the cochlea, a bony spiral tube and three-quarter turns filled with fluid. The sound wave travels through the fluid of the cochlea across the strings and the hair cells respond at once by resonating and exciting the nerve fibers running to the brain. Later scientists modified the idea to some extent, but the basic principle of the inner ear in collaboration with the brain contributing to what is heard remains. The listener is not passive. In addition to the orchestra in the stage, there is an orchestra in the inner ear of the listener, which is also contributing to what is heard. This terzi suoni contributed by the listener is according to mathematical principles. Leibniz said, “Music is the soul’s unconscious exercise in arithmetic.”

These ideas have powerful implications for indirect pedagogy, adding new dimensions to the creative contribution of the pupil to what is heard from the teacher. In the analysis of creativity, the steps of preparation, incubation, inspiration and verification, and the unconscious processes contributing to the sudden transition from incubation to inspiration has been explored by psychologists for nearly eight decades from the time of Schön and Wallace. But the physical basis of musical creativity contributed by the piano in the inner ear presents a new dimension which does not seem to have been explored by researchers on creative education. Anfilov points out that while the composer’s is being interpreted creatively by the orchestra, the listeners ears are also contributing creatively, in addition to receiving the sonic presentation. This concept also supplements the idea of “Musical Eureka: Received Creativity”
Musical Model

Tartini's terza suono – third note – heard when he played double stops on the violin was interpreted by Helmholtz as created by the listener's piano in the inner ear, creating the new note, according to the rules of resonance and using music as "the soul's unconscious exercise in arithmetic'.

Anfilov adds after citing this episode that when an orchestra plays, the listener hears the external orchestra as well the responding orchestra located in his inner ear, which creates a matching music.

Extrageneric pedagogic model

This musical model of creativity adds a new dimension to what has been said on creative thinking by Wallace, Schon, Torrance, Guilford, and in our own country by Baqer Mehdi, Passi, Raina and others.

While the teacher is presenting, perhaps in the 'double stop mode', the student's inner ear and mind may develop a third mode in tune with it. This model is worth exploring in depth over a period of time, by interdisciplinary teams including even ENT specialists.

These ideas have great relevance for indirect/invisible pedagogy.

5. ANIMATION OF DIFFERENT SUBJECTS THROUGH MUSIC

(a) Animation of English & Hindi Poetry

"Singlish" is an approach developed by BBC three decades ago for popularising English in other cultures, such as Latin America. The other methods, such as structural approach are also used, but the learning is reinforced through a pedagogic song. In the primary classes, English nursery rhymes are used. In the present case, song is used as a method of inviting the retarded pupils in high school to enter. Several singable poems from the text were set to music.

Class X: Stopping by Woods: Robert Frost

| Whose woods these are I think I know |
|---|---|---|---|
| s S | r G | m G | s S |
| His house is in the vill- age though |
| s S | r G | s R | p r P |
| He will not see me stopp- ing here |
| s S | r G | m P | d N |
| To see his woods fill up with snow. |
| p S* | p G | m P | g S |
Singable poems from the high school and upper primary school were sung were set according to the mood and sung. Certain film songs were also used for mastering words and structures. It was found that though the word ‘hi’ (=only) was found several times in a single lesson, and the teacher had written the meaning on the blackboard and the pupils also had copied it, they were not able to recall it and use it.

Hence Latha Mangeshkar’s song:

\[
\begin{align*}
tum hi meri mandir \\
tum hi meri puja \\
tum hi dev tu ho
\end{align*}
\]

Mukesh’s song

\[
\begin{align*}
aaj tum se dhar roho kar \\
aisa roya mere pyar \\
chand roya sat mere \\
rat royi har har
\end{align*}
\]

was actually selected for grammatical gender reinforcement in the poetic context:

\[
Chand roya, pyar roya - rat royi
\]

Incidentally it was found that here is an excellent example for helping the pupil avoid the wrong code-switching in English structure which has

\[
Preposition- Noun/pronoun \quad and \quad Verb \quad object
\]

The Hindi and Malayalam normal structures are:

\[
\begin{align*}
Noun-postposition (vibhakti) & \quad object \quad verb
\end{align*}
\]

The inverted forms given in the poem “sat-mere” exactly given “with me”

“roya mere sat” – “wept with me” is a better lead into English than the normal “mere sat roya”
Anfilov (1966, pp.65-67) also presents the innovative experiments of Thomas Young, an acrobat and multiple genius, who used to do experiments with the tight ropes in his leisure time. As he stretched them tighter they would transmit motion quicker. The same effect could be produced by a shorter rope of the same tension. Young continued the experiments with multiple vibrations in a musical instrument. The string vibrates (1) as a whole, giving fundamental tone; (2) at half the length producing the first overtone, an octave higher (3) at one-third, producing still higher overtones (3rd harmonic); (4) at one-fourth it produces the 4th harmonic, two octaves higher. The string’s chorus can be controlled. When plucked suddenly, rapidly, short standing waves are produced when pulled softly, waves are slow and long. The point at which a string is excited is also important. If plucked at the middle, a good proportion of harmonics are lost because it is the node common to all the odd overtones. Though it is easy to set a string vibrating at the middle, this is rarely done; it is sounded near the ends.

Young experimented with the node of standing waves formed at the point where a vibrating string is stopped - violinists make use of it touching lightly at the nodes of the aliquot parts [middle, thirds, fourths, fifths etc]. Flute-like tones are produced. The higher overtones are bolstered, while the lower harmonics are suppressed. Expert violinists can produce not only these natural harmonics, but also artificial harmonics -- pressing the desired note with the first finger and gently touching at exactly one-fourth of the vibrating length. Thus continuous flute-like sound can be produced with the violin. The point of tetra-section has to be very precise. Otherwise unbearable sound will be heard. Before playing artificial harmonics violin
students are recommended to practice octaves on adjacent strings using 1st and 4th fingers.

In a study conducted by Bhavani (Manonmaniyam Sundaranar University, 1998) an analysis of physics-music interface dimensions were made:

Though the main scale - vernier scale relationships are concerned mainly with length, some aspects which pupils find difficult to understand can be clarified by analogy with the way tension is adjusted at two levels in some stringed instruments. In the veena, violin and guitar, tension is adjusted in the strings primarily by rotating the main pegs. But by rotating only the main pegs we are not able to get the precise tightness needed to produce the exact note - sa or ma in the South Indian style of setting. To make these finer adjustments, the veena and the violin have some adjustment mechanisms in the tail piece itself. Since the finer adjustments in the violin are screw mechanisms, one full rotation of which is equivalent to a small fractional rotation in the main peg, it provides an analogy to the principle of minute adjustments in the screw gauge.

Complexities in the resolution of forces can be understood by observing the setting for the sruti (pitch) of the mrdangam. Some of the polygon of forces involved in this setting will be more advanced than the cognitive competencies required even at the higher secondary level.

The topic of Sound in physics is directly related to music. Some important characteristics of sound, transverse and longitudinal waves, vibration producing sound, resonance, the concept of beats, pitch, intensity, timbre, difference between noise and music, and many other concepts can be learnt through musical instruments, particularly through string instruments. The relationship between pitch and thickness of the string, between pitch and vibrating length, between pitch and tension, between amplitude and intensity and many other factors can be brought out.
Sonometer is an arrangement that helps pupils to understand the concept that frequency of vibration of a string increases as its tension is increased. Though the sonometer can be useful in clarifying many concepts in sound, there is no indication in any school that pupils were allowed to handle it themselves to get the necessary concept clarifications. It is much easier for a student to get access to a guitar and learn many more principles than what a sonometer can teach. Since it is a fretted instrument some of the relationships between the notes of the scale can be directly seen, and some constructed. The veena also can teach many of these, but it is a very costly instrument and cannot be handled so freely as the guitar. However, for pitch differences caused by lateral finger pressure, it is an ideal instrument.

Timbre and tone colour can be learnt by comparing different instruments. The shades of tone colour within a single instrument is best brought out in the violin. "The violin is one of the most remarkable of all instruments, being that in which the art of instrument-making has achieved its greatest triumph in terms of simplicity of material, beauty of tone and appearance, and acoustical effect, in which the emotional expressiveness and flexibility of the human voice are combined with a special brilliance and agility quite of its own." This is a unique creation of human ingenuity and inspiration - and, not less important, is the bow, 'the soul of the instrument', without which the violin must remain a mute objet d'art'. Some have poetically compared the violin to the female and the bow to the male element in producing enchanting music. The violin has been characterised as the 'king of musical instruments'. It can produce a variety of tone colours. It can sing, weep,
laugh and produce several other tonal shades which anyone who has heard maestros would be quite familiar with. It was perfected to produce the optimum resonance and tonal beauties by the Italian violin-maker Antonio Stradivari by about 1700. In order to make the violin string vibrate, the bow-hair must be rubbed with resin. Without this friction no sound will be produced.

In addition to stopping the notes by pressing the strings on to the finger-board, great violinists can also produce harmonics by just giving a feather touch at half the length of the string when one hears a flute-like tone an octave higher; at quarter of the length it will produce a flute-like tone two octaves higher. At other positions, different upper notes are heard according to the laws of physics. All these are natural harmonics. When a note pressed with the first finger is given a feather-touch by the fourth finger, at the one-fourth point the most typical artificial harmonics is heard. These are high applications of physics in music.

In order to vibrate the strings in the guitar and produce the notes, the strings are plucked at a point above the hole or struck with a plectrum with the fingers of the right hand. To produce higher notes the strings are pressed between higher frets or the player moves from a lower (left) to a higher (right) string. But the strings are plucked at one end and not at the middle. Plucking the string at the middle would be easier. But plucking at the central nodal point would create vibrations which will dampen the sound.

The flute is a simple, affordable wind instrument. It is easy to handle. It is easy to organise practical work in trying to understand various principles by playing on it.
The flute is a cylindrical tube of metal or wood (usually bamboo) closed at one end and open at the other. Near the closed end a hole is drilled for blowing to get the musical note. Along the side of the flute, on line with the mouth hole a number of other holes are also drilled calculated at distances which will exactly produce the notes of the western major scale (Dheera Sankarabharanam) when successively opened. In the better flutes one or two more holes are drilled. These help to produce nuances and also to play other ragas. Expert players produce minor notes, shades etc., by closing a hole in the 'open system leaving one hole open after the 'closed system', adjusting the blowing pressure, tilting the angle of holding the flute or of blowing and by other means.

\[
\begin{align*}
S & \quad R & \quad G & \quad M & \quad P & \quad D & \quad N & \quad S^* \\
\text{All holes closed: } S & \quad \includegraphics{all_holes_closed} \\
\text{One hole open: } R & \quad \includegraphics{one_hole_open} \\
\text{Two holes open: } G & \quad \includegraphics{two_holes_open} \\
\text{Three holes open: } M & \quad \includegraphics{three_holes_open} \\
\text{Four holes open: } P & \quad \includegraphics{four_holes_open} \\
\text{Five holes open: } D & \quad \includegraphics{five_holes_open} \\
\text{Six holes open: } N & \quad \includegraphics{six_holes_open}
\end{align*}
\]
Experts take a middle point – with three or four holes – as the key (Sa). That would help taking four or even five notes below Sa in the lower octave (mandara sthāyi). But in order to understand the principles of physics, it would be advantageous to treat the all (six) holes closed position as Sa. Now the vibrating air column is long. If the finger near the open hole end is lifted, the vibrating column is shortened and we get Ri. As further holes are lifted one after the other the vibrating air column is more and more shortened and we get Ga, Ma, Pa, Da and finally Ni (all holes opened – shortest column, highest note within the octave). If all the holes are closed and blown with force the frequency of the original Sa is doubled and we get the upper Sa*.

This principle of creating an octave by shortening the vibrating column of air can be done through an improvised jalathatangam. Eight stainless steel (or any musically sounding materials – bronze if available) tumblers of the same size are taken and arranged in a row. When the open tumbler is struck on the rim, the full air column vibrates. This is treated as Sa. Water is poured gradual in the next tumbler, continuously testing, till a clear Ri is heard. By pouring more and more water and shortening the air column above the water we can get the full octave:

Any raga can be formed by adjusting the air column above the water, but it would be easy to work with a diatonic scale like Sankarābharanam (Western major scale).
Improvisations similar to the inside of a piano (when exposed on a small range this is a xylophone) can be done by collecting a number of musically sounding rods of different lengths. They may be placed on two small wooden bars slightly hollowed at intervals to hold the rods in position. The longest may be put at one end to represent lower Sa. Then the slightly shorter ones are tried till the true Ri is got. The process is tried till the full octave S R G M P D N S* is got. With very young children such an improvised xylophone is even better than a permanently fixed xylophone bought in a shop. If the M and N rod are removed, children will get a pentatonic scale. They may not yet know that it is the raga Mōhanam but they will be enchanted by this abbreviated scale.

Similar improvisations can be conducted with percussions with membranes and discarded tins or hemispherical coconut shells. One such improvisation is given in DPEP text for Class 4.

Improvising musical sounds with stretched strings or fibres, varying tension and length could provide a variety of episodes. This would bring us close to ethnophysics. Early hunters at some stage became aware of the musical sound produced when an arrow was discharged from a taut bowstring. They noted that strings of different length produced sounds at different pitches. By fitting a number of such bows in the order of length (keeping tension constant), a full octave and greater ranges of musical sound could be produced. Later they found that in the same bow itself a number of strings could be stretched. The arc which provides
the end points, progressively yields shorter chord and higher tones. Thus the early
harp came into being.

Another improvement was to stretch a string on a flat plate of wood or other hard,
smooth materials, and adjust the length by pressing the string on the plate. The
plate can be attached to a gourd with a hole at one end over which the string
passes. Thus a resonating chamber is built to augment the sound produced by the
string. Such an instrument will be close to what has been called Ektār in North
Indian ethnomusic. When multiple strings are attached we have the beginnings of
what has been documented in Sangam literature as yāzh, the precursor of the
veena. Swami Vipulananda has attempted to reconstruct the early yāzh forms by
analysing Classical Tamil literature and collecting current and ethnomusical
instruments in a wide geographical area extending up to Malasia (In Manuel 2000).

The interest for the study lies in the fact that ethnomusical instruments provide a
simple and transparent base for children exploring physics-music interface.

There are advanced physics-music interface studies studying the notes of the scale
as well as quarter-tone srutis in terms of frequencies. They are considered too
advanced for the present study.

Shalin (1991) gives a brilliant analysis of music-modern physics interaction
constant of the universe. Minkovsky revealed that space and time are alloyed into a
unity by the connecting shaft of pure light. It was at this time that music ceased to
be a ‘thing’ and became a ‘process’ that glowed incandescently. Music converted
into light.

The foundation for this amazing transmutation began in 1886, when Heinrich
Hertz, a German physicist, detected the presence in the atmosphere of an
electromagnetic wave that had an exceedingly long wavelength (in yards or even
miles)-visible light minute fraction of an inch. Maxwell’s pronouncement (1873)
that electricity, magnetism, and visible light were just different manifestations of
radiant energy. Hertz called these long waves ‘radio waves’. They are at the far end
of the e.m. spectrum and are invisible, they are a form of light ...this light no one
could see would become music everyone could hear. Guglielmo Marconi (1895)
converted agitated compressed molecules of sound into pure light in the form of
radio waves. So transformed, the sound of music could then hitchhike a ride on
these silent waves light - metamorphosis began when sound waves struck sensors in
the diaphragm of a microphone – transmitter.

Because of music’s transubstantiation into light, space has contracted like an
accordion, and a vast, invisible electromagnetic net has been cast over all of
humankind. With the advent of TV we have dramatically increased the outpouring
of light as information. Now or stellar audience can see what we look like as well
as how we sound. ...For centuries, poets, lovers, and mystics have been praising
one form or other of music as eternal. These paens were premature since sound
lasts only a few seconds. But when the first radio wave music escaped earth’s
atmosphere, it literally did become eternal... Another revolutionary implication of
the conversion of music into light is that it can be stored, either as a light
interference pattern on a magnetic tape or on a laser disk (pp. 284-288).

(c) From Physics to other studies

Tame devotes a full chapter to the “Physics of the OM”. Both the physics part is
largely conjectural. The substantive part of the thesis is metaphysical rather than
physical. (p. 205).

But some of his interdisciplinary sweeps of thought are interesting and could
stimulate multi-level investigation. He calls attention to the harmonic ratios and
proportions in nature. We cites Thomas carlyle : “See deep enough, and you see
musically, the heart of human nature being everywhere music, if you can only
reach it”. Hans Kayser argues that the whole number ratios of musical harmonics such as the octave, the third, fifth and fourth correspond to an underlying framework in chemistry, atomic physics, crystallography, astronomy, architecture, spectroanalysis and botany. (In Tame pp.227-228). Tame imaginatively attempts to grasp the “Harmonic Principles in the Natural Psychology of Man”, to move towards a Grand Unified Field Theory of Physics, delves into Astrology as the Music of the Spheres matching the table of seven svaras and planets. He closes this discussion with a treatment of Infrasonics, Ultrasonics and Acoustic Oddities (ibid.pp.229-246).

With chemistry several analogical models are possible. The Matrix of chakra number x raga number within each chakra represents an absolutely mathematical periodicity. This can help to understand the principle embedded in the periodic table. Similarly as one goes down a group in the periodic table some properties increase (e.g. atomic weight). As one goes across the groups along the rows, some properties increase, some decrease progressively, some increase and decrease—the various yalis—srotta, gopuchcha, mrdanga—might give intuitions which help the student to learn chemical principles.

(d) Musical Models for Social Studies

The correlation possibilities with social studies are so many and since it is the major specialisation of the investigator, it is very risky to enter into the details and present the ideas within a reasonable space in this multi-dimensional study. Only the major themes and conceptualisations are stated here, cross-referring the applications in other sections in this chapter. One aspect of social studies—the development of social skills—is totally neglected in the treatment of the subject. Social studies
concerned mainly or only as a subject for examination. This study focuses sensitivity to the point that the use of songs in the assembly, in group interaction, for development of social values, for presenting segments of Indian and other cultures are all cases of Music-Social Studies interaction. It has already been noted that an illustrative song used under Māpplā Pāvu brings out the economic factors much clearer than the dry facts memorised for examination. Indian history in its varied panorama can be presented through song and music as done in many American social studies programmes. Such aspects will have to be taken up as separate projects. Other sections like the Individual and the Group, National Integration and International Understanding are full of application potential for social studies. A few are referred in passing. Reference was made under Fugue: Analogical applications in education that just as a major theme presented in a musical fugue, is taken by other voices and elaborated in its flights in various ways, a mathematical idea can be pursued in physics, prosody, language and so on. It is possible that social studies can provide one of the flight zones or even treated as the integrating matrix.

6. MUSIC AS SPEECH

Chandola (1988) has made a masterly analysis of Music as Speech. It may be recalled that many tribals have an elaborate system of drumming to communicate ideas. The effect of music of early culture analysed as speech is evidenced in early Tamil literature (Manuel, 1964, 1983). The tradition has been continued in live forms in Kerala especially in the percussion varieties and nuances in expression
The Malayalam word for drum, 'para' is the same word used for the verb 'to speak'.

Chandola analyses the speech, 'bol' of the tabla with great depth. His analysis is conducted within the framework of musicolinguistics, a discipline which studies music from a linguistic point of view. He analyses the phonetic components of drumming. Chandola later (p.71) cites the musicolinguistic studies such as those of Herzog (1945) about drum-signalling. He recalls that there are drums which are used for 'free conversation' by imitating some features of human sound as are formed in various native cultures of Africa, America, and the Pacific.

The sound of each stroke of tabla is an imitation of a linguistic syllable. Such a syllable is called bol (= 'speech sound, utterance') in Hindi-Urdu. The Sanskrit word for imitative sound is varna which means 'sound, color, phoneme, sign, letter'. These terms clearly suggest that drumming was considered a language by the musicologists of ancient India. In the bol of the tabla, Hindi-Urdu became the reference point for the strokes, for, tabla originated in Delhi (ibid, p.6). 'Chol' in Tamil-Malayalam percussion schools has the same expressive connotation which Chandola attributes to Hindi-Urdu 'bol'. Mattalaviyal (The Science of Drumming), V.P.K.Sundaram (ed) brings out several such nuances combined with complicated folk mathematics, used by percussion artistes in South India and recorded in detail in Tamil manuscripts.
However, it is Chandola who has analysed such folk speech and mathematics in terms of modern scholarship. So in the rest of the analysis in this section, his analytical presentation is summarised.

The basic syllables for the tabla are:

Left hand stroke syllables: ge, ke

Right hand stroke syllables: ta, tā, te, ti, te, ra, rā, tin, tun, thun

The naming of the syllables is very complex. An illustrative table is given below:

<table>
<thead>
<tr>
<th>Left</th>
<th>Right</th>
<th>Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>ge</td>
<td>tā</td>
<td>dhā</td>
</tr>
<tr>
<td>ge</td>
<td>nā</td>
<td>dhā</td>
</tr>
<tr>
<td>ge</td>
<td>ti</td>
<td>dhi</td>
</tr>
<tr>
<td>ge</td>
<td>tin</td>
<td>dhin</td>
</tr>
<tr>
<td>ge</td>
<td>thun</td>
<td>dum/dhum</td>
</tr>
<tr>
<td>ge</td>
<td>te</td>
<td>dhe</td>
</tr>
</tbody>
</table>

These nuances in the bol of the tabla explain why two Hindusthani tāls having the same total mātras per bar as well as the same configuration yet produce different tāls. Rūpak as well as Tīva (pushtoo) have an identical configuration of 3+2+2 = 7 (vide Ch IV section on Rhythm, Meter and Tempo), and hence the difference in the ‘personality’ of the tāls lies in the differences in the ‘speech patterns’.

The nuances in tabla are also caused by the accent and other factors. The first beat is marked by highest stress (sam). In the eight-beat rhythm called kahnwā the 1st, 9th, 17th, beat get the highest stress. The others are equal. In the 16 beat tin
The highest stress occurs on every beat that comes after every cycle of 16 beats. The 6-beat rhythm called dādṛā is structured as:

```
1 2 3 4 5 6
  dha dhin na dha tun na
```

In singing also peripheral linguistic systems are represented. Song composition in the nom-tom style is called the tarānā. The tarana songs are very frequent in classical dances - in dance some more syllables like tat, thei, tho, tha, rang, jhi, jha etc are added. The dancer expresses by imitating these syllables by foot strokes and ankle bells. The peripheral linguistic systems have three nomenclatures: nom-tom, sargam, drum-stroke names.

Music is a language that can express through drum sounds. Musical dialectology and stylistics can be discerned in different schools of drumming, especially in the use of the extent of 'thin' and 'wide' strokes. A stroke or syllable requiring three or more fingers is khula bol or open utterance. e.g. ge, te. Using one finger per syllable is band bol or closed utterance. It is considered that playing wide strokes on the tabla is a kind of borrowing from mrdanga (pakhawaj).

Chandola illustrates the differences by how two tāls with the same configuration and total bar length could differ in tāl as well as in style.

He develops a case for impressionistic phonetics. The human ear may get the impression of having heard identical tones, no matter from what sources they
come. This freedom of source is a very interesting concept in describing the tonal system of music. Some attempts have been made in linguistics to free the description of sounds from articulatory behaviour (e.g., concept of distinctive features (Jakobson and others). But until now all such attempts have failed to develop a real general phonetic matrix which will explain why we hear 'human' sounds from 'non-human' sources, e.g., 'bit' form and English mouth or mynah. Chandola (pp.87-89) presents interesting arguments and tables to break new ground in this dimension. The simplest of the tables in shown below:

**Table 6:Tabla Positions and Phonetic Sounds**

<table>
<thead>
<tr>
<th>stroke</th>
<th>rim</th>
<th>median</th>
<th>inner</th>
<th>closed</th>
<th>open</th>
<th>thin</th>
<th>wide</th>
</tr>
</thead>
<tbody>
<tr>
<td>ge</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ke</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>ta</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>taa</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>te/t.e</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ti/ra</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>r.a</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>naa</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>tin</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tun</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>thun</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

Before proceeding to set up the model from the discussion, it may be expedient to add some more points. 'Speaking' is an ideal towards which all instruments seem to aspire, just as “All art aspires to the condition of music” (Auden). Fritz Kreisler is said to play the violin so that it 'speaks'. The Parur school of South Indian violin
playing also is adept at it, particularly with the two octave in single string and single finger techniques. When M.S. Gopalakrishnan, the most distinguished second generation member, plays the phrase “mānāmu lētā? abhimānāmu lētā?” one can hear Tyagaraja speaking to Rama with an intimacy, born out of bhakti: “Don’t you have shame? Don’t you have feelings?” (that your devotee should be derided by all and sundry because of his attachment to you). The further sangatis that he adds seem designed to intensify the poignancy of the question. Kunnakudi Vaidyanathan speaks with his violin in the dialect which his audience knows and hence gets a mass appeal.

This can be heard in other instruments too. When the late Sheik Chinna Moula Sahib plays the typical phrase in husāni, one can clearly hear the words “Rama ninne”. Veena Chittibabu and Balachander are masters of ‘speaking’ with the veena. Even as a boy, Srinivasan used to make a relatively ‘flat’ instrument like mandolin sing and speak. While presenting him an award at the Music Academy, veena Balachandar said: “When a person plays veena in a mechanical way people would say: ‘He plays the veena like a mandolin’. But this young boy plays the mandolin like a veena.” He implied ‘like a veena speaking’.

In Western music, many play the piano like a dead instrument. All the notes and chords would be struck perfectly. Only, the real music would not pour forth. It is said that when masters like Liszt and Chopin played, the piano would speak. Among Indian maestros, the late Handel Manuel and the scientist Raja Ramanna
are noted speakers on the piano. Handel Manuel could speak even better on his favorite pipe organ at St Andrew's Church, Egmore.

**Model following from the above discussion:** The child's primitive cognition of tones and rhythms takes place in his or her own speech. The purpose of his cognition is interpretative and communicative like the song of birds. Human beings differ from the other animals in that they have acquired the ability to transfer speech tones and rhythms to instruments. Eventually we find that a human child can utilise tonal and rhythmic organisations that are independent of speech without realising initially that such organisations were available in his or her own speech. It is when this realisation is made that music reaches its goal. (Source: Chandola, *op.cit.*)

The extreme nuances which Chandola has analysed in the *tabla's bol*, and which can be heard in the playing of Umayalpuram Sivaraman on *mrdangam*, can be heard in another style in the performance of the folk artistes of Kerala in *Chendai* and other drums. There is a large repertoire of performing talent and connoisseurship in the community. It would be a great service to the nation if these talents could be harnessed for the purpose of formal and nonformal education. The extramural artist-teachers may be drawn upon to help to introduce the real *bol* or *chol* in the school. If all art aspires to the condition of music, teaching as an art should also aspire to the condition of music, and even more to 'musical speech'.

In classical Tamil prosody, (common to Kerala and present Tamil Nadu), four kinds of metric sounds are distinguished: *tuval ocai* (springing meter), *ahaval ocai* (declaiming meter), *lungal ocai* (hanging meter), and *ceppal ocai* (speaking meter). The last one is considered to call for the highest poetic skill and the art which conceals art. The essence of the model is that the school should become more and more musical, but not filled with the overtly loud music that plucks the strings, 'saws' with the bow, 'beats' the drum, but the covert and refined music which speaks to the heart of educators and educands.

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### 7. MUSIC AND POETRY

Hundreds of citations can be found to bring out the relationship between music and poetry. On considerations of space only a small number are recalled to develop the main points. It will be appropriate to begin with a Sanskrit *sloka* which Kunchan Nambyar cites in the prefatory part of his play *Symantakam* and explains elaborately in simple Malayalam:
Music and poetry are like milk flowing from Sarasvati's two breasts; one sweetness is felt instantly; the other sweetness accrues from meditation.

It is this 'immediately-felt' sweetness of music that accounts for its animating power, especially Animation: Level 1. But then there is an analytical understanding of music too. Deep classical music either Western or Indian has both instant sweetness and meditative (analytical) sweetness (ālochanāmrtam). This can be seen best in the enjoyment of a sonata or fugal forms or a rāgamālīka pallavi with decorations. There are extremely rhythmic forms of poetry which bring instant enjoyment. But then this immediacy can be due to the presence of the straight musical rhythms embedded in the poem. The fact is that music and poetry are two art forms having much in common, and yet having distinct identity as art forms.

Poets often use the term music in their expressions. But that may have a varying shades of meaning, some very different from the analysis of music as an art. It would be worth examining some of this music-poetry interactive discourse. This analysis has been elaborately done with reference to English poetry.

Shakespeare considers music to constitute the essential nature of man:

The man who has no music in himself
Nor is not moved with concord of sweet sounds
Is fit for treasons, stratagems and spoils. (Merchant of Venice)

The composer Purcell, was one of the earliest to analyse the role of music and poetry precisely and state the need for interaction of the two. "Music and Poetry
have ever been acknowledged Sisters, which walking hand in hand support each other. Both of them may excel apart, but sure they are most excellent when they are joined ... For thus they appear like wit and beauty in the same person."

Hassals who presents this citation (In Jacobs, p. 151) adds that this was written at a time when, except in the practice of the master himself, the relationship between the "acknowledged sisters" was beginning to show signs of cooling off. Until very recently, like sisters who have married husbands in widely-opposed walks of life and settled down in different parts of the world, music and poetry have been at loggerheads. Poetry, in particular has shown little interest, and certainly no pride, in the family tie. The reason is not far to seek.

One is that our age is moving more and more towards specialisation. The Elizabethan lutenist was his own lyrist. Then "everyone burst out singing." A song is something conceived by the heart, and carried on by the heart with the help of the mind's ear. Today the heart finds the straw for the brick-kiln in the poet's head. The process is of little use to the musician whose song only lives to be heard, one performance at a time, as against the modern lyric which so often only lives to be seen and stewed-over as it lies on the page, happy to be read and read again until the full depth of its purpose has been realized. An age of "seen" poetry—argumentative, introspective, obscure—means a bad time for the art of song (ibid. p.152).

The essence of poetry is to evoke; therefore it relies much more on the collaboration of the reader. It evokes, and for the sake of sharper evocation, it contracts. The more it contracts, the more it demands of its special reader, and the
greater its demand the farther it moves from the art song. The modern composer likewise, with his elaborate harmonic structure and his own form of "purism" makes no less a demand; and there too, like the poet, he is working in sovereign isolation, allowing for no collaboration other than that of the listener. It follows that to bring music and poetry together again, both arts must make concessions.

There are many advocates of verbal music. But Carlyle presents a different picture about the music of poetry: "A musical thought is one spoken by a mind that has penetrated into the inmost heart of the thing. All inmost things, we may say, are melodious...Poetry, therefore, we will call musical thought...See deep enough, and you see musically." Here we see the word 'melody' in a special meaning. Apparently he is thinking of a level in which poetic intuition, musical intuition, the 'inner light' common to all arts and revelation merge in one. Jacques Maritain is also taking a similar view.

T.S. Eliot was apparently thinking along the same lines when he wrote, "I believe that the properties in which music concerns the poet most nearly, are the sense of rhythm and the sense of structure." In the same essay he remarked that "the music of poetry is not something which exists apart from the meaning", which is important to bear in mind when distinguishing poetry from the music of the musicians, which has no "meaning".

There is poetry which depends largely on the music of rhythm and other sound effects than on meaning. Here the pleasure can hardly be a poetic pleasure, for it is the response to a toneless music, an audible pattern merely. Much of Swinburne's
work is so musical in this sense that it acts like a narcotic, and the commonest symbols, “wind” and “sea”, soon grow utterly meaningless.

Poetic music in the real sense results when a thought conceived in a rhythm of emotion is felt to have been exactly preserved because the author has fashioned its counterpart in measured language. The music of poetry is not a sound merely. It is the sound of something perfectly translated out of silence in such a way that it is “felt in the blood and felt along the heart”; for the meaning of poetry is rather felt like a revelation, or received into the mind like a “remembrance” (Keats), than actually understood. In the mind, at last, it evokes an image of itself, and this is part of the poet’s work. (ibid. p.155)

A poem just read is compared to husk. It has yielded itself up and gone to live elsewhere, in the reader’s brain to participate in the process of “reflection”. The visual element in poetry is so predominant that one might almost define it as heard vision.

The phrase “verbal music” is misleading. The ends that musician and poet hold in view are so different that it is hardly surprising to learn how few poets have had an ear for their sister art. Tennyson, the most musical of English poets, was practically tone-deaf. He frequently uses the loveliest phrases to refer to an art he could never appreciate.

Browning, on the other hand, was a real musician, and yet the bulk of his work is argumentative, monologic, a bold spate of discussion (or more often a confession)
at times perilously condensed, and frequently carrying the maximum ballast of prose. He would probably have agreed with a remark of Walt Whitman's, "I take a great deal of trouble with words, but what I am after is the content, not the music." And yet only a musician could have written Abt Vogler.

In Balaustion's Adventure occurs the phrase "Who hears music, feels his solitude Peopled at one"; Browning ended Pietro of Abano with eight bars of a melody in C, not words. No, the musician-poet need not be a lyrist. The Swinburnian sense of melifluous and measured speech, is no outlet for the harmony of the soul. Browning keeps the arts distinct. He knows too much about them to do otherwise. The music in Browning's verse is instrumental rather than vocal. Although a monologue in language, Andrea del Sarta, perhaps his most perfect piece of work, is more of a tone-poem, if one must consider it in terms of music. For the poet with a musical ear, the sound of "tonal" music may well evoke in the mind its counterpart in verbal cadence (ibid. p.156).

The difference between the two kinds of music is best expressed by Keats

> Heard melodies are sweet, but those unheard  
> Are sweeter; therefore, ye soft pipes, play on;  
> Not to the sensual ear, but, more endear'd.  
> Pipe to the spirit ditties of no tone.

The Elizabethan poets did bring the two arts together. Unlike the madrigal, where the words were only the means to a musical end, the lute-song encouraged the poet, for it called him as equal partner. Soon there came about "the divorce of lyric poetry from music", which has been acclaimed as "perhaps the greatest revolution
that has ever occurred in English poetry" (Cecil Day Lewis. In ibid, p.157). This is attributed to the puritan influence and other social/political factors. The puritans closed the theatres, and the masque evolved into opera, a musical form in which, granted the structure of the plot can be followed visually, the words are carried like long-suffering passengers in the triumphal chariot of song. In opera the poet becomes the composer's country cousin. Milton, an exceptionally musical poet understood the problem very well. The lyrics in Camus show a subtle appreciation of musical form. By the time the theatres reopened, opera had been born in England. Dryden has happily described music as being "inarticulate poetry".

The Germans had meanwhile developed the Lied (poem dully accompanied by music.) Schubert and Schuman were among the greatest exponents of this form. They developed the so-called "through-composed" (durchkomponiert) music for a poem where the composer tried to follow musically the changing moods of the poem instead of nailing each stanza of the same length to the same section of a reiterated melody. This meant that greater poetic subtlety could be accommodated in music, and indeed, the Lied was largely inspired ... by the lyrics of the German Romantics. The result was the division — which in our own day has become a gulf— between popular song and the vocal music written for cultivated audiences. This type of music also began to arrive by the eighteenth century.

The opening lines of the Choric Song in Tennyson’s Lotus Eaters read:

There is sweet music here that softer falls
Then petals of blown roses on the grass
where the music serves to enlighten the visual image of petals on grass, more
than the roses sweeten the sweet music.

T. S. Eliot has used music in his work in an entirely different sense. In *Four
Quartets* he treats his themes exactly like a musician, suggesting, interweaving,
and developing them in a form which is almost fugal; the "themes" in themselves
being more like musical thoughts tinged with literary meaning than purely literary
ideas, for at every recurrence they seem only just expressible, like feelings in dread
of being pressed to death by speech. When poetry approaches as closely as this,
it divorces itself from all hope of connection with music proper, simply because it
possesses to a pre-eminent degree that quality of "suggestiveness" that Bridges
knew to be the soul of his art, which is lost when the "means" are "enforced".  
*Quartets* – 2nd section called *The Dry Salvages*:

*to apprehend*

The point of intersection of the timeless
With time, is an occupation for the saint—

There are cases where attempts to set good poetry to music, and attempts to write
poetry to good music have failed. Reflection on such episodes have led to some
useful conclusions: The poetic qualities most desirable to a composer in search of
a text are: simple imagery, short phrases, dramatic construction, sense of
spontaneity, and a feeling about the whole. Although able to stand by itself, it will
yet be simultaneously enhanced when buoyed up by an accompaniment in keeping
with its emotion and enhance by the "theatrical" element unavoidable in song. It is
nonsense to suggest that only second-rate poetry is suitable for musical treatment. "Words for music" differ in kind, not in degree, from the self-sufficing work of a poet. There is nothing second-rate about the lyrics of Shakespeare, Burns, or Shelley. But a poem for music, like the poetry in verse-drama, should sink into the mind as easily as easy conversation. Its meaning and beauty are inseparable.

The work of John Donne is intractable, for the musician because he argues with puckered brow. We peel the meaning off his poems again and again, And still another skin will form with all the persistence of a bewitched and inexhaustible onion. Nor so the poem for music, which must yield up core and all and at a blow. The ideal poem of this kind must have a "toughness" that will prevent its withering in this forcing-house atmosphere.

Isaac Watts, whose "O God our help in ages past", is a perfect example of the sort of poem that fits naturally with music. Each line of a lyric should be self-contained, or "end-stopped". This rule applies to song-writing in general. The phrase of a melody also denotes a literary division, for each musical phrase is a vehicle for a line of verse. The long sentence, winding from line to line, is awkward to accommodate in musical phrasing.
### Characteristics of music-poetry interface

- **Distinction between** āpālamadhuram and ālochanāmrta (yielding instant sweetness and meditative sweetness) (Kunchan Nambiar)

- Music vibrates in the memory after sweet voices die (Shelley)

- Music and poetry are like sisters who excel apart but are most excellent when joined. (Purcell)

- Sense of rhythm and sense of structure bind poetry and music together.

- When the two come together it is “felt in the blood and felt along the heart.”

- Poems can be set to music for a typical verse and the music repeated, or the music of the poem can be through-composed.

- The inner core of poetry full of musical thought to be seen deep enough, resulting in seeing musically” Carlyle).

- Seen poetry, evocative poetry, poetry whose music is inextricable from the meaning, poetry which has yielded itself up to the reader for reflective experience, ‘tough’ poems with multiple layers of meaning that cannot be easily peeled off (Donne) are unsuitable for setting to sung music

- End-stopped poems, with clear-cut phrases simple imagery, short phrases, dramatic construction, sense of spontaneity, and a feeling about the whole are easy to set to music.

- Masters of verbal music among poets need not be musicians; a master of music like Browning may write argumentative rather than lyrical poetry.

- Eliot treating his themes exactly like a musician, suggesting, interweaving, and developing them in a form which is almost fugal; making them more like musical thoughts tinged with literary meaning divorces his poems from all hope of connection with music proper.

### Combinatory model types

- ālochanāmrta type poems are better recited (or even read) rather than sung
- āpālamadhuram type poems lend themselves to set to music.

- The lingering effect of the music in poetry is testable.

- The joint effect of poetry and music is testable.

- Poems like those of Sarojini Naidu, Changampuzha, and other rhythmic poems can be selected to test these e.g., Palanquin-bearers, Kāvyanartaki.

- Comorandel Fishers, Moon so round and yellow, Stepping by the woods etc. (Manuel and Alex), and experimental composition of Kāvyanartaki (Manuel and Vasantha) in Rāgamālīka – attempts at through-composition.

- The inner light experience preceding poetry and art may be analysed – perhaps it is difficult to test empirically.

- Some of the ‘tougher’ examples may be tried with B.Ed. students with English elective. At school level, poems of Wordsworth, Ullur, RajarajaVarma may be better recited than sung.

- SINGLISH type and singable Malayalam poems are identified.

- Plenty of singable poems can be identified from school texts satisfying these conditions – March-type, ballad-type, straight-imagery type

- Eliot model is too tough for school children. But it is an excellent example for trying out with B.Ed. students.
8. MUSICAL MODELS OF LESSON PLAN AND CURRICULAR DESIGN

The sonata and fugue are musical models which have been used by some eminent experts in the west for lesson planning. These models have also been used in literary criticism for analysing spatial novels like those of Joyce and 'spatial' poetry like those of T.S. Eliot. The three major stages in Sonata structure - of Exposition, Development and Recapitulation and the sub-components therein - establishment of the theme in home key, modulation leading to the contrasting key, the promise what is to happen before we return to the home key in Exposition; meandering of the music through foreign keys, feverish activity, revelation of the potentials hidden in the theme, use of devices such as inversion, augmentation, diminution, unity and diversity, logic and passion fuse at white heat to create much out of little – and such other marvellous techniques in the stage of Development; a transition passage leading to the home key when the tension abates, the psychological climax, reconciliation of the opposing keys, the triumph of the home key shown in the Recapitulation, the final Coda (tail) providing the summary – all these could be used in any artistic lesson planning involving dramatic tension-building and resolution. It could be particularly valuable in certain types of lessons combining history and literature. In fact an attempt was made to plan one such dramatic unit, but it was considered not feasible to try it out in our school conditions, especially in a multifaceted project such as the one taken up by the investigator.
(a) Sonata Model for Wasteland

Hence it was decided to try the sonata-fugue model with the B.Ed. students who have taken Elective English taking T.S. Eliot's Wasteland as the theme. This theme was found particularly appropriate because Eliot is said to have designed this poem on the model of a structure with fugal elements added. Most of the students who have studied this poem and even lecturers teaching it have found this poem difficult and even frustrating because they could not see the musical design underlying the poem. In this type of literature, the author seems to throw in the ideas in a haphazard manner, sometimes darting from one point to the other, without any cogency, literally without rhyme or reason. But there is a carefully built design underneath this apparently careless throwing in of words and phrases. The author expects the reader to collaborate with him, pick up the pieces, and reconstruct it in his mind. Merely reading the poem and the notes in a linear manner will not help the reader to appreciate the hidden art in this work. Hence a lesson plan was got prepared in a Literary Analysis Club with the supervising teacher as Chairman and chief analyst and the investigator as a key member.

A kind of model in notes, bringing the text and notes in parallel form so that the reader can reconstruct the heavy sonata form and fugal form which Eliot borrows from music and carries into poetry. It is heavy, multi-dimensional, multi-allusive, multi-dimensional, multi-language matter condensed using summarising codes and symbols. The full model tried out with B.Ed. English students is presented in Appendix- II.
It is actually a heavy model of literary material used in heavy musical architectonic. It is testable only with mature persons strong in English. The main hypothesis here is that if this is studied as mere literature without understanding the musical architecture, the study itself could be a wasteland experience. But when a reader enters this with the musical form background, it can be an excellent example of Animation Level 2, pointing out to Animation level 3, culminating in Om Shantih Shanth Shantih. If this happens the earlier frustrating, hellish experience in reading Eliot, can turn into a heavenly experience.

The fugal principles, canon, counterpoint are other dense application points for musical forms guiding lesson plan. The principle of theme and variations are excellent models for lesson planning as well as for then teachner improvising during the lesson.

The Indian forms like Ragam Tanam Pallavi, Structures of pieces – Pallavi, Anupallavi, Charanam followed by decorations, the North Indian structures like sthayi, antara and other variations discussed under khyal and drupad offer rich possibilities. The structures are elaborately discussed in Chapter IV. It would consume an enormous amount of space to rewrite them here and structure them as lesson-planning models. The sonata and the fugue have been accepted in progressive western circles as excellent models for lesson planning. This study should at least sensitise the possiblity of using Indian structures, especially the deep structures in music as models for lesson planning.
(b) Polyphony, Canon, Counterpoint, and Fugue

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<tr>
<th>Musical analysis</th>
<th>Educational application</th>
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<td>(i) POLYPHONIC SINGING implies 'multiple voices', blending of different tunes at the same time by different voices to produce pleasing effects. Harmony and polyphony are related, but the main difference is that in harmony, the vertical integration of notes into chords are emphasised, while in polyphony, two or three melodies are moving horizontally, and blending beautifully. Choir masters sometimes find it a torture to make the part singers to hold out a single chord of blending notes in a harmonious way because each part member is holding a single note consciousness. Some even try to hold on to their note without being 'distracted' by others singing different notes. But in polyphonic singing each part singer is concerned not with a note, but with a patterned melody which carries him/her through merrily, but the piece is so arranged that while the melodies are moving forward horizontally, if a vertical line is drawn at any point one would find a concord, or a passing dischord, which will be duly resolved. Polyphonic singing presents a gestalt of gestalts. Hence it is easier to teach polyphonic singing than to teach harmony. Polyphonic singing is not alien to Indian tradition. Many folk songs have a polyphonic texture, one melody cutting across another or a refrain.</td>
<td>The discipline of different people singing different things and yet combining them into a unity can much more easily be brought about in Indian conditions than the teaching of harmony. This practice is found in many folk songs and in some film songs. The film Chemmin provides some typical examples. It is not a difficult problem to get pupils to practise such polyphonic pieces from Indian tradition or from specially designed school texts from Western culture.</td>
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<tr>
<td>(ii) CANON: Canon literally means 'law'. In music it refers to the round song set according to a law or rule. It is the easiest way of presenting polyphonic singing to children. A song is constructed in such a way that the different lines sung together will harmonise in terms of musical tone, though the words will be different. In a three line round song, first all three groups, A, B and C sing it together. Then each group sings as a separate unit and continues the song, repeating it three or four times. When Group A has completed line 1, B commences in line 1 while A proceeds to line 2; when this is done A sings line 3 simultaneously with B singing line two and C singing line A. This round goes on and on. After A has finished the determined number of rounds, one would hear B.</td>
<td>More important educationally and socially is the 'polyphonic educational transaction' in the school – children performing different patterned activities designed in such a way that the 'teacher-conductor' can bring out the larger unity embedded in them.</td>
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A large number of round songs are selected with 2-line (Row row row your boat), 3-line (Music alone shall live) and 4-line (Roses von Fra) sequences. The pedagogical potentials of the songs in terms of rhythm, embedded mathematics, language components, values, international understanding were also considered. They were to be tried out with school children, training.
(iii) COUNTERPOINT AND FUGUE:
In the fugue unity and shape are given to the texture through presenting a motive in one voice and restating in another, the first voice continuing with counterpoint (point-for-point). Maximum effect is produced when this repetition is done by all the voices at different times and pitches. Fugue (from Latin fuga) implies flight - the flight of fancy, the flight of the theme from one voice to the other. A fugue is a contrapuntal composition for three or four voices, the theme pervading the entire fabric, now in one voice, now in another. The fugue unfolds the sense of mounting, always maintaining continuity and a sense of organic growth using inversion, augmentation, diminishing and other techniques such as 'tightening'. The heightening of the tension brings the fugue to a climax. Then the tension is released and the work comes to a close.

Fugue is compared to an animated conversation on a chosen topic between three or four people. The conversation is never dominated by any single speaker, the participants discuss the theme on equal terms. (Leichtetritt, p. 62)

Before proceeding with the application of fugal principles in education, it is necessary to train some educational personnel. Some bright pieces of music building in the fugal principles were chosen for trying out with training college students. Educational applications of an educational motive presented in one voice, then taken up by another while the first voice gives a support or a counter melody and carrying on further flights, always maintaining some order were attempted. A mathematical principle is selected, put into music, intersected with Malayalam meter and extended applications tried in other disciplines. The last point has great implications for educational democracy.

<table>
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<tr>
<th>South Indian Musical Forms</th>
<th>college students and youth groups</th>
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<tr>
<td>Devices like Yati have implications for lesson writing and presentation. South Indian Musical forms like Kirtanam with Pallavi, Anupallavi, Charanam and decorations, Ragam, Thanam, Pallavi and North Indian Khyal and Dhrupad and their components can also suggest ideas for lesson planning</td>
<td>Some trial models written. Judging Panel felt that it made sense.</td>
</tr>
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9. THE DIALECTIC OF THE GROUP AND INDIVIDUAL

There has been a complaint that in many respects our people work as individuals rather than as a group. Some consider this even as a national character. Group games like football and basketball can help to develop group spirit. But most of the schools in Kerala have very little playground space. Many schools present the picture of basketball grounds, with the goalpost, ring and board broken, indicating that once the game was instituted with a vision, but has become defunct in the school for decades. Young people (school pupils or outsiders) sometimes use this space for playing improvised cricket. The present norm is that as soon as the final bell rings the teachers and pupils quit the campus, take the crowded bus and reach home. Many pupils rush directly to the 'parallel colleges' for a further dose of the academic fare to be crammed in. If at all the school grounds exist and are inhabited in the evening, it is by a small group of pupils who stand a chance of representing the school team and competing with other schools. Sometimes youth groups from outside fill in the vacuum. Each pupil attends school with his individual academic destiny (in many cases, a bleak destiny) in view.

Pupils sit in class groups. But it is not a natural interacting group. They sit in rows for nearly five hours a day, facing the teacher and the blackboard, concerned with their 'individual destinies'. Once a week, all the pupils may stand in a formation and salute the flag, stretch their hands forward in token of having taken the pledge. If songs are sung it is usually by a select few. Socialisation does take place in the school, but by the petty group games improvised by the pupils themselves during the 'teacher-free' hours. Many schools curtail even this activity, which is seen as a sign of 'indiscipline'. The lunch interval is functionally reduced
from one hour to 30 minutes, after which pupils are expected to sit in the class and read (or pretend to read). The pupil leader will stand in front and write the names of pupils who talked during what should have been their legitimate lunch break, and promptly hand over the list of pupils who dared to socialise to the teacher.

In this school environment, desertified in terms of social or group-interaction, music can be considered as a potential resource to serve as an oasis, attempting to re-establish healthy group spirit and social relations. But then the picture of South Indian music as individual, elite, and meant for the few, stands in the way, and has resulted in establishing new elitisms instead of a democratic spirit and participation of all. The fact that our culture includes mass singing programmes of simple works like kirtanas and bhajans and a large repertoire of folk songs is overlooked. In the early kuravai songs all the members of the community are expected to participate.

In Western culture, the practice of singing national anthems and certain other essential songs by the entire group present is a common phenomenon. M.B. Srinivasan trained relatively large choirs (by Indian standards) to sing even classy Indian pieces. So it is not an impossible target to aim at singing for all in the ordinary Indian school.

In actuality the singing even of the national anthem, the school song and other essential songs by all does not exist in practice. The possibility that all the pupils can be made to sing together does not seem to have been taken into consideration even as a theoretical proposition. In most schools, the formality of closure with the national anthem is easily satisfied by requiring all pupils to stand up at the ringing
of the final bell, while two or three pupils sing it on the public address system. In the assembly also the same practice of two or three singing for the whole school is the norm. The group ethos of the whole group of hundreds, and even thousands in unison is a natural phenomenon in many western countries. Later a thrilling episode on this dimension reported by the famous Hungarian composer Berlioz is reported. This is not an impossible target. Some training colleges have succeeded in doing it. Only rarely has this been attempted in whole schools.

In planning the whole school or even a class group to sing together here are some practical propositions – about the range, the tessitura (the sub-range in which most of the song is sung), the rhythm, the tempo etc have to be considered. Once these measures have been taken even informally, many of the problems now considered impossible would vanish.

Apart from group songs from the point of view of social ethos, there is the educative use of group singing. In the early church, there was antiphonal singing – the priest or leader of the service singing one part and the choir and congregation responding. Some innovators in music pedagogy – like Violinist B. Sasikumar – have attempted to convert even scales and exercises into the question-answer form. Even musical dialogue form – as in the Sound of Music – is thinkable. With the use of round songs and polyphonic music natural for Indian conditions, it is possible to establish group singing and simple musical dialogue as educational devices.
10. FOLK AND ELITE IN MUSIC AND EDUCATION

(a) General

Many people understand the folk and the elite as a dichotomy. The elite are supposed to be superior people in every way. People in the superior strata of society or the most wealthy or the leisured classes are also thought to be the repositories of culture. The poor, the depressed and those at the lower rungs of organised society are thought to be lacking in culture. To give just one instance, an author who has done extremely good work in collecting the folk songs of Kuṭṭanāḍ, and who has also shown extreme sensitivity to the suffering and exploitation-proneness of the tillers of that area (the granary of Kerala) has added a statement which not only a socialist, but even a liberal democrat in the West will question. He considers intellectual power as the asset of the savarṇas (upper classes) and labouring capacity to be the asset of the avarṇas (lower/working classes). The combination of these two factors contributed to bringing up Kuṭṭanāḍ as one would cradle and nurture a child. Some carry over this analogy to draw the inference that only the upper classes can appreciate and produce good music. These prejudices are carried over into general education too. The teachers in many schools producing low results try to defend themselves saying that with this 'low stuff' this is all that can be produced. The role of the environmental factors, and cases of successful interventions bringing out the best even among the downtrodden are conveniently forgotten.

It will be argued in this section that in the world of music the top-most musicians have been above this prejudice. Creative musicians of the upper and lower
classes have interacted to promote the evolution of culture including music. During certain periods in history, the lower castes have been custodians of music. In recent times, as well as in earlier transitional periods, wandering music enlighteners have played an important role in rejuvenating not only musical, but even general culture. Distinctions like desi and marga (folk and classical) do not necessarily imply low and high. In fact many classical musicians built on folk music as the foundation.

While the credit of writing *The Ramayana* goes to the sage Valmiki, the pioneering role in popularising it among the masses goes to Rama's own children, Lava and Kusa, born and brought up in the forest ashram and leading the life of minstrels. The key role of music in education was noted two thousand years ago in early Tamil bardic culture represented by the *pāṇar* and other wandering minstrel and dance troupes. In medieval and early modern India, a variety of peripatetic musicians and poets of the secular and bhakti schools cultivated various Indian languages, the earliest being recorded in Tamil from about the seventh century. While the secular schools in most of the languages got lost for want of continuity of tradition, the *bhakti* schools were ensured of perpetuation. Since they displayed a sense of equality and mass appeal, they went a long way in unifying Indian culture taking in elements from different local and regional cultures. Even during times when caste divisions fragmented institutionalised religion, nothing prevented Lord Siva and other deities from taking roles among the most disadvantaged communities and show how precious they found the song, flute and drum worship of the *bhaktas* from all strata of society.
Amir Khusro represented a blending of Indian and Persian cultures through poetry and music. The poet-musicians who display a mystic and universalistic tendency, using the ordinary language of the people had an appeal cutting across religion and even language. Surdas and Kabirdas are perhaps the foremost in this category.

In medieval Europe it is represented by the troubadors, jongleurs and other troupes. A convention of integrated presentation of music dance and poetry, recorded in Ancient Greece, cultivated in the extreme south two millenia in the name of muttamizh embodied in the epic written by the Chera prince-poet [langō Adigal], were disintegrated after some centuries. They tended to be reunited in the temple arts, though the tendency of the disciplines to separate themselves was also seen. The Kerala temples and folk festivals still preserve aspects of the original form of sopana sangitam combined with folk drumming practices of the most elaborate kind expressing calls – to the people, to fellow artistes and to the deities and combining speech and emotions of high complexity. They are also combined with other arts – literature, dance, drama, drawing (kalamezhuttu).

Folk songs and dances include tunes that were originated by some unknown person or group, and have been sung and modified over the years by countless more. Folk music has survived because it is functional. Folk music is part and parcel of any culture. Advanced cultures in the modern sense, who have overcome earlier habitants of a place have gradually succeeded in replacing or modifying beyond recognition several aspects of the earlier cultures, but folk songs show an
extremely high amount of persistence and indestructibility. Later, when the dominant cultures are firmly set and have no more to fear from the earlier cultures, it takes interest in the earlier folk music and even tries to revive it. This can be seen very clearly in the United States, where understanding the song and culture of early ‘Indian’ tribes is as much a part of musical studies as of social studies. The USA, being a new nation, attempts to find one facet of its identity through a new bend of a multiplicity of folk songs. The deeply moving Afro-American Negro Spirituals is a feature of which American culture is proud. The USA was originally formed of people emigrating from several European nations and hence the dialogue between the folk music of these nations was part of the nation-building activities. Ethnomusicology is a discipline which American universities and culture groups promote assiduously. Russian music historically had close relations with folk music. When the Soviet Union was formed, ethnologists, ethno-linguists and ethno-musicians played a great part in collecting the folk music of different Union Republics and of the 'nations' (tribal groups) in order to build the larger culture of the USSR. Soviet historiography of music gives much importance to the part played by the serfs and ordinary folk. Russian texts on learning music and its grammar profusely include folk songs (narodny pesni) as illustrations and exercises.

Most Indian historiographers tend to derive everything from 'Aryan' sources, especially the vedas. The epics, Ramayana and Mahabharata do mention other cultures, and the ‘ally cultures’ are reported favourably. Aryan supremacy is a framework of the historiography, but Sri Lankan music, and Ravana as a master of music are noted, even though they represented the opposite camp.
It is not easy to define folk music, but the definition by the International Folk Music Council (1954) has the highest acceptance:

Folk music is the product of a musical tradition that has been evolved through the process of oral transmission. The factors that shape the tradition are: (i) continuity which links the present with the past; (ii) variation which springs from the creative individual or group; (iii) selection by the community, which determines the form or forms in which the music survives. [It excludes composed popular music because] it is the refashioning and re-creation of the music by the community that gives it its folk character.

The range of folk songs are very wide: epics and stories, ballads, betrothal and wedding songs, dirges, cradle songs and work songs.

(b) Travelling Folk Musicians and Popularisers

Folk art, music and folklore has been developed in developed and nurtured in specific localities. But some types of folk music and folk stories have been found in places separated by long distances. It appears to be a wonder how this diffusion took place. While most people lived and died within a few miles of where they were born, there were a few people who travelled widely. Peripatetic minstrels and strolling players of musical instruments wandered across the whole of their native country, and even across alien country. The wandering minstrel had a stock of melody which would attract the clientele in different areas. He would also pick up songs and folkloric material during his travel. The most influential among these were able to enter the service of noblemen and during these periods, they prospered.
The troubadours and minnesingers of Europe, the South Indian minstrels called *Panar* [who had mastered the scales and modes (pan) of early South Indian music and carried a string instrument called *yazh*], dance-drama artists called *kuttar* and instrumental artists called *kodiyar*, *vayiriyar*, wandering through the fivefold land - hill, forest, fertile plain, sea-coast and desert unified diverse cultures ad paved the way for classical music to develop. They diffused culture across regions.

Folk song cannot be called romantic, but served the ends of romantic composers. Folk music embodies the national character of a country's musical thought. Great composers have been influenced by folk music. Haydn has used Croatian themes in his compositions. Composers who have made even greater use of folk tunes include Dvorák, Bartók, Grieg, Smetana, De Falla, Vaughan Williams, Rimsky-Korsakov. Among several incidents evidencing this the case of the Czech composer Dvorak regularly attending the Kickapoo Indian medicine shows and visiting Minnaha Falls during his stay in America alone is cited.

These experiences evoked the thought in him of writing an Indian ballet or opera. While at the falls Dvorak asked for a piece of paper and a pencil, but as only the pencil was at hand, he scribbled some notes on the broad white cuff of his shirt, and later used these as the theme in the second movement of his Sonatina, Opus 100, dedicated to his children, and still later rearranged by Fritz Kreisler for violin solo under the title of *Indian Lament*. On his return to Spillville from this trip he made notes and sketches for work he intended to complete in New York – and this was the set of “*Humoresques*”.

Wagner holds that *the Folk* must of necessity be the Artist of the future. This realisation would help to break the intellectual egoism of the artists of the Present who from their lofty pedestal, deem that "the Folk" are the raw uncultured masses and what they call the rabble. He proceeds to define the Folk. ...
However, neither you nor this rabble do we understand by the term, *the Folk*: only when neither Ye nor It shall exist any longer can we conceive the presence of the Folk. Yet even now the Folk is living, wherever ye and the rabble are not; or rather it is living in your twin midst, but ye wist not of it. Did ye *know* it then were ye yourselves the Folk; for no man can know the fullness of the Folk, without possessing a share therein.... He, therefore, who *not* from this conglomerate of pride and barrenness, thus not from the *statutory rights* which hold this composite together, but from the fullness and depth of naked *human nature* and the irrefutable right of its absolute need, draws force for resistance, for revolt, for assault, and openly avows this plain necessity in that he gladly suffers every other sorrow for its sake, and, if need should be, will even give up his life, *—he, and he alone, belongs to the Folk*: for he and all his fellows have a common *Want* (Leichtetritt pp. 95-97).

There are hundreds of instances to show that the top Indian classical musicians *drew* from the living sources of folk music. Thyagaraja was inspired by a Kerala Marar’s rhythms and his *Entaro mahanubhavalanthatigi vandanamu* is not only a classic in Telugu composed by one who had been brought up in the cultural centre of Tamil Nadu. It is also an inspiration to the educators who wish to tap the hidden resources of the folk. Ilango calls *desi* and *marga* as *vettiyal* and *poduviyal* (king’s court style and common people’s style). He profusely draws from the folk songs of the five-fold land and makes them classical. He puts the most intricate musicology calling for high intellect in the Shepherdess’s dance music as well as in the court danseuse’s music.

Dalai Lama Dukoom Tulkoo, the spiritual head of the Tibetans and the President of International Conference on Holy Music (Bangalore, April 2000) argues that the folk music of all communities are similar in its basic substance. He adds that the sparks of traditional holy music urge the humanity for harmonic unity — different voices, but one music and different efforts, but one mission — a unique prelude for global understanding.
11. MUSIC FOR NATIONAL INTEGRATION AND INTERNATIONAL UNDERSTANDING

(a) The Use of National Songs in Education

Bharat as a spiritual entity (punya bhūmi) is more than a physical territory. It was developed in the mind of sages and wandering pilgrims, promoted through travelling minstrels and accepted by even ordinary people who did not move out of their locality. But the India which emerged as a free state in 1947, even though with serious mutilations on the sides, has clearly demarked physical territory, people and governance guided by a Constitution drafted fifty years ago. Statehood is a political category whereas nationhood is an emotionally integrative category built through common experiences, common sentiments, common sacrifices and so forth. Purely constitutional provisions and administrative fiats cannot make a nation. Many countries have built nationhood through significant common experiences, often through ‘blood, toil and tears’. There has been a tonal side to the American Revolution and to the nation-building struggles in many countries. Music has in fact created nations. In the Indian freedom struggle too, music was a powerful rallying, unifying force cutting across castes, classes, language groups and creeds.

Even after independence, it is necessary to maintain this emotional integration of the nation, apart from the political process. It is a problem for all newly emerging nations. Multicultural nations have an additional problem in maintaining the national identity. Some comparative educationists have analysed two distinct strategies in such situations. The ‘nationists’ advocated that one language should be preferred and made the basis for emotional integration of the nation. The
'nationalists' advocated that since people's sentiments are tied to the grassroots, all the languages must be cultivated to develop the national spirit, and integrated in a delicate manner so that fissiparous tendencies may not assert themselves.

India is a multi-cultural, multilingual nation. It is much easier for a unilingual nation to develop a self-identity than for a multilingual one. In India, too, there have been and there are 'nationists' who have a simple prescription. Cultivate one language as the symbol of national aspirations. Specifically they would say that Sanskrit or Hindi alone should be enthroned in this integrative seat. But nationalists would say that even two millenia ago, the wandering sages knew not only Sanskrit but also the regional languages to communicate with the people. Tirumular, the mystic shepherd saint of Tamil Nadu has said, "Pandits are those who can find the ideas embedded in all the eighteen languages". Even recently, reacting to the strong views of some 'nationist' Hindi protagonists, some Members of Parliament from Tamil Nadu expressed sentiments bordering on sessionism. Then Vajpayee was provoked to quote from the Tamil nationalist poet Bharatiyar (Demographers would be interested in the fact that at the time the poet sang, undivided India, including Pakistan and Bangladesh had only 30 crores of people):

muppatu kōdi mukamudaiyā| enin moympuravondudaiyā| - ivāl
ceppu mozhi padinejudyaiyā| - enin cindanai onduaiyā| ,,,,,,enka| tāy

| She has three hundred million faces  
| She has one strong uniting back  
| She has eighteen spoken languages  
| Yet she has one unified thought |
| - *Our Mother.* |
The nationist in India would be happy that there are plenty of songs in Sanskrit and Hindi broad unifying though which every sensible person would be glad to accept. Some of the passages from the Upanishads are extremely democratic and universalistic. The passage:

| asado mā sad gamayā | From falsehood, lead us into truth |
| tamaso mā jyotir gamayā | From darkness, lead us into light |
| muryo mā amrtam gamaya | From death lead us into immortality |

is a cosmopolitan prayer in which people of every religion can join without reservation. It has been sung by several great souls, and the one which is rendered in the Kanada film Malayamārutam is particularly enchanting.

When South Indian composers like Muthuswami Dikshitar and the Kerala prince-poet-musician Swati Tirunal chose to compose mostly in Sanskrit, it must have been on the 'nationist' model. But they have composed in the ordinary spoken languages too. 'Bhāṣāmālīka' (garland of languages) is also used in some of their compositions.

A strong tendency which has emerged in recent decades is that of collecting a number of national and cultural songs in different Indian languages. A historical event which is not usually recorded in educational documentation is that this collection was originally made by stalwarts of the previous generation like Kumara Gandarwa. Whenever Gandhiji used to come to Delhi, he would request this devoted singer to come and sing national and devotional songs in various Indian
languages. Later the music maestro became Director of the Gandarva Mahavidyalaya in Delhi. The Centre for Cultural Resources and Training under the Direction of Premlatha Puri catalysed these multiple national song pattern into NCERT through the Teacher Education Wing, then under the Headship of Dr R.C. Das. Later, NCERT alone took it over, with attractively printed books and audiotapes. Music directors of the calibre of M.B. Srinivas helped to develop ways in which large choirs could sing these songs in unison without losing the Indian nuances.

But then, it would be worth checking up whether the original spirit in which the pioneers initiated this multiple national language singing in a quiet way is kept up; whether these songs are sung by all the pupils, or by a select handful; whether they are sung as a performance/showpiece, or as participation in the spirit of national integration; whether those who sing the songs in languages other than their mothertongue understand the meaning and full import of the songs.

(b) Music for International Understanding

Today we are moving towards globalisation. There are some wary statesmen and political analysts who think that globalisation policies at the political and economic levels could result in the hegemony of certain super-powers and the less developed nations, “The South” could get exploited. It is not necessary to go into the political aspects of the matter in the present study. We are interested in an educative, non-exploitative globalisation, in which cultures from different nations, and different cultures within the same nation will be shared on terms of equality.

There is the danger that if we start from the syndrome of politics, particularly power politics, even the educational plans towards building international understanding
may fail to take off on a plan of equality, genuine sharing and mutuality. On the
other hand if we start with the educational vision of the one world mooted by
educators and statesmen, even the political processes in globalisation could get
raised to higher levels and exploitative tendencies minimised. In this context we
may recall the contributions of the greatest souls which India has produced.
The poet Rabindranath Tagore, who made music central to his educational
scheme, aspired to break all ‘domestic walls’ not only within the country but
between nations too. He wanted the whole world to share the varied cultures
‘under one nest’. Even during the freedom struggle, when Mahatma Gandhi was
demanding the British rulers to quit India, he bore no hatred towards alien cultures.
He said: “I will keep the doors and windows of my house open. I want the wind of
all cultures to blow into my house. But I will not be blown off my feet”.

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<tr>
<th>Music as international understanding medium</th>
<th>Educational steps</th>
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<td>Music offers a cost-effective, value-intensive opportunity with high production potential and minimal hazard of exploitation. Already several great souls from our country as well great thinkers and cultural leaders from other countries have given the lead in this dimension. The life history of many great composers and evolutionary history of many musical genres show cross-fertilisation of musical ideas (Vide Ch IV and Inspirations from Great Musicians infra). Globalisation measures taken in the best sense, information and electronics revolution offer free opportunity of exchange of musical ideas as never before.</td>
<td>Providing opportunity to listen to music of other cultures. Singing music of other cultures and in other languages – meaning also should be provided – guidance should be given for getting the right pronunciation – the cultural context of the music should be explained – an elementary theory of the other music should be given – what harmony, polyphony, flying from part to part imply.</td>
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<td>A person who can understand and appreciate the music of different nations has already become an international citizen in the world of music. In this kind of international passage, neither passport nor visa is needed.</td>
<td>Brief understanding of our own music is necessary to explain it to a foreigner – those who can’t sing or play can use audio-tapes. Plenty</td>
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</table>
But there are a few hazards. Some novices may sing the pieces of another nation very badly. The use of audio and videotapes can help to reduce this danger. In amateur singing there could be shortcoming, and tolerance in receiving alien utterance (as in the case of languages is also part of the game). The greater danger is in stereotyping music of another culture in terms of only one of its (not necessarily the best) forms e.g. understanding Western music only as rock music.

of resource materials should be prepared.

Encounter of musicians from another culture.) The encounter of the East and West is taken up in the next subsection.

(c) Encounter of the East and West

“East is east and West is west, and the two will never meet.” This was a refrain current some decades ago. But it is not true. The wandering musicians seem to have cross-fertilised musical ideas, modes, instruments and forms not only within a nation, but also across nations and even across continents. Today several TV channels are available so that the East can hear the West and the West can hear the East. Special encounters of performing artists have been arranged so that artists of different nations can master the music of another nation. After seeing and hearing Balasarawati’s dance to the song Krishnā ni bēganē bārō (rag Yaman kalyani) a young American named Jon Higgins fell in love with Indian culture. He mastered Carnatic music to the level of performing on the best platforms in India and recording several audiocassettes. This gifted musician died prematurely in an accident.

Similarly Indian artists like the late Handel Manuel, Raja Ramanna have mastered Western music sufficiently to play before then best Western groups. Zubin Mehta
son of Mehli Mehta, the best Indian violinist of then 1950s has become the conductor of the New York Philharmonic Orchestra.

More interesting from our point of view is the fact that artistes like Menuhin, Ravi Shankar, M.S. Gopalakrishnan can play the styles of both Western and Indian and can be ambassadors of culture. Menuhin and Ravi Shankar particularly have given a number of performances designed for the East to understand the West and for the West to understand the East.

One of the best examples of East-West mutual understanding in music education came in the form of an encounter organised four decades ago by the Ministry of Culture headed by Humayun Kabir and attended by the best musicians and musicologists from India and the West. The dialogue: *Music East and West* has been published by the Indian Council for Cultural Relations (1966).

12. **INSPIRATIONS AND INSIGHTS OF GREAT MUSICIANS**

The famous Hungarian composer Berlioz, who later inspired by the cultural regeneration of Hungary through music was inspired by the spirited mass singing at the Anniversary Meeting of the Charity Children in St Paul's church. He entered, disguised as a churchman and saw

Nine almost vertical amphitheatres, each having sixteen rows of benches, had been erected in the centre of the building, under the cupola” children dressed in new clothes occupied their seats with sober joy ... And deep was the emotion when, the six thousand five hundred little singers being at last seated, the ceremony began.

Following a chord on the organ, there arose a gigantic unison the first psalm sung by this extraordinary choir:

All people that on earth do dwell.
Sing to the Lord with cheerful voice.

It is useless for me to attempt to give you an idea of the musical effect; the strength and beauty were to those of the best choirs you have ever heard ... But when we came to the psalm in triple time by J. Ganthamy, an old English master (1774),
sung by all the voice to the accompaniment of trumpets, kettle-drums, and organ under the shattering effect of this glowing hymns, so grand in its harmony and in its expression as noble as touching, nature reasserted its right to be weak, and I had to make use of my music-copy, as Agamemnon did of his toga, to veil my face... A great nation, which possesses the instinct of great things! The soul of Shakespeare lives in it! (Berlioz, In Jacobs, P.52).

In the case of Beethoven, the intercourse with creative spirits took the place of the formal education he never had.

The Bible, Homer, Plutarch, Dante, Shakespeare, Goethe and Schiller were his spiritual companions. His knowledge of philosophy gave his music an impetus of unequaled power. Dramatic and tragic elements were balanced and jubilant outbursts of joy - between these extremes the breadth and majesty of contemplation... Yet this superman always retains warm human feelings; emotional experiences of the ordinary person, intensified, purified, and ennobled. Here lies the secret of Beethoven’s universal appeal. Throbbing life, no mere intellectual art...Beethoven’s hero is man- not the nationally specified individual man, but every man... No other musician, not even Bach or Mozart, no poet, be it Dante, Shakespeare of Goethe could speak the language of universal brotherhood with the power of Beethoven. [He was the] spiritual offspring of French revolution... proclaimed new freedom from traditions and conventions... cosmopolitan appeal... art animated by his individual artistic beliefs. (Leichtettritt, p. 117)

To Bach figured-bass was the whole foundation of music, played with both hands in such a manner that the left hand plays the notes written down, while the right adds in consonances or dissonances, the result being an agreeable harmony to the glory of God and justifiable gratification of the senses.

After breakfast every day Haydn sat down at the piano and improvised until he had lighted upon ideas which served the purposes he had in mind: and these ideas he straightaway committed to paper.
Mozart's friend Nierentshek characterises the genius as “Creativity in action”

Mozart always wrote so effortlessly and swiftly that at first glance the process might seem hasty and casual: and moreover he never went to a piano while he was composing. When he conceived a work, his imagination allowed him to see it all before him, clear and full of living force. His great mastery of composition gave him an overall view of the entire harmonic structure of the piece. Hardly any alterations or erasures are to be found in the drafts of his scores. This does not mean that his works were simply flung on to paper: the work was already finished in his head before he ever sat down to his writing table.

When he was given the text of any vocal work to set, he would keep it in his mind for as long time and think it all out in his head, allowing his active imagination to have full play; next, he would fully work out his ideas on the piano; and only then would he sit down to write. Thus writing itself was for him an easy task, during which he often joked and played about. [in his later years, in the tranquil silences of night his imaginative power was kindled into the liveliest activity. At such times Mozart seemed the incarnation of musical feeling, while the most wonderful harmonies flowed from his fingers. Only someone who has heard Mozart during such hours as these knows the depth and range of his musical genius; for then it was that his spirit, free from all care and distraction, could soar upon bold wings to the highest regions of art. In such hours, when the poetic mood possessed him, there was no limit to Mozart's creativeness.

Schubert, in one sense, was an intensely active worker, for whilst drawing incessantly on his creative genius, he sought at once to perpetuate and fix on paper the full treasures of his musical fancies. When his work was over for the day, it needed but the faintest suggestion to call and wake up his sleepless spirit, as we know by the story of the Standchen. According to the anecdote, this song was written by Schubert on the back of a menu-card at a beer-garden, on a moment's inspiration after reading the poem.

Chopin’s creativity is described by his novelist friend George Sand:

His creation was spontaneous and miraculous. He found it without seeking it, without foreseeing it. He came on his piano suddenly, complete, sublime, or it sang in his head during a walk, and he was impatient to play it to himself. But then began the most heart-rending labour I ever saw. It was a series of efforts, of
irresolutions and of frettings to seize again certain details of the theme he had heard; what he had conceived as a whole, he analysed too much when wishing to write it, and his regret at not finding it again, in his opinion, clearly defined, threw him into a kind of despair. He shut himself up in this room for whole days, weeping, walking, breaking his pens, repeating a bar a hundred times, writing and erasing it as many times, and recommencing the next day with a minute and desperate perseverance. He spent six weeks over a single page to write it at last as he had noted it down at the very first. (Jacobs pp. 65-66)

Robert Schumann’s Musical Aphorisms are illuminating:

On critics: Music induces nightingales to sing, pug-dogs to yelp.

Music resembles chess. The queen (melody) has the most power, but the king (harmony) turns the scale

You must industriously practise scales and other finger exercises. There are people, however, who think they may attain to everything in doing this; until a ripe age they daily practise mechanical exercises for many hours. That is as reasonable as trying to pronounce a-b-c quicker and quicker every day. Make a better use of your time.

It is a pleasant sign if you can pick out pretty melodies on the keyboard; but if such come to you unsought, and not at the pianoforte, rejoice, for it proves that the inward sense of tone pulsates within you. Fingers must do what the head wills; not the reverse.

Art is not a means of amassing wealth. Become a continually greater artist; the rest will happen of itself.

Your mind will only become clear when form has become clear to you. (Jacobs pp. 71-73)

Liszt’s power of dealing with kings is illustrated by the well-known story of his ceasing to play at the Russian Court, because the Czar and his friends were talking, was a case in point. When Liszt stopped, an aide-de-camp came up and told him to continue, but he replied with the most dignified air, “Quand le Czar parle, tout le monde se tait.” (When the king speaks the whole world keeps silent.)

The approach of Liszt is more polished than that of Beethoven who got irritated by
some noblemen chatting while he was conducting. He stopped conducting and said bluntly “I don’t play for such pigs.”

Nicholas Rimsky-Korsakov brings out the multi-dimensional character and sensitivity of Borodin the Russian Composer.

On visiting him I often found him working in his lab which adjoined his apartment. When he sat over his retorts filled with some colourless gas and distilled in by means of a tube from one vessel into another, -- I used to tell him that he was “transfusing emptiness into vacancy”. Having finished his work, he would go with me to his apartment, where we began musical operations or conversations, in the midst of which he used to jump up, run back to the laboratory to see whether something had not burned out or boiled over; meanwhile he filled the corridor with incredible sequences from successions of ninths or sevenths. Then he would come back and we proceeded with the music or the interrupted conversation.

...Borodin, who had always given but little of his time to music and who often said ... hat he loved chemistry and music equally well, began to devote still less time to music than before. Yet it was not science that enticed him. He had become one of the prominent workers in establishing medical courses for women and had begun to participate in various societies for the aid and support of student-youth, especially women.

Dvorak was a very plain man and a great lover of nature. During his visit at Spillville a morning walk through the groves and along the banks of the river ... he particularly enjoyed the warbling of the birds; in fact he admitted that the first day he was out for a walk, an odd-looking bird, red plumaged, only the wigs black, attracted his attention and its warbling inspired the theme of the third movement of his string quartet [the “nigger” Quartet, Opus 96].
The musician Delius analyses his method in terms of a phrase of Walt Whitman: "It was long, long time before I understood exactly what I wanted to say, and then it came to me all at once." Delius also feels that studying too much can kill creativity:

People with a little talent nearly always kill it by too much learning. Learning kills instinct. It is just as dangerous as too much reflection. ... Music is an outburst of the soul. It is addressed and should appeal instantly to the soul of the listener. It is not experimental analysis like chemistry. Never believe the saying that one must hear music many times to appreciate it. It is utter nonsense; the last resort of the incompetent.... the amateur is much better without a knowledge of the science of music. When you see a lovely rose you treasure it as it is: you don't pull it to pieces to appreciate its beauty and find out where its delicious perfume comes from. So it should be with music.

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<tr>
<th>Inspirations and Insights</th>
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<td>The hungarian composer Bartok admired the gigantic unison singing of 65000 British charity children singing the St. Pauls. He exclaimed a great nation: the soul of Shakespear lives in it. Probably this inspired him to launch a mass movement in Hungary to raise the cultural level through Music.</td>
<td>The case for mass uplift through music. endorsed by Experts. For that large collections of music were made. Construct validity and consensual validity.</td>
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<td>Beethoven's language of Universal brotherhood - warm human feelings emotional experiences of the ordinary people intensified, purified and ennobled.</td>
<td>Song chosen from Beethoven and others. Eg. Brothers raise your country's anthem.</td>
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<tr>
<td>Creativity processes revealed in Mozart and Chopin</td>
<td>New perspectives endorsed.</td>
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<tr>
<td>Among Shumann's maxims the case of people practioning scales all their life is described. He compares such mastery to being able to pronounce ABC quickly.</td>
<td>This applies to the repeated drills emphasising in our schooling system.</td>
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<td>Borodin shifting from Chemistry laboratory to musical compositions and also to social service.</td>
<td>There are creative students of this type are identified.</td>
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13. MODELS FROM SCHOOLS OF MUSIC/SINGING SCHOOLS.

In Violin, the British Honeyman School starts with the easy scales for the violin (3#, 2#, 1#) and easy melodies right from the beginning. Easy scales begin with the first two strings introduce the songs very early. Children are encouraged to enter. But they can also pile up bad habits. They can be blocked by moving to deeper theories. On the other hand, Schools like Tour (French) Spohr (German) Kaizer (German) et al., go to depths from the beginning. If a person survives in the school for two or three months he rises to the very high Kreutzer attaches greater care in proceeding towards the advanced musical pieces.

There are bridge schools (which tries to connect to easy openings with depth simultaneously).

In the organ schools, Smallwoods tutor gives mechanical 5 finger exercises and all basic theory in the very beginning. Right also follows the same but proceeds to more melodious exercises quickly.

There are a number of American schools, which introduce song approach with correct fingering and note reading integrated and theory is dispersed.

Gleason's studies for the pipe organ is a master-piece of analysis of the basics and progression and drawn richly from the greatest composers. It also allows improvisations with technical study.
Russian schools of Music tend to draw examples for musical grammar and literature from folk songs, balanced with classical works. Thus, bridging folk and classic.

The American singing schools tend to integrate music with the total curriculum and the school rhythm. It is organised into themes like homes, festivals, community, seasons etc. It uses certain patterns like calls, motives, etc. It is connected with rhythms and activity among children. It permits keeping a lower performance level and higher appreciation level.

Among Indian innovators, one of the deepest schools is Parur Sundaram Iyer Violin School, father of M.S Gopalakrishnan. For children’s learning B.Sasikumar encourages creativity right from the beginning. One of the early exercises is in ensuring correct intonations in ‘Ma’ and upper ‘Sa’. ‘Sa’ ‘Pa’ assured in setting. The child is freely allowed to play in scales. If the child makes any mistake it will be one of the 36 melakartha. After this exploration stage the first raga taught is Sankarabharanam major scale and Maya malava gawla later. The approach insists on getting true tones with pure intonations before going to gamakams. In the singing, excersises combines traditional patterns (vaythari) into new forms. It also combines all the three tempos in the same excersise. It converts scale excersises into Question-Answer Model with two groups.

In all the great models of the best composers invitation to enter music, at the same time, building into the basics of music and building into variety as well as creativity at an early stage are seen.