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# Schemas and improvisation in Indian music

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## 1 Introduction

Many years ago the Indian classical singer Ritwik Sanyal was performing at a music festival in India, in which he had planned to sing a song of his own composition in the melodic mode or *rāga* Bāgeśrī, and in a rare metrical structure (*tāla*) of 9 beats. Warming up in the green room, while the previous artist on the programme was performing on stage, he found that his accompanist on the drum *pakhāvaj* was uncomfortable playing the 9-beat *tāla*, so he instantly re-composed the song in a more familiar 12-beat metre. He then found that the previous singer was already singing Bāgeśrī. No audience likes to hear the same *rāga* twice in succession, so he re-composed the song again, in the same *tāla* but a different *rāga*. He then gave a full 40-minute performance, in which the newly re-composed song was preceded and followed by extensive melodic and rhythmic improvisation. The performance as a whole can hardly have been planned in advance, still less rehearsed with the accompanist.

How are such feats of spontaneous composition and improvisation (on the part of both musicians) possible? Nettl [1974] suggested that all music consists of a sequence of fixed structural points. If these are close together, the music is pre-composed; but if they are further apart, the performer must navigate from one to the next by interpolating blocks of material, whether spontaneously created or selected from a memory bank. This model of improvisation (which I have simplified for the sake of argument) fits Indian music well in many respects: the metrical cycle of *tāla* provides fixed temporal points for action, especially the first beat of the cycle, called *sam*; a pre-composed block, or “composition” (*bandiś*), alternates with improvised episodes; the melodic grammar of the *rāga* provides pathways from note to note and motivic material for filling space within the *tāla* cycle. But Nettl’s model (in this over-simplified form) seems a rather one-dimensional concept of performance, as if the performer needs only to think about one thing at a time—now I’ll do this, now that—and needs only to make decisions about how to get to the next “structural point” at the beginning of each “block”. Intuition would suggest that the

process of performance is more complex than this, with multiple parameters in play at any one time, and decisions being made at many moments along the way between structural points.

A number of studies have suggested that improvisation in Indian classical music is less spontaneous than it appears to be, and is almost always reliant on extensive memorised materials and procedures [Meer, 1980, Slawek, 1998, Napier, 2006, Zadeh, 2012]. But whether a singer truly improvises or not can be hard to tell, and seems to vary between individuals; some, like Sanyal, are clearly adept at on-the-spot composition. Perhaps the only way to tell that everything has not been worked out in advance, is where an improvised passage threatens not to turn out as intended, and we can hear the performer adjusting his materials in real time, in order to hit a structural point or to compensate for not hitting it. It is the ongoing negotiation of conflicting requirements and structures that makes performance of this kind particularly exciting for the listener.

This paper focusses on a performance by the singer Ritwik Sanyal, accompanied on the drum *pakhāvaj* by Ashok Kumar Tagore, recorded in the SOAS recording studio in 1988.<sup>1</sup> It represents the *dhrupad* genre of North Indian classical music, which entails certain distinctive structural and stylistic characteristics. In this genre performance begins with a long, unscripted melodic improvisation, the *ālāp*, sung with little metrical regularity, minimal percussion accompaniment, and non-lexical vocables in place of poetic text. This is followed by a pre-composed song, sung in the same mode or *rāga* as the *ālāp*, set in a fixed metre (*tāla*), with *pakhāvaj* accompaniment and song lyrics in classical Hindi. Although the song can be rendered in a very few minutes, its performance is normally extended to many times that length, through the interpolation of improvised episodes between reprises of the song's refrain. It is this process of variation (*laykārī*) that I wish to examine here. My thesis is that both the singer's improvisation, and the listener's comprehension of it, depend on the simultaneous combination of pre-existing schemas, which enable the singer to arouse, and the listener to feel, varying degrees of uncertainty, expectancy and resolution.

## 2 Interaction in Indian music

This paper describes a performance in which a solo musician, with a single accompanist, addresses an unseen, future audience via a recording studio microphone, rather in the manner of an orator pre-recording a broadcast speech.

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<sup>1</sup>The performance is presented in complete transcription and analysed in Sanyal and Widdess [2004]. This paper re-considers aspects of the earlier analysis from a cognitive perspective, with reference to schema theory. The drum *pakhāvaj* is a double-conical drum with two drum-heads, played with the hands.

Leaving aside (for the moment) a degree of interaction between the two musicians involved, the scenario seems to be that of a monologue rather than a dialogue. I wish to argue, however, that in such a performance, the sound recording represents only one, externalised side of an interaction in which the other side, that of the listener(s), is silent, internalised, and potential.

The performance of Indian classical music is often represented as a process of interaction, and the behaviour of both soloists and listeners in live concerts confirms this perception. Informed listeners are active listeners, de-coding the music as it unfolds, and they show this by physical and verbal responses. Listeners may respond to a particularly felicitous, technically impressive or beautiful moment in the performance with a physical movement of hand or head, and/or with a verbal response such as “*Vāh!*”, “*Śābāś!*”, or “*Kyā bāt!*”, all equivalent to “Bravo!” or “Wonderful!”. Clayton has observed [2007] that listeners’ physical responses often begin *before* a climactic moment has been reached, showing that listeners anticipate the resolution of musical processes.

The communicative process is not, however, limited to an externalised performance on the part of the soloist, and a largely internalised response by the audience. In addition there is an intermediary, in the form of the accompanist, playing a drum (*tablā* or *pakhāvaj*). There may also be a melodic accompanist, playing the bowed lute *sārangī* or a small hand-pumped harmonium, though neither of these instruments is used in the performance examined here. Both rhythmic and melodic accompanists provide a kind of running commentary on the soloist’s performance, which we could understand as an externalised realisation of an informed listener’s real-time internal modelling of the performance. Thus the soloist does not interact with the accompanist alone, but with the expectations of all listeners including the accompanist.

Three types of musical expectation have been distinguished [Huron, 2006] (pp.231, 235) [Widdess, 2011]: *veridical expectations*, where the listener has heard the same music before and knows precisely what comes next; *schematic expectations*, where the listener can predict what is likely to come next on the basis of familiar melodic, rhythmic or formal patterns; and *dynamic expectations*, expectations based on the perception of patterns emerging as the music unfolds. These categories undoubtedly overlap, and all depend on repetition and memory. In the case of North Indian classical music, where “improvisation” is emphasised more than the repetition of pre-composed pieces, schematic and dynamic expectations may be more significant than veridical.<sup>2</sup> In particular, I suggest that expectations are generated by *cognitive schemas*, whether

<sup>2</sup>But see Napier’s discussion of the use of inherited material in performance [2006]. My comments refer exclusively to North Indian classical music; veridical expectations may be more significant in the case of South Indian classical music, where composed items are more important than in the North.

these are learned through cumulative listening or generated dynamically within a single performance.

### 3 Schemas in music

A *schema* has been defined as “[a mental structure] formed on the basis of past experience with objects, scenes or events and consisting of a set of (usually unconscious) expectations about what things look like and/or the order in which they occur” [Mandler, 1984]. A schema consists of a number of variables or categories in a certain relationship. For example, in English the verb *to write* evokes a schema in which a person guides an implement across a surface so as to leave a trace, usually representing language [d’Andrade, 1995] (p.123). Person, implement, surface, trace and language are all variable categories, and the schema articulates a spatial and temporal relationship between these categories. Schemas<sup>3</sup> may be culturally nuanced: in some cultures the “writing” schema includes drawing pictures, in others it refers only to representations of language (ibid.).

Music seems to be composed of a large variety of specialised schemas, some of which may be explicitly formalised as music theory, and others not [Snyder, 2000] (p95). They consist of categories including pitches, beats, rhythmic durations, contours, themes, chords, stylistic elements etc., between which they establish static or temporal relationships: pitch intervals, scales, key relationships, melodic contours, modes, metrical or formal structures, styles and genres etc. They can be hierarchically combined, and generate expectations. Cognitive schemas are not immutable, and can be modified to accommodate new situations and experiences. Their existence in listeners’ perception of music can be empirically verified, as Rosner and Meyer showed in a pioneering study [1982]; and their significance in Western art music has been discussed [Gjerdingen, 1988, Gjerdingen, 2007, Byros, 2009, Byros, 2012]. For schemas in Indian music, see Widdess [2011]; Zadeh [2012].

Schemas in music include both relatively fixed patterns (“scripts”, “formulae” or “riffs”) and highly flexible structures (“plans”, “templates”) [Schunk and Abelson, 1977]. The former tend to be relatively small-scale and to be embedded within the latter, but there is no definitive boundary between the two types. Schemas of both types can be combined in innumerable ways during composition and improvisation, thereby constructing extended and complex pieces or performances. Thus a jazz performance, for example, might combine a harmonic schema (chord sequence) with a melodic script (the song tune), a temporal schema (metre), pitch schemas (key, scale, mode), a verbal script (lyrics), a formal template (song—solos—song), and a stylistic schema in-

<sup>3</sup>In Greek the plural of *schema* is *schemata*, but since this is not always recognized by English speakers as a plural, I use the English plural form *schemas*.

cluding aspects of sound, playing/singing techniques, ornamentation, rhythm, melodic conventions etc. that are typical of jazz. To consider these as separate schemas is no doubt an analytical approach: to the performer and listener, at the moment of performance, they appear as a single blended entity.

I want to suggest that performance of Indian classical music can involve combining schemas of different kinds at the moment of performance, in a relatively unpremeditated way, and that this is what we mean when we call such music “improvised”. These schemas include melodic, text and rhythmic schemas, and both fixed scripts and overarching plans. I will suggest that this combination of schemas is possible because some are sufficiently flexible to be adapted to others that are less flexible. It is not that the combination of A and B has to be mapped out in advance to make sure that they fit; rather that B can be modified to fit A, or vice versa, as the combination unfolds. It is also possible to overlap schemas so that their boundaries do not coincide; but such overlap may create the expectation of subsequent reconciliation. This process of schema combination enables communication and interaction between soloist, accompanist(s), and silent but active listeners.

#### 4 The schematic basis of performance

The performance discussed here is based on a pre-composed song, in the *rāga* (mode) Multānī, and in the *tāla* (metre) Cautāl. Figure 1 shows the first phrase of the song, occupying the first metrical cycle, which can be repeated; most of the ensuing improvisation is based on this first phrase. It establishes a number of schemas that remain in play throughout the performance: principally (1) text, (2) *tāla* and (3) *rāga*.

- (1) The text, *Tūhi bidhātā lokapati [namo namo]*, “I worship thee, the Ordainer and Lord of the Universe”, is a script that can be varied only minimally in improvisation, by the selection and repetition of groups of words. As far as possible in the heat of improvisation, words are kept intact and not reduced to separate syllables. Words and groups of words can be repeated, however.
- (2) The metrical schema (*tāla*) is a cycle of 12 beats, of which the first, called *sam*, is the most emphasised (it is in effect both the first and last beat of the cycle). The rotation of the cycle is indicated in performance with hand gestures—claps and waves—according to a conventional pattern that divides the cycle into 2-beat segments (shown above the staff in figure 1). These gestures assist the drum accompanist, the audience, and the singer himself, in keeping count of time. They form an embodied metrical schema, a template within which an infinite variety of rhythms can be created.

- (3) The melodic mode or *rāga* determines
- a scale (here a non-diatonic heptatonic series with  $b2$ ,  $b3$ ,  $\sharp4$  and  $b6$ );
  - a pitch hierarchy: here 1 and 5 are strong,  $b2$  and  $b6$  weak; and
  - ascending and descending pitch sequences: here  $b2$  and  $b6$  appear in descent only – and in this phrase, not at all.

sam  
↓

clap      wave      clap      wave      clap      clap  
X            0            2            0            3            4

Tū - - - hi bi - - dhā - tā - - lo - ka-

Rāga Multānī

Figure 1: First phrase of composition in *rāga* Multānī, as sung by R. Sanyal

After singing the composition, the singer improvises on it, periodically returning to the beginning of the composition. In this style of improvisation, called *laykārī*, the main schemas remain in play: *rāga*, *tāla*, and text. What changes is the relationship in time between these schemas. The *tāla* and tempo remain constant, but there is an increase in rhythmic density, that is, the number of notes and syllables per beat, so that both the melody and the text pass by more quickly in the improvisation than in the original composition. Each period of improvisation must end after one or more cycles, on beat 1, the *sam*. The drum accompanist improvises simultaneously with the singer, and must also conclude on beat 1 (*sam*), accurately predicting the end of each improvisation. Figure 2 shows an example of *laykārī* improvisation by Sanyal, based on the first phrase of the composition shown in figure 1.

Is *laykārī* improvised, in the sense of being composed at the moment of performance? Some singers reduce the risk of error by calculating and memorising it in advance; others say that improvised *laykārī* sounds more spontaneous and effective, and it is therefore worth the risk of missing the *sam*. Ritwik Sanyal belongs to the latter viewpoint. When I asked him how he improvises *laykārī*,

sam  
↓

clap      wave      clap      wave      clap      clap  
x            0            2            0            3            4

Tū hi      bi dhā tī      lo - ka - pa - ti na mo - na mo Tū hi bi dhā - lo - ka pa - ti lo - ka - pa - ti lo - ka

phase 1      2      3

pa - ti Tū hi bi dhā tī lo - ka - pa - ti na mo bi dhā tī lo ka pa ti na - mo - na - mo bi dhā - tā bi - dhā tī bi - dhā - tā

1      2      T1      T2      T3

Tū

Figure 2: Example of Sanyal’s *laykārī* improvisation on the Multānī composition

however, he could not specify any particular technique: he said that one learns it by imitating one’s teacher, and “when I am in the right mood, it works”. Analysing examples like this one, however, enables us to suggest some of the compositional techniques involved and to identify the important role of schema combination and re-combination.

## 5 *Tihāīs*

The most critical part of an episode of improvisation is its ending, since this must be successfully timed to end with a return to the beginning of the composition and an emphatic arrival on *sam*. Before that point, the singer seems to have almost limitless freedom; but the challenge is to time the end of the “free” part of the improvisation in such a way as to arrive effectively at *sam*.

In most of Sanyal’s improvisations, the last few beats of each episode are constructed in the form of a *tihāī*. This common feature of Indian music, probably originating in dance, comprises a rhythmic motif repeated three times, ending on or just before *sam*. The motif for a *tihāī* can be of any length, but it must begin at the correct point in the metrical cycle in order to end

at *sam* after three repetitions, with or without a rest between repetitions. At the same time the rhythmic motif must be combined with a suitable melodic motif, derived from the *rāga*, and with a segment of the song-text; indeed the rhythm of the text segment being sung at the time may suggest to the singer the rhythm of a *tihāī*. *Tihāīs*, I suggest, are particularly revealing about the processes of real-time schema combination in improvisation.

Figure 3 shows a sample of *tihāī* patterns used in this performance, lasting in total 1, 1.5 and 3 beats (longer ones, up to 5 beats, are also used in this performance: see Sanyal and Widdess [2004] (p263)). In each case, the singer needs to sing the first syllable of the song, namely *Tū*, on the concluding *sam*, in order to return to the first phrase of the composition (see figure 1). These *tihāīs* therefore all end just before *sam*. In the 3-beat *tihāīs*, the rhythmic motif occupies 1 beat, repeated 3 times (T1, T2 and T3 in figure 3). This rhythmic motif is used on three occasions in this performance, but each time it is combined with different chunks of text, and the melodic content is also different each time. The text-chunk has to be a valid word or group of words from the song-text, and the melody has to conform to the structure of the *rāga*. The three-beat *tihāīs* shown here exemplify a rhythmic script—a small-scale, relatively fixed formula—conforming to a template common to all *tihāīs*. But the rhythm, melody and text of each realisation of this three-beat *tihāī* belong to independent schemas that are combined at the moment of performance.

A *tihāī* can be spontaneously adjusted in performance. For example, if too few syllables remain in the current “chunk” of text, some may have to be repeated (e.g. the first syllable of *u-tā-ra* in cycle 31); or if the singer mistimes the start of the *tihāī*, it can be discreetly stretched or compressed to fit the time available. The singer can even subvert the schematically-induced dynamic expectations of the listener (and drummer) by deliberately arriving early or late for the *sam* (this is called *atīt* or *anāghāt* respectively).

## 6 *Laykārī* improvisation

The example of *laykārī* improvisation shown in figure 2 occupies two complete metrical cycles and culminates on *sam* of the third cycle; each line of notation here represents one cycle. In each cycle, the improvisation is structured in three phases, numbered 1–3 in figure 2, of which the third is occupied by a *tihāī*. This three-fold division of the cycle is something Sanyal often does in longer *tāls*, though he was unaware of it until I asked him about it; he tends to take a different text chunk in each phase, and here he also situates breaths between them. But the phase divisions do not correspond to equal divisions of the cycle: the three-phase schema is flexibly mapped onto the metrical schema, showing that they are independent schemas, and that the three-phase schema can override the inflexible structural boundaries inherent

Tihāīs

*sam*  
 ↓

Clap pattern		clap	clap	clap	clap	
Beat no.	8	9	10	11	12	1
Length in beats:	Cycle no.:					
1	21					lo- kalo- kalo- ka- Tū
1.5	22					pa- ti pa- ti pa- ti Tū
3	24					pa- ti pa- ti pa- ti Tū
	31					ra- ta bhā- ra u- u u- tā- ra Tū
	37					-ta lo- ka- pa- ti na- mo na- mo Tū
						T <sub>1</sub> T <sub>2</sub> T <sub>3</sub>

Figure 3: Sample *tihāī* structures in Sanyal's Multānī performance

in the metrical schema.

The improvisation in the first phase of cycle 1 comprises two short exclamatory phrases, separated by rests, as if sounding a warning to the drummer (and listener) that something complex is about to happen. The first exclamation begins in the last beat of the preceding cycle, overlapping the cycle boundary. The second phase, at beat 5, introduces an iambic rhythm which transgresses the boundary, marked by the dotted barline, between two-beat segments at beat 7. This beat is denoted by a silent wave in the embodied metrical schema, and is an important structural point in the *tāla* cycle, the beginning of the second half of the cycle. Sanyal normally marks this beat with a new syllable, but here he allows the iambic rhythm to flow across it. The third phase has a similar boundary violation at the 4th clap beat (beat 10), and its text chunk implies a continuation into the next cycle.

We need only examine the *tihāī* at the end of the first cycle here to see the complexity of the challenges that the improvising singer faces in combining the different schematic elements in play. The *tihāī* motif is based on the word

*lokapati*, but when we arrive at the end of the cycle we are only half-way through this word (*lokapati lokapati loka - ?*). If the singer wished to “come to *sam*” at beat 1 of the next cycle, he would have to leave the word unfinished and sing *Tū*. More elegant is Sanyal’s spur-of-the-moment solution: he starts a new phase of melodic and rhythmic improvisation on *sam*, and allows the word [*loka*]-*pāti* to overflow into the new metrical cycle, displacing the expected syllable *Tū* to the third 16th (an example of *anāghāt*: see above). Postponing the expected conclusion on *sam*, he continues his improvisation for a second cycle.

The disjuncture here is also reflected in the melody. The melodic script of the *tihāī* (F♯ Ab G) is interrupted after the Ab by the new improvisation beginning on Eb: Ab is normally followed by G in this *rāga*, and this is the only occurrence of the interval Ab – Eb in the entire performance (it would normally be considered a grammatical error). The expected resolution on G is postponed to the third 16th, at the syllable *Tū*. At this point both text- and *rāga*-schemas are resolved at the same time, but not in synchrony with the metrical schema; and the G is as much part of the new phase of improvisation, beginning two 16ths earlier, as it is the conclusion of the *tihāī*. Thus melodic and textual schemas are allowed to overlap each other and the rigid boundary of the metrical schema.

This tension between melodic, textual and metrical schemas remains to be resolved at the end of the second cycle, and is effected by a second *tihāī*. This time the *tihāī* occupies five beats, and is based on the three-syllable word *bidhātā*; it uses the same melodic script—F♯ Ab G—as the previous *tihāī*, leading to the first note of the song melody, F♯. But here the three iterations of the *tihāī* formula are not identical: T3 is longer, and is also melodically and rhythmically different from T1 and T2. Here we have an example of the spontaneous adjustment of a *tihāī* to ensure that the singer arrives correctly on the *sam*, on the correct beat, the correct syllable (*Tū*) and the correct note (F♯ – the first note of the song). Here all the schemas in play are brought into alignment once more.

Figure 4 analyses the progressive unfolding of the *tihāī*. On line 1 it shows that if the *tihāī* were continued in the most straightforward way, it would end correctly on *sam*, but on the wrong syllable (*-tā* not *Tū*) and on the wrong pitch (G not F♯) (the cross-head notation in figure 4 shows the inferred continuation). In order for the syllable *Tū* to be sung on the *sam* beat, the *tihāī* needs to end just before *sam* if it is not to be truncated. Accordingly, Sanyal brings in T2 half a beat earlier than might have been expected. But now the syllable *Tū* is set to fall half a beat too soon, if the pattern of the *tihāī* so far is continued to the end. T3 is therefore stretched to fill the remaining two beats of the cycle (figure 4, line 3). In T3 the rhythmic pattern changes to

fill the space (its three successive notes becoming progressively shorter), and the melody also changes so as not to prolong the weak pitch  $A^b$ , which would be a grammatical mistake in this *rāga*. At the same time the *pakhāvāj* player plays a loud *tihāī* of his own as if to keep singer on track; but this *tihāī* starts on beat 9, so it is different in length and structure from the singer's *tihāī*, coinciding with it only at the end point. (The accompanist has foreseen the conclusion on *sam*, but not the structure of the *tihāī*; rather he has assumed that the *tihāī* would begin on beat 9, as it did in the previous cycle.)

The figure displays a musical score for a performance in Multānī. It consists of three staves. The top staff is the vocal line, with lyrics 'bi - dha - ta' and 'Tu' written below the notes. Above the vocal staff, 'clap' is written above beats 9 and 11, and 'sam' with a downward arrow is above beat 1. The middle staff is the accompanist's line, and the bottom staff is the pakhāvāj line. A legend indicates that notes with an 'x' are 'inferred continuation'. The pakhāvāj line shows three distinct rhythmic patterns labeled T1, T2, and T3.

Figure 4: Spontaneous modification of *tihāī* in Sanyal's Multānī performance

The singer successfully adjusts his *tihāī* as it unfolds to conclude on the correct beat, syllable and pitch, simultaneously with the accompanist, and in fulfilment of our metrical and other expectations. At this point, the fixed boundary of the metrical schema overrides all other schemas, which are adjusted to bring them into synchrony with it. It is at moments like this that expert members of a live audience would be likely to say “*Vāh! Śābās!*”, or indicate by silent movements their anticipation and appreciation of the musicians' successful arrival at *sam*, and their resolution of the tensions caused by allowing schemas to slip out of synchrony earlier in the improvisation.

## 7 Conclusions

I argue that, in Ritwik Sanyal's *laykārī*, the physical *tāla*-gestures (shown at the top of each example) embody a schematic plan of the metrical cycle that maps and structures everything that happens within it. What happens is that schemas controlling melody, rhythm and text, are combined not only

sequentially, as ready-made chunks or blocks, but also simultaneously. This requires their mutual adjustment in real time as the combination unfolds, more flexible schemas (including melodic contours, rhythmic motifs, *tihāīs* and text chunks) being adjusted to less flexible ones (principally the *tāla* cycle itself).

This model of improvisation would help to account for the kind of unpremediated performance that I described at the start of this chapter. But we need not assume that those performers who rely more on memorized material are any less reliant on schemas. As Treitler (following Bartlett) argued [1974], memory recall in music is a reconstructive or generative process, and Rubin [1995] has shown that “combined constraints”, including rhythm and melody, are among the means by which memorised text is recalled or reconstructed in oral performance. Schemas are equally important for listeners to form an understanding of what is heard, whether by recognizing schemas that they already know, or by perceiving dynamically the schematic structure of music as it unfolds, and thereby participating in the interactive process of musical communication. I suggest that empirical and analytical study of the schematic structure of orally composed and transmitted music, and of processes of schema combination, would illuminate our understanding of phenomena that we imprecisely characterise as improvisation.

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