Indian Rhythmic Systems as Sources of Inspiration for Western Composers

Tomáš Reindl

IT is well established that Indian classical music in both its North Indian (Hindustani) and South Indian (Carnatic) forms uses highly elaborate and sophisticated rhythmic systems. Western musicians and composers have long benefitted from Indian rhythmic concepts, from the enriched experience of rhythmic feeling available in metric cycles (*tāla*) of different lengths and structures, intricate work with phrases and their combinations in Carnatic music, the sound and the playing technique of North Indian *tabla* drums, rhythmic recitation using special syllables (*bol*, *konnakol*), among others. Even more, these concepts have inspired and continue to inspire innovations in rhythmic creativity; in this article, I will provide an extensive sampling of these inspirations.

[2] From the beginning of the 20th century, top Indian artists began to appear in the West, from Inayat Khan & the Royal Musicians of Hindustan in 1911 to Rabindranath Tagore shortly thereafter, and later on the Uday Shankar dance troupe (Farrell 1997, 144–167). The first books presenting Indian music to Western audiences appeared nearly simultaneously, including the pioneering *The Music of Hindostan* by Fox Strangways (Strangways and Henry 1914). Not surprisingly, contact with this culture soon attracted the interest of Western composers, at that time still limited by romantic rhythmic clichés despite radical changes in the harmonic language.

[3] The young Olivier Messiaen was among the first composers to find vital suggestions towards new rhythmic phenomena in this contact. In 1924, in the *Encyclopédie de la musique et dictionnaire du Conservatoire* (Lavignac and La Laurencie 1921), he discovered a table of 120 *deśi tālas* ("provincial rhythms") that were collected in the thristeenth century treatise *Sangīta Ratnākara by* Śārangadēva (Śarṇgadeva 1978). These are ancient Indian rhythmic patterns no longer used in musical practice (Rowell 1992, 207–214).[1] The term *tāla* in North and South Indian classical music primarily represents a rhythmic cycle, i.e., a framework within which musical events take place, as we will discuss below. Messiaen,

1. These are one hundred and twenty rhythmic cycles ranging from one (adi-tala—marked as No. 1 in the list of deśi-tālas) to thirty (simharanadana—No. 35) counts.

however, did not understand the *deśi tālas* as cycles, but treated them in his own way. He derived from this material several rhythmic techniques, including added value (either by extending a note with a dot or by adding another small note), irregular augmentation/diminution, decomposition/reassembly of rhythmic formations, the importance of prime numbers, the chromatic scale of durations and so-called non-retrograde rhythms (Van der Walt 2007, 18).[2] For him, at that time, the table of *deśi tālas* was the only, very limited source of information about Indian music theory. Back then, it was unthinkable for anyone in the West to study this tradition in more depth, let alone learn to play any Indian instrument. Today, by contrast, in an age of unlimited possibilities for studying non-European cultures, we witness in ever more ways how the compositional thinking of today's composers can be influenced by encounters with the systems of Indian music.

[4] For composers such as Messiaen or Philip Glass, the contact with Indian rhythm was not only of casual interest but became the crucial impulse for the development of their characteristic compositional techniques. This is true as well for the great Czech composer Miloslav Kabeláč, whose work for percussion instruments became internationally known and appreciated (Nouza 2010).[3] In addition, Indian approaches to percussion was a fundamental impulse for the development of his distinctive musical language.

BASIC FEATURES OF TRADITIONAL INDIAN RHYTHMIC SYSTEMS

[5] Let us now explore typical techniques of Indian rhythm, highlighting those features that have inspired and will continue to inspire composers:

2. Non-retrograde rhythms (Messiaen's term) are mirror-symmetrical rhythms. The composer sought a kind of abolition of the perception of time by "reading" non-retrograde rhythms simultaneously from the front and back towards the midpoint, which symbolizes eternity.

3. Miloslav Kabeláč (1908–1979) was one of the greatest Czech composers of twentieth century. The main focus of his work is in eight symphonies, but he was also the first Czech composer experimenting with electronic and electroacoustic music in 70's. At the same time, he was the first Czech composer writing for percussion instruments too. He was also deeply interested in non-European music; his first contact with Indian music was through attending a performance of Uday Shankar's ensemble in Prague in 1935. It was a breakthrough experience which changed completely his attitude to percussion instruments and at same time it deeply influenced his rhythmical thinking. Later, in the 1960's, he collaborated with the French ensemble Les Percussions de Strasbourg. He dedicated to them three compositions from which the *8 Inventions for percussion* became internationally known; they were later used by the great American choreographer Alvin Ailey for dance performance.

1. Metrical frame (*tāla*)
2. Phrase "building kits"
3. Augmentation and diminution: successive and simultaneous presentations
4. Additive and subtractive processes
5. Indian percussion instruments and their playing technique
6. Recitation of rhythmical syllables or numerals

Each technique will now be considered in detail, with corresponding examples.

Metrical Frame (*Tāla*)

[6] The term *tāla* is used in both Hindustani and Carnatic music theory. It refers to metrical cycles or frames of different length (Kippen 2020, 243).

[7] On top of these cycles, often very sophisticated compositions or improvisations unfold. In the case of Indian music, in some cases we could literally speak of bimetric structures (Tichý 2014, 55), which means that on the top of one fixed meter – *tāla* – there is another layer with variable metrical units (Gottlieb 1993, p. 34). This top layer in certain points coincide with the main counts of the *tāla*, especially in the points called *sam*, *tālī*, or *khālī*.

[8] A typical example from North Indian classical music is a threefold cadential resolution to the first beat (*sam*), called *tihāī*, exemplified in Table 1.[4]

[9] In this structure, we can see the triple repetition of the statement *Dha Dha te te Dha* arranged in such a way that the last stroke of the phrase meets the first beat of the *tāla*.

[10] This was an example of the most elementary *tihāī*; in practice we often find much more elaborate variants. For instance, an extensive threefold composition in which the statement contains another smaller *tihāī* is called a *chakradar* (Kippen 2005, 196).

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	1
Dha	*Dha*	*te*	*te*	*Dha*	–	*Dha*	*Dha*	*te*	*te*	*Dha*	–	*Dha*	*Dha*	*te*	*te*	*Dha*
+				2				o				3				+

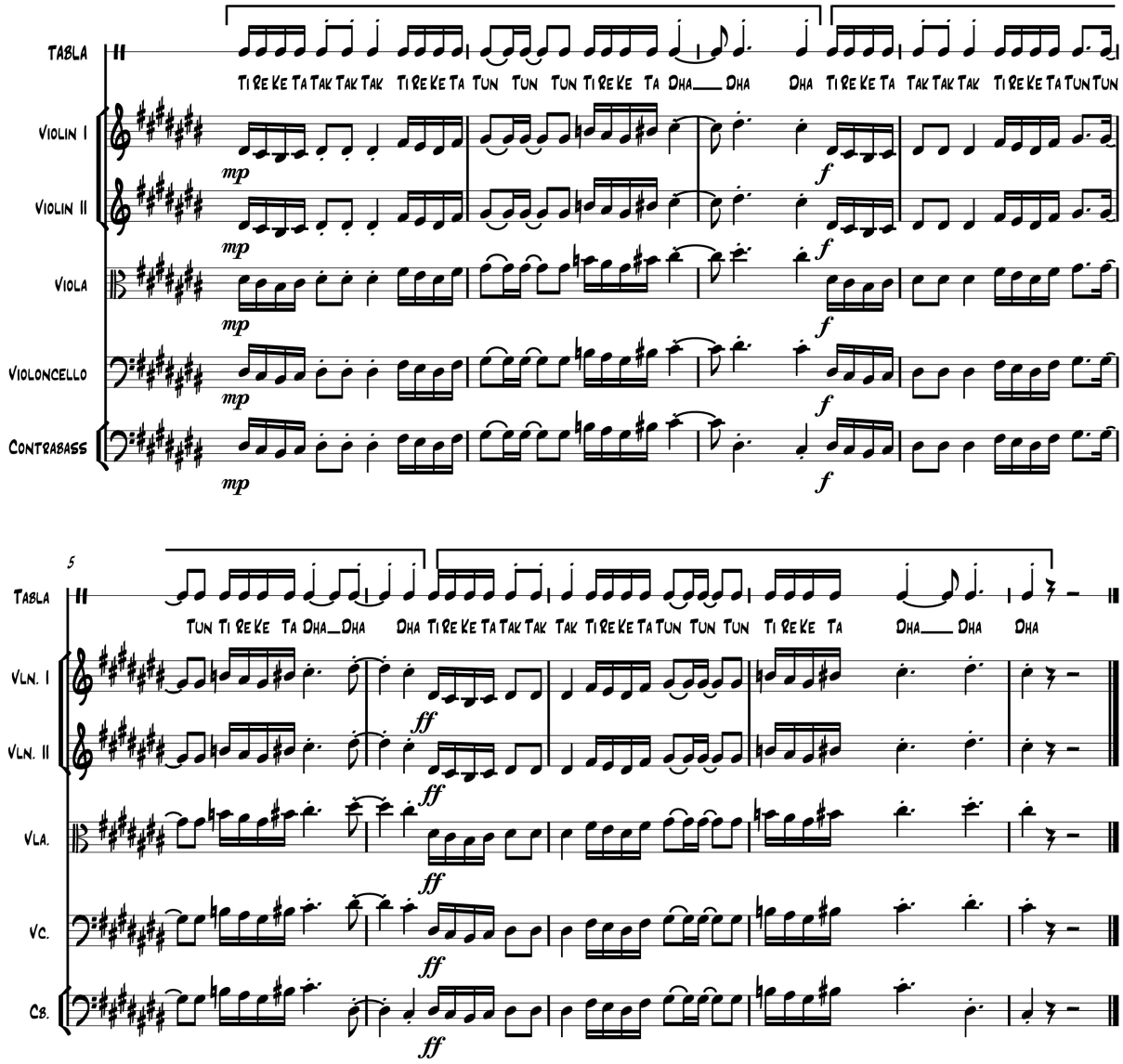
Table 1. Example of a *tihāī*.

4. In the table, the main points of the *tāla* are indicated with the symbols "+" for *sam*, "2" and "3" for *tālī* and "0" for the *khālī*.

[11] A process inspired by *chakradar* is utilized in the work of British composer Jonathan Mayer.[5] His composition *Dissecting Desh* is basically a small concerto for sitar and *tabla*, emerging from the usual form of *raga* performance involving improvisation by soloists. The concluding section of the piece (Example 1) is made up of a *tihāī* formed by triple repetition of a rhythmic statement (bracketed) over the 4/4 bar so it finishes on the downbeat. The repeated material itself consists of three parts based on the threefold repetition of "*tireketa*," followed by three longer strokes, cycling through "*tak tak tak*," "*tun tun tun*" and "*dha dha dha*" in different lengths.

[12] In this case the traditional structure of Indian music was taken and arranged for full symphonic orchestra; the excerpt shown in Example 1 gives only the string section. Note also the shape of the melody, which follows the development of the phrases; there is also an increase of dynamics with each repetition.

5. Jonathan Mayer (*1975) is a London-based composer and sitar player. He is a son of the India-born composer John Mayer (1930 – 2004).

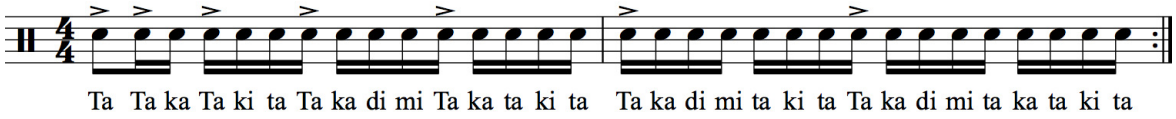


Example 1. Jonathan Mayer: *Dissecting Desh*.

Phrase "Building Kits"

[13] We can find systematic applications of the combination of rhythmic phrases of different lengths in both North and South Indian styles. In the Hindustani *tabla* solo repertoire, this principle is applied to create variations in *kaida* type of compositions; we can also find its use in constructions of some *tukras, chakradars, or gintī* (counting) forms, known from *kathak* dance, among other examples (Gottlieb 1993). However, the most sophisticated implementation of phrase sequencing appears in Carnatic music. Phrases of different length (*jāti*) are chained one by one on top of the fixed metrical frame *tāla* (Reina 2016, 35).

Ta – Taka Takita Takadimi Takatakita Takadimitakita Takadimitakatakita



Example 2. Carnatic *jāti* phrase arrangement

[14] The basic Carnatic rhythmic building blocks (*jāti)* are:

1: *Ta*
2: Ta ka
3: Ta ki ta
4: Ta ka di mi
5: Ta di gi na tom
7: Ta ka di mi ta ki ta
9: Ta ka di mi ta ka ta ki ta

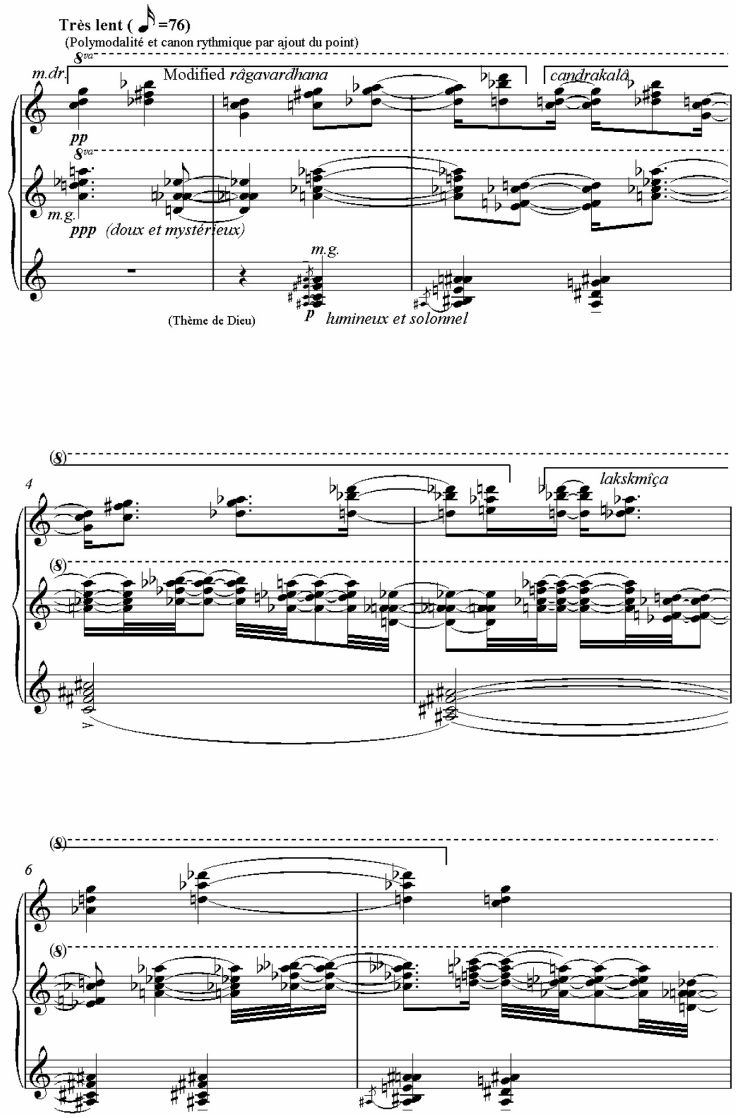
[15] For example, we can combine these phrases in the sequence of 1, 2, 3, 4, 5, 7, 9 on top of a basic cycle of eight beats (*ādi tālam*) and it will fit exactly to one "round" of the *tāla* (see Example 2).

[16] In addition, we can rearrange the order of the phrases in any way without being "out of *tāla*," so several new rhythmical structures can be derived from one initial configuration. We can also carry out further operations on the *jāti* phrases, including replacing notes by silences, increasing the density of notes by doubling the speed, stretching or compressing (see paragraphs 18–26: "Augmentation and diminution"), etc. Moreover, the *jāti* can be applied to another beat subdivision, for example to triplets, quintuplets, septuplets, or nonuplets (Reina 2016, 21).[6]

[17] Many examples of the use of this technique can be found in the work of contemporary composers, including my own compositions; particularly interesting examples of such phrase sequencing are in the work of Olivier Messiaen (1908 – 1992), despite the absence of references to the Carnatic system or to modern Hindustani *kaida* forms in his music. In his piano piece *Regard du Fils sur le Fils*, the fifth movement of the cycle *Vingt regards sur l'enfant Jésu* (1944), we can see combinations of ancient Indian rhythmic patterns from the already mentioned table of 120 *deśi tālas* (Messiaen 1998, 331). For instance, on the top staff of Example 3a, Messiaen uses a combination of three *deśi* rhythms: *rāgavardhana* (rhythm No. 93 from the original list), *candrakalā* (No. 105)

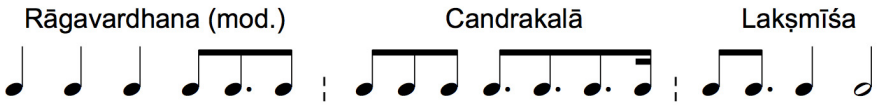
6. These subdivisions are called *gati* in Carnatic music.

and *lakṣmīša* (No. 88); the rhythmic sources are shown on Example 3b.[7] In the excerpt, the rhythms are set above two rhythmic layers in the other staves which have completely different metrical structures, within the notated meter of 2/4 (Van der Walt 2007, 28).



Example 3a. O. Messiaen: *Vingt Regards sur L'Enfant-Jésus - V. Regard du Fils sur le Fils*.

7. *Rāgavardhana* rhythm is used here in a modified form; the original version from the *deśi tāla* list is:



Example 3b. *Deśi tālas* in Messaien (Example 3a, first staff).

Augmentation and Diminution: Successive and Simultaneous Presentations

[18] The core of Carnatic rhythmic practice is based on an idiosyncratic and highly sophisticated method of phrase processing, involving in particular processes of stretching or compressing, in traditional terms *augmentation* and *diminution*. It can happen in both linear and non-linear versions.

[19] For example, here we apply different forms of stretching to the traditional Carnatic 5-beat *Tadiginatom* phrase:

a. Linear augmentation – pauses are put in between notes evenly, for example:

Ta di gi na tom (5 beats)

Ta – di – gi – na – tom – (10 beats)

Ta – – di – – gi – – na – – tom – – (15 beats)

b. Non-linear augmentation – the phrase can be warped by putting pauses irregularly, at certain points of the phrase only, for example:

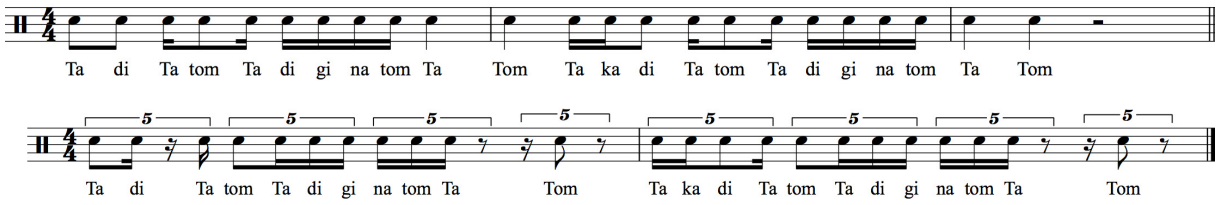
Ta di – gi na tom (6 beats)

Ta – di – gi na tom (7 beats)

Ta di – gi – na – tom (8 beats)

Ta – di – gi – na – tom (9 beats)

[20] Augmentation and diminution can be presented as a *successive* process, where each version of the rhythm is altered to follow some pattern of growth or decay. In Indian percussion music, a successive presentation often takes this form: the percussionist starts playing in one resolution (for example, in a straight eighth note pulse) and then moves to the same material modulated into a higher density of pulses (for example a triplet or quintuplet pulse), without loss of connection with the original metrical matrix (*tāla*).

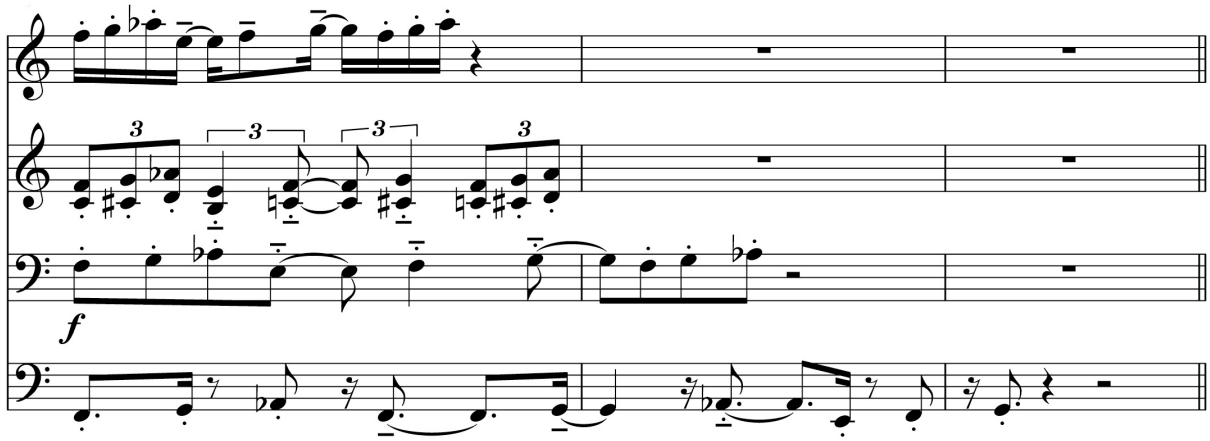


Example 4. Carnatic modulation.

[21] We encounter this successive mode in Hindustani *kaidas* where phrases are modulated from the basic resolution (*barābar*) into triplets (*āri*), or sometimes even into quintuplets (*kuāri*) or septuplets (*viāri*) (Gottlieb 1993, 39). However, the process occurs in its most sophisticated form in Carnatic music, where this technique is called *gati bhedam* (Reina 2016, 45). The principle is demonstrated in the Example 4, where the original sixteenth note phrase (*chaturushra gati*) is modulated into quintuplets (*khanda gati*).

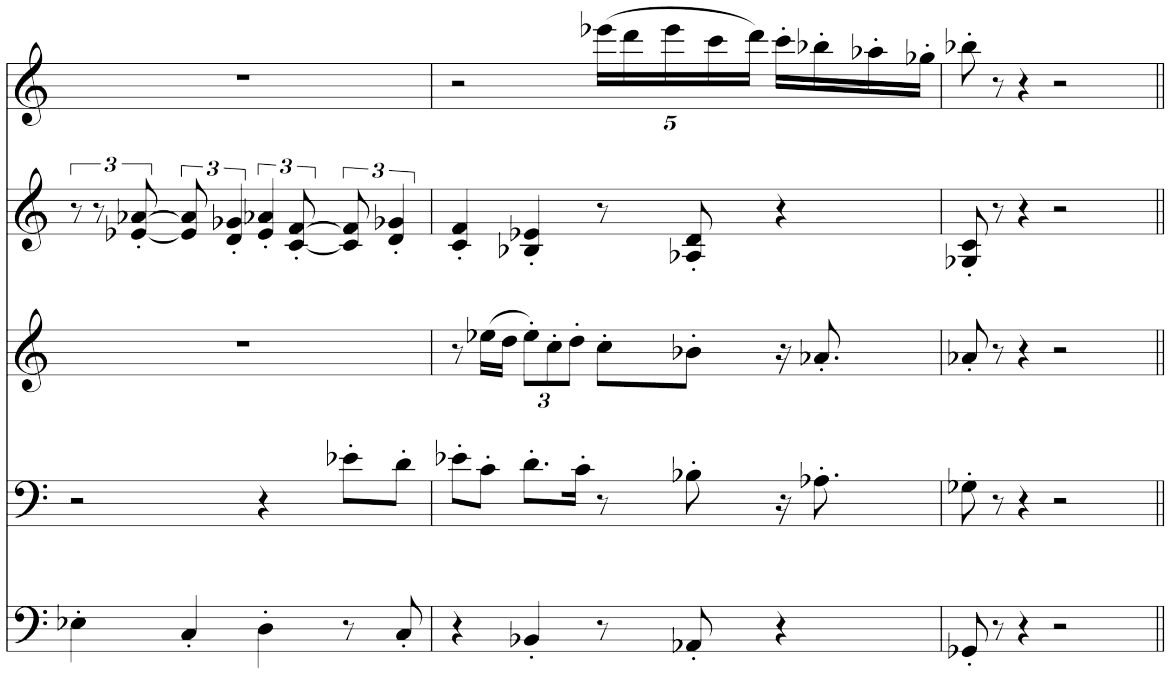
[22] Composers developing this technique have also employed a *simultaneous* presentation, in which different versions of the same rhythm are layered on top of each other. The next two examples, from my own composition *Utero: Concerto for Cello, Tabla and Symphonic Orchestra,* show the simultaneous presentation of both linear and non-linear augmentations in polyphonic and polymetric situations (Tichý 2014, 109).

[23] In Example 5 we can see linear augmentation in its polyphonic form. A kind of Morse code "S.O.S." motif (a sequence of three short notes, then three long and again three short notes) is used at four different resolutions of stretching: in sixteenth notes in the upper staff, in both triplet and straight eighths beneath that, and finally in dotted quavers in the bottom staff. The phrases start together on the first beat, but they diverge from each other gradually.

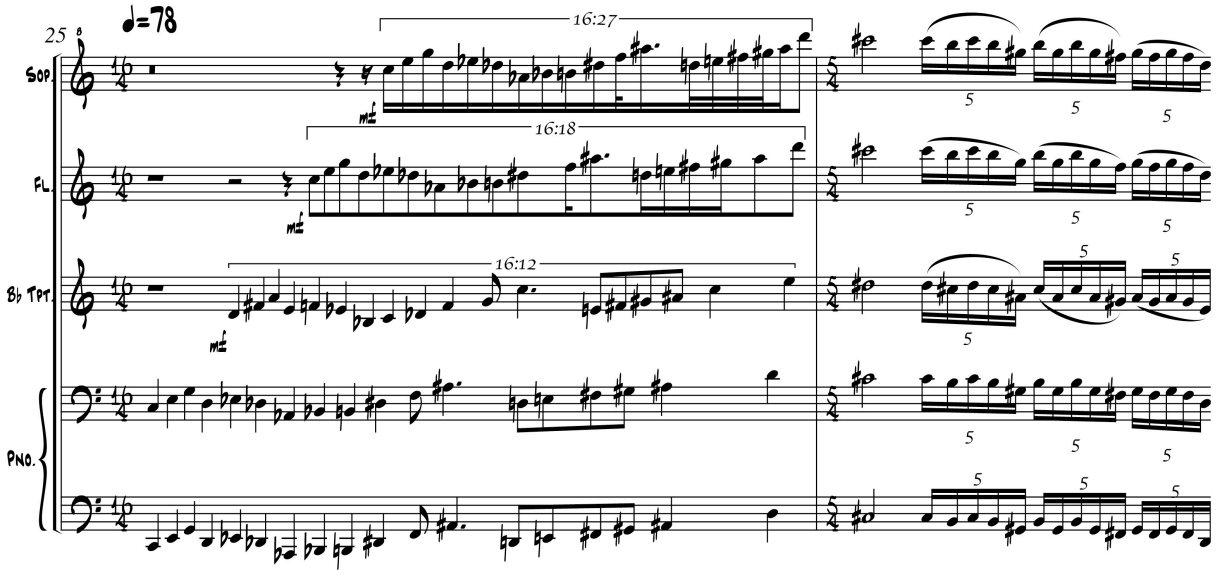


Example 5. Tomáš Reindl: *Utero – Concerto for Violoncello, Tabla and Symphonic Orchestra*.

[24] The second excerpt, in Example 6, shows an extreme form of polyphonic non-linear augmentation. The nine-note phrase from the second bar of the upper staff is stretched in several different ways non-linearly, so the gaps between the last five notes are gradually increased, while the phrase movement as a whole is slowing down. In this case, each voice starts the phrase at a different point, but the calculation was made such a way that they finish together on a downbeat.



Example 6. Tomáš Reindl: *Utero – Concerto for Violoncello, Tabla and Symphonic Orchestra.*



Example 7. Ned McGowan: *Tools – Telescopic Ladder.*

[25] In his composition *Telescopic Ladder*, from the cycle *Tools* (2003), the Dutch composer Ned McGowan similarly uses a highly intricate multi-layered simultaneous presentation.[8] The same melodic phrase covering sixteen beats in its basic form is modulated into three different speed levels related by the ratio 4:3 (see the Example 7). This means that the relation of the second level (trumpet) to the basic speed is 16:12, so a phrase originally lasting 16 quarter note beats shrinks to a length of only 12 beats (3/4 x 16 quarters = 12 quarters). The next diminution (flute) is in the same ratio to the trumpet phrase, lasting 9 beats (from 3/4 x 12 = 9). Finally, the last layer (sopranino recorder) is in the 4:3 ratio to the flute part, and lasts 3/4 x 9 or 6 3/4 beats (i.e., 27 sixteenth notes).

[26] In the composition, this section is repeated four times, so that each time another instrument with a different tempo layer is added; the example below comes from the fourth and fullest repetition. Then all the instruments finish together on the first beat of the next bar.

Additive and Subtractive Processes

[27] This principle is typical for Carnatic rhythmic development, where the additive, expanding forms are called *srotovaha yati* ("river mouth") and the subtractive, narrowing forms are called *gopucca yati* ("cow's tail") (Kippen 2020, 249). These processes are also

8. Ned McGowan (*1970) is an American composer, flute and contrabass flute player based in Amsterdam. In his compositional work, he is fascinated with proportionally intricate rhythms inspired largely by Carnatic techniques.

used in Hindustani *kaidas or gintī* types of composition in North Indian *kathak* dance. In the West, a similar principle was used by Olivier Messiaen in his practice of *valeur ajoutée*, inspired by the ancient *deśi tālas*, as we have discussed above (Messiaen 2001, 11).

[28] Here is an example of traditional Carnatic "pyramid form," sometimes called "mridanga yati," which combines the processes of *srotovaha* and *gopucca*:

kida tom –

ta – kida tom –

ta – ta – kida tom –

di – ta – ta – kida tom –

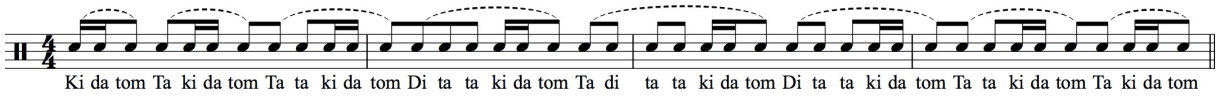
ta – di – ta – ta – kida tom –

di – ta – ta – kida tom –

ta – ta – kida tom –

ta – kida tom –

[29] The core phrase "*kida tom*" is developed in such a way that during each repetition we append to the front another element, here a syllable followed by a pause, until we get the full phrase "*ta – di – ta – ta – kida tom –*". Then we apply the mirror process, removing the appended syllables gradually. In this case, the process unfolds within an 8-beat cycle, shown in Example 8 (Lockett 2008, 105).



Example 8. Carnatic "pyramid form".

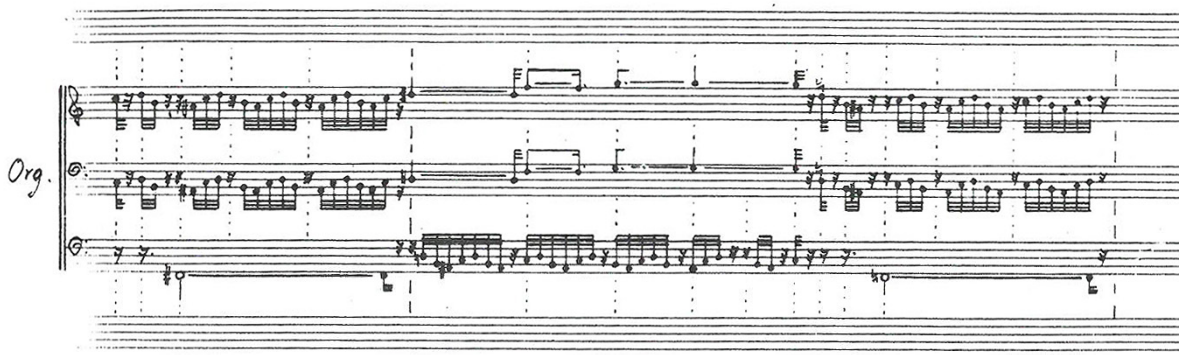
[30] A similar process happens in the Hindustani *gintī* ("counting") forms used often in the North Indian classical dance *kathak* (Kippen 2005, 185).[9] In this case numbers are used instead of syllables.[10]

The typical example is *gintī tihāī* in 10 beat cycle *Jhaptal*:

/: 1 – 1 2 – 1 2 3 – 1 2 3 4 – :/ $_{3x}$

[31] We can see a very similar procedure in the work of Czech composer Miloslav Kabeláč (Reindl, 2017, 77). In the organ part of his *Symphony No.8 "Antiphones"* (1970), the additive principle is applied to the isorhythmic rotation of the four-note sequence (C, D, B, A#) which is one of the basic motifs of the composition. A very striking phrasing is created by expansion of the motif by adding extra thirty-second notes gradually in sequence: 1, 2, 3, 5, 6, 7 (see the Example 9). The number 4 is intentionally omitted by the composer, since if a four-note motif was used two consecutive phrases would start on the same note, disrupting the isorhythmic concept. After reaching the 7-note phrase, the process is reversed, similar to the Carnatic "pyramid form" above.

[32] Comparable additive processes can be found in the work of Philip Glass, especially in his music from the late 1960s through the mid 1970s, from *Two Pages* to *Music in Twelve Parts* and *Einstein on the Beach*, which we will study in paragraph 35.



Example 9. M. Kabeláč: *Symphony No.8 "Antiphones"*.

9. *Gintī* (transl. counting) rhythmic forms are used in the North especially in connection with the *kathak* dance. They are based on phrases made of different numbers of beats which are recited by numerals during life performance. These phrases are systematically developed and calculated so they fit to the particular *tāla*.

10. See the paragraph 34.

Recitation of Special Rhythmic Syllables or Numerals

[33] In both branches of Indian classical music there is a common practice of solfege in both melodic and rhythmic forms. For the recitation of rhythms there are special onomatopoeic syllables developed from the sound of different strokes of Indian drums. These are used not only for educational purposes but also as effective performance techniques. In the North, the rhythmic solfege is called *bol,* and it is connected to *tabla* strokes. In the South, the solfege (*solkattu*) is developed from *mridangam* strokes; performance in a concert setting is then called *konakkol* (Nelson 2008, 3). We have already seen examples of Indian solfege in sections 2, 3, and 4 (e.g., *Tadiginatom*, etc.).

[34] Moreover, in the North, there Hindi numerals are also used in *gintī* forms.[11] So, the *gintī tihāī* (already mentioned above)

/: *1 – 1 2 – 1 2 3 – 1 2 3 4 –* :/ $_{3x}$

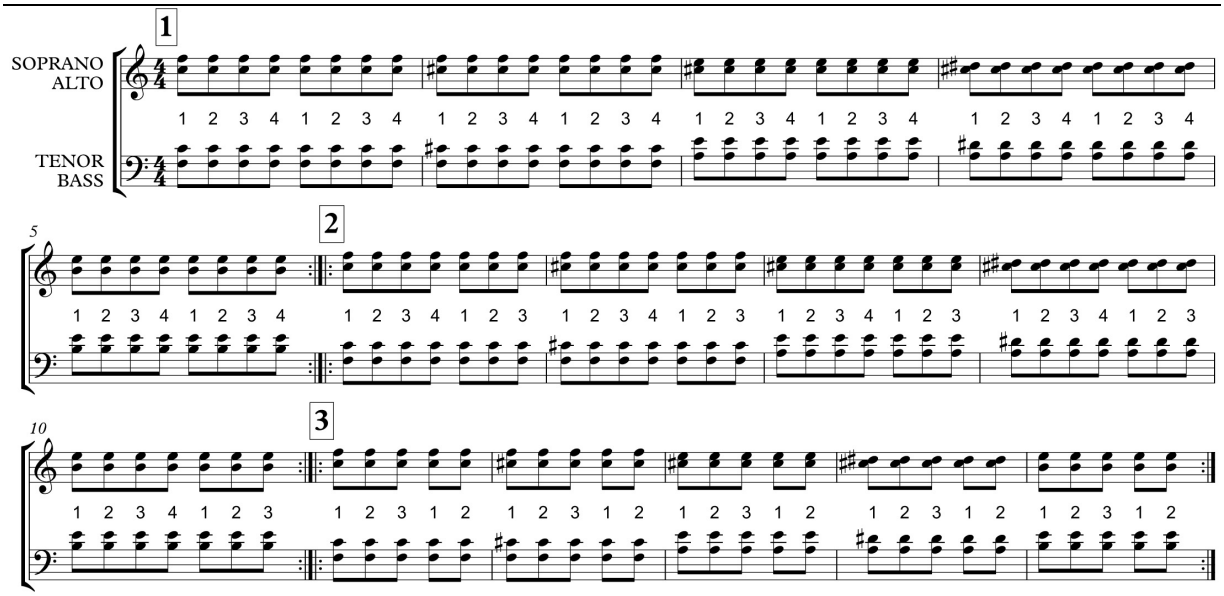
would be recited in Hindi in this way:

/: *Ek – Ek Do – Ek Do Tin – Ek Do Tin Char –* :/ $_{3x}$

[35] In *Knee Play* 3 from his opera *Einstein on the Beach* (1976) Philip Glass has the choir sing numerals instead of lyrics over the music; an excerpt is provided as Example 10. It is the same principle as in the previously mentioned *gintī tihāī*, using English instead of Hindi. Moreover, in this passage the numerals are describing the development of phrases using the additive/divisive principle: phrases of four eighth notes are gradually shortened to three and two eight notes, or combinations thereof, while maintaining the overall harmonic progression. A similar way of working can be found in his other compositions from that time (*Two Pages*, *Music in Twelve Parts*, etc.)

[36] At this point it should be noted that Glass's compositional style as such is heavily influenced by Indian thinking about rhythm, specifically the additive principles in Hindustani *kaidas* and their variations. Glass studied these principles in the 1960s with tabla player Alla Rakha while he worked for Ravi Shankar in Paris, transcribing and orchestrating music from his recordings (Kratochvíl 2013, 24–27).

11. See paragraph 30 above.

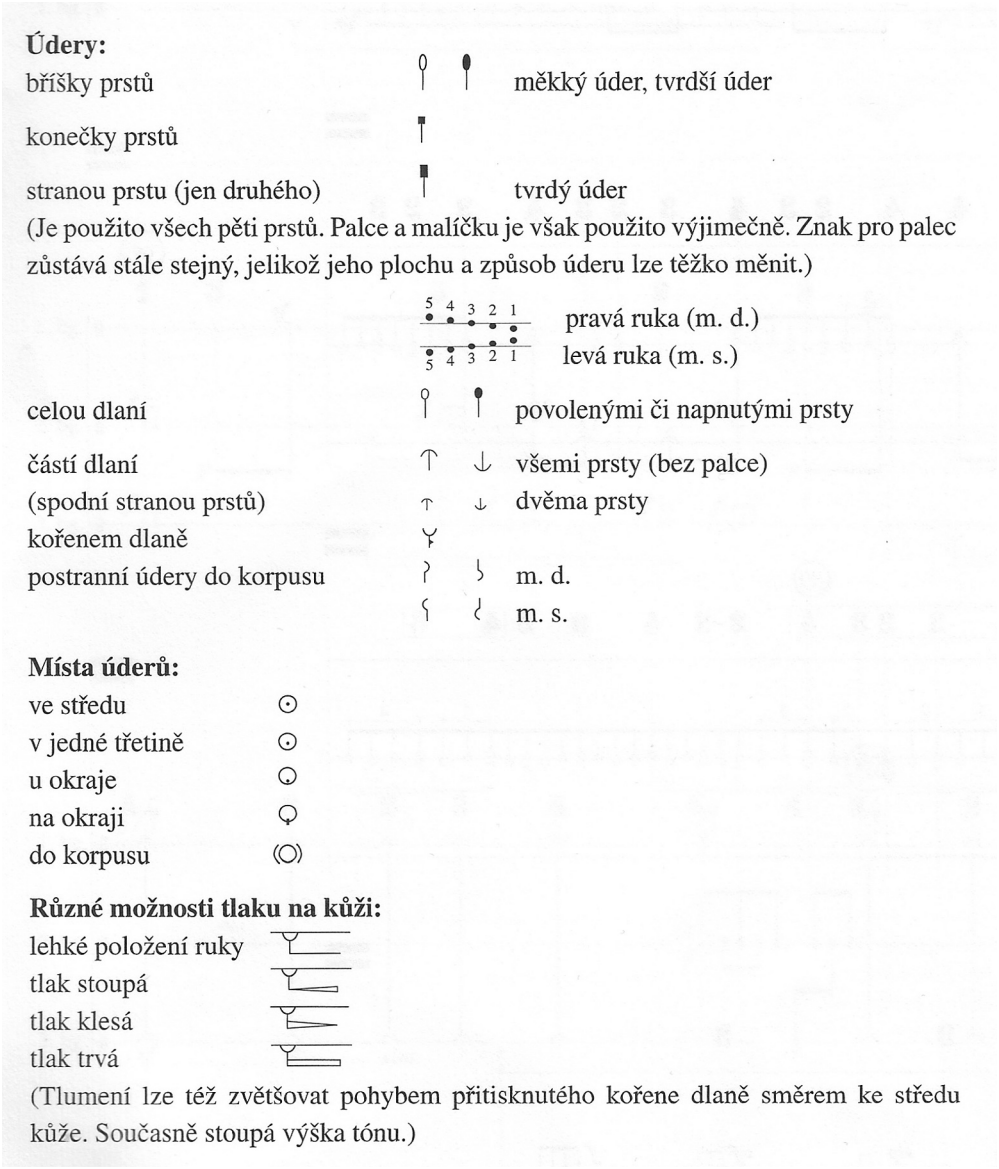


Example 10. Philip Glass: *Einstein on the beach – Knee Play 3*.

Indian Percussion Instruments and their Playing Techniques

[37] Indian drums, such as the tabla, mridangam, and pakhawaj, have a special construction of heads, designed to enhance the harmonic character of their sound. Highly sophisticated finger and wrist techniques allow the player to use the sound capacity of the drum to the maximum extent. These aspects of Indian drumming have no parallel in the tradition of Western classical music; of course, many Western composers have used tabla drums in their work.

[38] However, the next example demonstrates the influence of techniques of Indian percussion on more general writing for the instrumental family. It comes from the 1970's, from communist Czechoslovakia, where tablas were unavailable, as were opportunities to study Indian music in general. In his cycle *8 ricercari for percussion* (1967), Czech composer Miloslav Kabeláč gave special instructions for the bongo part (Example 11); it is evident that this part was inspired by tabla technique, despite the limited sound possibilities of the bongos in comparison to the heterogeneous pallette of the tabla. In the score, we can see symbols for the different type of strokes applied to different parts of the drum, as well as for the amount of pressure to apply to the skin. There are detailed instructions for stroke technique (using fingertips, side of the finger, all fingers, whole palm), the place of the stroke on the drum (in the middle of the skin, one third of the way from the bottom, or along the edge) or different possibilities of pressure to the skin (light application of the hand, rising or falling pressure on the skin, etc.). At the bottom of the page there is an instruction in Czech which translates as follows: „The muffling can be increased by the



Example 11, Miloslav Kabeláč: *8 ricerari for percussion.*

movement of the lower part of the palm towards the middle part of the skin. As a result, the pitch of the sound is raised." This is a clear reference to the technique of the *bayan*, the lower drum of the tabla pair.

[39] An interesting compostional specialty are the works inspired directly by the genre and form of Hindustani tabla solo (Gottlieb 1993). One of the Indian musicians who visited the North American continent from the 1960s onwards was Pandit Sharda Sahai (1935-2011), an eminent master of the North Indian solo tabla drumming and a major exponent of the Benares gharana (Shepherd 1976).[12] His students included, among

12. Sahai lectured at several colleges and universities in the United States and Canada, including Wesleyan, Brown, and the Berklee School of Music; he taught courses in tabla which were attended by a number of professional percussionists, some of whom are also composers.

others, Bob Becker (*1947, founding member of the percussion ensemble Nexus and member of Steve Reich and Musicians) and Payton MacDonald (*1974, currently teaching at William Paterson University in New Jersey). Both have mastered the tabla at a high level and are also skilled composers. Among Becker's works influenced by the repetoire of the Benares gharana, mention should be made of *Lahara* (1977), *Palta* (1982) and *Mudra* (1990). *Lahara* is virtually a pure transcription of traditional tabla solo forms for the snare drum, while in *Mudra* the material is arranged for five percussionists, and in *Palta* the drum kit player takes the solo part instead the *tabla*.[13] The works of MacDonald most notable in this connection are the four *Concertos for Tabla and Percussion Quartet* (2002-2013) and the composition *Samsara* for large wind orchestra. The materials of these pieces are also based on traditional Indian phrases and forms, but the composer creates more elaborate structures from them. In the case of *Samsara*, MacDonald uses a wide range of orchestral colours, building rich orchestral textures by layering material with different rhythmic subdivisions (quintuplets, septuplets, etc.).

[40] As a suitable example to conclude this survey, we turn to the excellent composition *Metal Jacket* (2005) for *tabla* and Indian harmonium by Canadian composer Nicole Lizée (b.1973), in which she makes brilliant use of the rhythmic, technical and sonic (tonal) possibilities of this instrument. The *tabla* are used here as both rhythmically and melodically. The player has an extended set of drums to work with, with three different sizes of *dayan* drums tuned to G, A and B joining the single bass *bayan*. In addition, the glissando technique performed with the hammer applied to the *dayan* is used to maximum effect.[14] At one particularly ingenious, satisfying spot, the tabla player uses the technique to play a unison melody with the harmonium.

[41] What principles of Indian rhythm could we trace in this composition? First of all, the opening and closing sections of the piece work with varying phrase lengths. The tabla

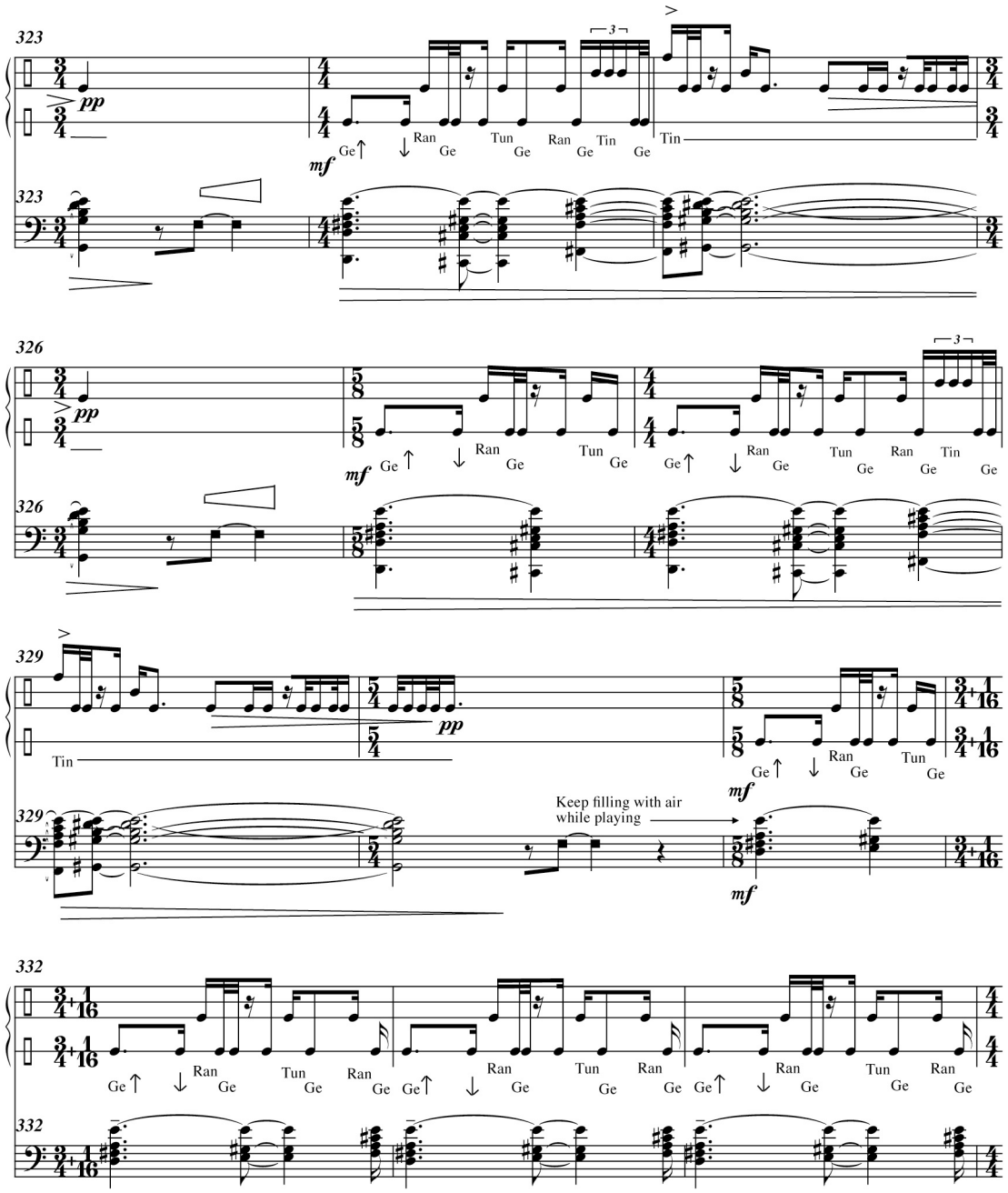
13. Becker's titles refer directly to features of the tabla repertory. For instance, the term *lahara* (sometimes also *lehara*) in North Indian music refers to a melodic loop describing the number of beats of a given rhythmic cycle (*tāla*), used as an accompaniment to a *tabla* solo. The term *palta* refers to a single variation of the solo *tabla* form *kaida*, which consists of a theme and a set of variations that may be either learned or improvised.

14. This trick is also known to Indian players, but only as a non-traditional effect not used in Indian classical music. It consists of gently placing the tuning metal hammer (held in the left hand) against the black circle (*syiahi*) of the *dayan* while the index finger of the right hand plays the open stroke *Tun*. The closer the face of the mallet moves to the centre of the skin, the higher the sound becomes and inversely, towards the edge of the skin, the pitch of the tone decreases. Thus, by moving the hammer, it is possible (within certain limitations) to intonate, and in addition, the characteristic glissando is created. In this way, notes in the approximate range of a fifth can be played on each drum (depending on its fundamental pitch).

part is built on the more or less traditional phrase *DhaGeNaGete*, which is systematically extended, reduced or interleaved with generally shorter measures of two eigth notes; it thus shows a characteristic use of additive and subtractive processes. In addition, the composer later works with the insertion of a pause, which is also systematically extended. We also find a distinctive application of the same material juxtaposed at two different speeds, at the basic eighth pulse and then the triplet.[15] Unlike in Indian traditions, there is no stable *tāla* over which the phrases are chained; the metre changes continuously in the piece to match the flexible phrase lengths.

[42] Example 12 from the middle section of *Metal Jacket* features an interesting, rhythmically quite complex *tabla* pattern, again applying additive principles. This phrase forms a kind of gesture that corresponds to the decrescendo progressions in the harmonium. From the original phrase (bar 324) the composer uses only a fragment (bar 327) followed by the original form again. Then, after the same 5/8 fragment (bar 331), Lizée introduces a longer fragment (this time in 3/4 measure with an added sixteenth note value), which is then repeated twice.

15. In traditional Indian music, this phenomenon has a parallel in the *tabla* form of *tripali gat*, in which the same phrase undergoes rhythmic modulation from a basic eighth note pulse through a triplet pulse to a sixteenth note pulse. In a *panchapali gat* composition, the process described has as many as five levels.



Example 12. Nicole Lizée: *Metal Jacket*.

Conclusion

[43] As we can see, Indian rhythmic systems have already been inspiring composers for many decades, in different ways and at different levels. This article has attempted to map out, through concrete examples, the various principles of Indian rhythm that can influence and inspire the compositional thinking of music makers. Of course, it could be argued that composers could have come to certain procedures (such as the additive principle, various types of diminution and augmentation, etc.) by their own logical reasoning. However, for the purposes of this paper, those cases have been selected where the influence of Indian rhythmic music is evident, either through a distinct compositional procedure or rhythmic formation referring to a traditional form, or where we have credible information that the composer has studied Indian traditional music and acknowledged that inspiration.

[44] For many music creators, the contact with Indian culture is a rather marginal matter; its resources serve them only as an occasional diversification of the musical language. However, for some composers it represents the primary impetus for reassessment of their rhythmic approach; for these musicians, the encounter stands at the birth of a new, distinctive musical language. The inspirational process itself can take place in different levels, from quoting a traditional form, to using a traditional form in a new and unconventional way, to integrating a traditional approach into one's own musical language. It would then be possible to talk about syncresis or synthesis, which could be an interesting subject for a more in-depth, specialized study devoted to the influence of these phenomena on the compositional style of a particular composer.

REFERENCES

Courtney, David. 2002. *A Focus on the Kaidas of Tabla*. Houston (Texas): Sur Sangeet Services.

Farrell, Gerry. 1997. *Indian Music and the West.* Oxford: Clarendon Press.

Strangways, Fox, and Arthur Henry. 1914. *The Music of Hindostan*. Oxford: Clarendon Press.

Gottlieb, Robert S. 1993. *Solo Tabla Drumming of North India: Its Repertoire, Styles, and Performance Practices*. Delhi: Motilal Banarsidass Publishers.

Kippen, James. 2020. "Rhythmic Thought and Practice in the Indian Subcontinent." In *The Cambridge Companion to Rhythm,* edited by R. Hartenberger & R. McClelland, 241–260. Cambridge: Cambridge University Press.

Kippen, James. 2005. *The Tabla of Lucknow: A Cultural Analysis of a Musical Tradition*. New Delhi: Manohar.

Kratochvíl, Matěj. 2013. "Philip Glass." *HIS Voice* 13(3):24–27.

Rath, Arun. 2015. "*The World Music Education of Philip Glass*." Accessed March 3, 2022. https://www.npr.org/transcripts/401246742?t=1646132310178

Lavignac, Albert and Lionel de La Laurencie. 1921. *Encyclopédie de la musique et dictionnaire du Conservatoire*. Paris: Delagrave.

Lockett, Pete. 2008. *Indian Rhythms for Drumset*. New York: Hudson Music.

Mertens, Wim, & Michael Nyman. 1988. *American Minimal Music*. London: Kahn & Averill Publishers.

Messiaen, Olivier. 2001. *The Technique of my Musical Language: Text with Musical Examples*. Translated by John Satterfield. Paris: Alphonse Leduc.

Messiaen, Olivier. 1998. *Treatise on Rhythm, Color, and Ornithology. Volume 1*. Translated by Melody Baggech. Oklahoma City: University of Oklahoma.

Nouza, Zdeněk. 2010. *Miloslav Kabeláč: Tvůrčí profil skladatele*. Praha: Etnologický ústav Akademie věd České republiky.

Nelson, David P. 2008. *Solkattu Manual: An Introduction to the Rhythmic Language of South Indian Music*. Middletown: Wesleyan University Press.

Reina, Rafael. 2016. *Applying Karnatic Rhythmical Techniques to Western Music*. London: Taylor and Francis.

Reindl, Tomáš. 2013. *Úvod do rytmického systému indické klasické hudby*. Bachelor thesis. Praha: Academy of Performing Arts in Prague.

Reindl, Tomáš. 2017. *Indický rytmický systém: Zdroj inspirace západních skladatelů*. Praha: Academy of Performing Arts in Prague.

Rowell, Lewis. 1992. *Music and Musical Thought in Early India*. Chicago: University of Chicago Press.

Śarṇgadeva, Nihśanka. 1978. *Sangīta-Ratnākara Of Śarngadeva.* Delhi: Motilal Banarsidass.

Shepherd, Frances Ann. 1976. *Tabla and the Benares Gharana*. Dissertation. Middletown (Connecticut): Wesleyan University.

Šimundža, Mirjana. 1988. "Messiaen's Rhythmical Organisation and Classical Indian Theory of Rhythm." In *International Review of the Aesthetics and Sociology of Music* 19(1):53–73.

Tichý, Vladimír, Tomáš Kuhn and Vlastislav Matoušek. 2014. *Musical kinetics*. Praha: Academy of Performing Arts in Prague.

Van der Walt, Salomé. 2007. *Rhythmic Techniques in a Selection of Olivier Messiaen's Piano Works*. Dissertation. Pretoria: University of Pretoria.

Welch, Allison. 1999. "Meetings along the Edge: Svara and Tāla in American Minimal Music." In *American Music* 17(2):179–199.