KARNATIC RHYTHMICAL STRUCTURES

as a source for new thinking in

WESTERN MUSIC

PhD Thesis by Rafael Reina

Abstract

This thesis addresses the issues of how rhythm could be taught differently in the West, how the new methodology described here could impact the performance of rhythmically complex contemporary music as well as becoming the starting point of a new creative approach for improvisers and composers.

The three main goals of this research are to describe South Indian (Karnatic) rhythmical concepts which could be considered sufficiently universal to be integrated with western classical and jazz aesthetics, to show how these techniques can be utilised to analyse and perform western contemporary music with more understanding and accuracy, and to demonstrate how these concepts can be integrated within a western creative framework, be it improvised or composed.

Rafael Reina PhD Thesis

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Acknowledgments

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INTRODUCTION

Summary

My research addresses ways in which the Karnatic rhythmical system can enhance, improve or even radically change the teaching of rhythmical solfege at a higher education level and how this learning can influence the creation and interpretation of complex contemporary classical and jazz music.

Since 1995 I have been teaching a programme at the Amsterdam Conservatoire based on the extended research I conducted between 1993-97 in all aspects of karnatic music. The present text is the result of re-examining and deepening the material learnt in that initial period throughout the years and, further, during various trips to South India made in the period 2010-2012.

One of the main goals of the research and subsequent explanation of the different techniques is to use the architecture and skeleton of this musical culture not only to improve, modify, enhance or, even, replace the current rhythmical solfege system imparted in music centres all over the West, but also to increase the array of tools, awareness and accuracy among musicians to perform western complex composed or improvised music. I have developed these ideas into a thesis that aims to:

- Systematise those rhythmical karnatic devices which can be considered sufficiently universal to be integrated with western classical and jazz aesthetics, so there is finally a comprehensive and complete text providing access to many rhythmical elements used in karnatic music;
- Provide a methodology for how these devices can be practiced and taught within a western framework, in order to enhance enormously the current western solfege rhythmical system;
- Explain how these techniques can be used as a source of creative ideas for composers and improvisers;
- Demonstrate every step of every technique with the aid of recordings specially made for this purpose;
- Analyse sections of pieces of existing contemporary repertoire (both classical and jazz) where karnatic techniques can be used to perform passages with more accuracy and understanding or where parallels with karnatic concepts can be established.
- Analysis and audio recording of written and improvised pieces created by three composition students[1].

Research topic

The expansion of rhythmical possibilities has been one of the cornerstones of musical developments in the last hundred years, whether through western development or through the borrowing from non-western traditions. Most classical performers, whether in orchestral or ensemble situations, will have to face a piece by Ligeti, Messiaen, Varèse or Xenakis, to mention just a few well-known composers, while improvisers face music influenced by Dave Holland, Steve Coleman, Aka Moon, Weather Report or elements from the Balkans, India, Africa or Cuba. Furthermore, many creators, whether they belong to the classical or jazz worlds, are currently organising their music not only in terms of pitch content but with rhythmical structures and are eager to obtain information that would structure and classify rhythmical possibilities in a coherent and practicable way.

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[1] *All performers and composers are or have been students of my program at the Conservatoire.*

One of the triggering factors that led me to embark upon creating the present text was the interview to Pierre Boulez that I came across a few years ago; I felt that I had acquired a knowledge that could eventually lead to bridge what he mentions as one of the main obstacles for communication between composers and public.
In that interview Boulez said:

> *"For me, what still has to be acquired is the degree of precision you need from an orchestra. This is not only because I am obsessed by precision, but also because the orchestral sonority changes completely. The clarity is suddenly there; you can really hear the score as it is written. Sometimes with a piece of Stockhausen, Berio or myself, the precision is not in the performer's head before playing. As a conductor I have to be demanding. If you have sixteen violins playing a quintuplet (which is, by the way, something quite easy compared to a lot of music composed after 1950), they have to really be thinking a quintuplet. The kind of tempo modulation you have in Elliot Carter's music - well, it has to be very precise or otherwise is not effective. This type of precision is still not really a musician's habit, shall we say" (....)*
>
> *"If the rhythms and phrasing that are peculiar to contemporary music would be taught in the best conservatories in an intensive way, the future of contemporary music would certainly change and performers and general public would really start enjoying pieces by Berio, Xenakis or myself. The lack of accuracy in orchestras is the biggest obstacle for communication between composers and public".*

'Pierre Boulez the Composer and Musician's Musician',
interview by Jed Distler in August of 2000 with composer/conductor Pierre Boulez.
http://www.andante.com/article/article.cfm?id=12737

I will argue that today's music demands a new approach to rhythmical training, a training that will provide musicians with the necessary tools to face with accuracy more varied and complex rhythmical concepts, while keeping the emotional content.
The incredible wealth of rhythmical techniques, devices and concepts, the different types of *Tala* construction, the use of rhythm as a structural and developmental element and, last but not least, the use of mathematics to sometimes very sophisticated levels in South India, enable the western musician to improve and enhance their accuracy and/or their creative process and make the study of karnatic rhythm a fascinating adventure of far-reaching consequences. The large variety of rhythmical devices used in karnatic music is, in the West, one of the elements most unknown and least documented, yet potentially most universal.

After many years teaching and experimenting with these concepts in my own music, I have refined my knowledge into what can be divided into 'local' and 'universal' techniques. The former implies, for example, ways of using rhythm to accompany the melody within a tala, or phrases that are a means and an end in itself and that are very 'aesthetically-charged'; they are, however, of no relevance to the goal of this thesis. 'Universal techniques', on the other hand, are those concepts which have a clear set of rules that enable the musician to elaborate his own phrases and combinations, stripped of any cultural context; they can also be used to establish a methodology for how to study and approach rhythm and rhythmical complexities. The latter forms the cornerstone of the thesis since a system as complete, compact, consistent and far-reaching as the one used in South India has no equivalent in western musical cultures.

Through my research and through working together with Jahnavi Jayaprakash (who came to the Conservatoire of Amsterdam to give seminars between 1998-2002) and B.C Manjunath (between 2003-2011), I have been able to assemble a body of practical devices, all of which can, on the basis of my experience and research, greatly influence the thinking and development of western music. This process has involved a sifting of techniques: there are many devices used quite often in South Indian music which are not relevant to my project; similarly there are concepts used by only a handful of extremely good musicians in South India which can have enormous potential within a western context.

The reader may wonder why karnatic rhythmical structures can have this enormous potential and not any other non-western culture (or not to the same extend). Reflecting on my previous studies of Flamenco, Berber, African, Turkish and Maghreb music cultures in the light of my knowledge of karnatic music, I have come to the conclusion that any rhythmical technique in these cultures can be studied using names and applications within karnatic music; while many karnatic music principles are unique to South Indian culture, many are susceptible to use in a completely different context.

The three main differences at a rhythmical level between karnatic music and any other non-western music are:

- The role of the percussion in karnatic music is generally very active, providing layers of polyrhythms and polypulses, rather than providing a sort of 'mattress' for the melody or outlining the *tala* or metre. The most plausible explanation for this difference is the fact that in every concert of karnatic music there is always someone 'conducting' (keeping *tala*) and thus providing a visual reference of the metre to the musicians.
- The percussionist can elaborate, while accompanying or soloing, phrases and frames of a high rhythmical complexity, always keeping in mind that any development needs to have a common denominator. This point will be a very important issue in the thesis, as it is probably the element that enables the karnatic musician to study very complex material and, simultaneously, to relate rhythmic relationships (3:5, 15:16 etc) to a wide array of specific concepts for how these can be developed and combined.
- All musicians undergo strict rhythmical training with instrumentalists reciting each phrase many times with the so-called '*solkattu*' (set of rhythmical syllables) before he adds a melody to it.

An account of this strict and deep rhythmical training forms the basis of my thesis. During my musical studies in South India, I concluded that their methodology could be divided into the way lessons are imparted and the methodology of the content. The former is diametrically opposed to the western way of teaching[2], although the stereotype in the West of the 'old guru teaching a disciple', for example, while still part of the learning process in India now exists alongside university studies.

A study of the methodology of the content is at the very heart of my research: how karnatic musicians practise the elements, how these elements are interwoven and how one technique is the basis for a more advanced technique.

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[2] *A more elaborate explanation of the difficulties to obtain the right information from Indians will be presented later on in the introduction.*

Publications and written material

A majority of the books available on Indian music are dedicated to North Indian music, a very different musical culture to that of South India, in particular concerning form, raga development and, foremost, rhythmical devices and their development. Most publications produced in the West are more 'raga' or melody oriented and the few books trying to offer an overview of rhythm cover only a small part of the four-year programme 'Contemporary Music through Non-Western Techniques' which I teach at the Amsterdam Conservatoire. In an intense search over years for written material covering what I learned through my teachers, I have found nothing that properly describes, elaborates and analyses the variety of rhythmical concepts used by karnatic musicians and, more importantly, how these techniques could be the basis for a fundamental change in the way we can teach and conceive rhythm in the West.

There are three main types of written source material:

- Books written in vernacular languages (Tamil, Kannada etc). These tend to be very practical, but inaccessible to the western musician, since there are no translations into English.
- Books written by Indians in English: these tend to be very specific, focusing on one particular aspect and are basically for musicians who already know the background information regarding the particular subject. Two considerable obstacles for most western musicians are the fact that westerners do not posses this background information and that Indian writers use exclusively Indian terms for every musical and emotional concept. In order to read any of these books, I had to learn at least 2,000 words, compared to the 150-200 Indian terms I teach to my students.
- Books written by westerners: As mentioned above, most publications produced in the West are more 'raga' or melody oriented and the few books trying to offer an overview of rhythm usually provide a rather superficial explanation of one or two of the five types of tala construction and give only the very basics from which many other techniques and concepts are derived. Importantly, they omit any explanation about the most complex concepts that, though more rarely used in South-India, are of great interest for westerners as tools enabling them to approach complex composed or improvised contemporary music.

There is no book in the West that would explain all these devices used in karnatic music. No text provides a complete explanation of the techniques and their construction, developmental rules, etc. The goal of this thesis is to create such a text, presenting systematically in one document the results of my almost two decades of research along with the experience of teaching and composing with these elements for over 17 years. This text will include:

- All the main rhythmical techniques, concepts and devices in karnatic music that are suitable for use within a western contemporary composed or improvised framework.
- An explanation of each technique, describing and distinguishing it from other similar devices.
- Written examples in western notation, together with an explanation of how I express the karnatic principles according to a notation that tries to fuse the best of both worlds.
- 287 audio files with examples for each technique.
- An account of how these techniques, stripped of any cultural or aesthetic element, can be taught to western musicians within higher education.

My intention has been to explore the subject as comprehensively as possible, since my work is the first step in bringing the attention of western musicians to the rich possibilities of karnatic rhythmical structures. In India many of the techniques are taught orally and although no written information is available, most musicians know the techniques through their professional practice[3]. In the West, all these techniques need to be compiled and explained so that the western musician can have at his disposal a clear, complete and comprehensive summary of techniques, a clear and complete guide that will enable classical performers, improvisers, composers, future solfege teachers and students to use these techniques and their methodology to greatly improve their rhythmical skills.

To my knowledge, my thesis provides the very first comprehensive study of one of the richest rhythmical music cultures in the world, perhaps the most complex and structured in its complexity. Karnatic music is influencing musicians all over the world and attracts students in increasing numbers every year. My thesis offers an introduction to this music for a western audience, but also the seeds for further research and a tool for musicians and students.

Working plan and methods

My field research has involved taking lessons with various highly regarded musicians in South India as well as attending hundreds of concerts and rehearsals. Around trips to India conducted in the years 1993-97 and 2010-2012, I have repeatedly analysed the content of recorded lessons, studio recordings and live concerts, comparing how the same concept has been developed differently by different musicians, how theory is applied, respected or ignored, and how exceptions to the rule are justified.

Karnatic music is a highly regulated music culture but with great scope for innovation within the tradition. My main teachers (Jahnavi Jayaprakash, N.G. Ravi and B.C. Manjunath) are known for their vast knowledge of theoretical elements, great improvisational skills, respect for the tradition and innovative attitude. Their knowledge of the theory and practice allowed me to compare and analyse concepts in the light of different interpretations by other reputed musicians. My conclusion is that the rules are made after the practice, never the other way around. Once a new concept or technique has been accepted (whether in the XIV century or today), the rules provide a comprehensive theoretical backbone for other musicians, while leaving space for further innovation. Most professional musicians would never simply copy what is given to them.

However, **it cannot be stressed enough**, that the way the concepts and techniques are explained in this text differs greatly from the way karnatic music is taught in South India, whether to Indians or westerners.
As previously mentioned, the main source of information for any student is lessons with his guru. The lessons are always addressed to performers, and all techniques are imparted by first teaching phrases that the student will practice without providing the theoretical backbone that enables their creation. Only at an ulterior stage, the student *may* learn this theory (and not always) but with many aesthetic connotations and, I would daresay, conditionings.

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[3] *The reader can find more information about available books in the Appendix 4 named 'Sources of Information', under the heading 'Literature references'*

In my case, as a composer, I was not willing to go through the extremely lengthy process of learning how to sing, or play a percussion instrument (all of them requiring great technical complexity). This made the process for all my teachers and for myself quite problematic and laborious, since there exists no methodology to explain only concepts, and certainly not in the way the reader will find them presented in this text.

Therefore, next to my studies, I had to resort to listening to many recordings, reading some books (*see appendix 4 for more information about recording and books)* and asking the same question many times in different ways, in order to conclude something concrete. The bottom line is that, despite the amazing mathematical and logical Indian mind, many social and cultural differences have formed a way of explaining not only music, but essentially anything, that is diametrically opposed to the general western way. It was only during my third visit, that I began to fully realise this difference and to understand what to ask and how to phrase questions in order to receive an answer I could understand. This does not by any means imply that our method is better; the western and karnatic learning methods are simply very different, requiring a long and winding process to arrive at a common ground. After many years, what I have finally concluded is that the western way of thinking and formalising derives from an Aristotelian tradition, while the Vedanta concepts of *buddhi* and *manas* (roughly translated as intellect and emotions) are responsible for the Indian approach.

Consequently, what is set out here is by no means the way I received the information: rather, it is the distillation of a long-lasting process of analysis and comparison of karnatic material along with the translation of these concepts for a western mind.

Thesis structure

Any PhD thesis undergoes a profound process of change from the initial proposal through to its final completion; mine is no exception. Many could and have been the structures during the whole process. The final decision was to separate as far as possible, the description of karnatic techniques and concepts from the presentation of their possible application to western music, both pedagogically and creatively. This separation has ultimately been the 'red thread' of the whole text.

Thus, the thesis is divided into two parts. The first presents a description of karnatic concepts and techniques, subdivided into four sections that share a common denominator: 'Foundations', 'Exclusively creative techniques', 'Motta Kannakku' and 'Recent developments'.

The second part is divided in two large sections: 'Applications to western works' and 'Analysis of students' pieces'.

Notwithstanding the above, a neat and complete separation of both 'worlds' has not been entirely possible. Often I found it necessary to resort to certain comparisons between karnatic and western music to facilitate better understanding of a particular point. The most extreme case can be found in chapter four, *'Gati Bhedam'*, where I needed to devote more than half of the chapter to explaining the alternative notation that permeates techniques where crossing accents is the core concept. Without this explanation at that particular point, the presentation of many transcriptions from there onwards would have been impossible.

An important recommendation needs to be made for the reader: the 287 recorded tracks provide the 'flesh and bones' to the text. Reading the thesis without listening to the tracks can result in an almost dry experience, extremely theoretical in nature: however, if the reader listens to the examples, I believe the experience is bound to be a completely different one.

Practice method

Many chapters contain a practice method section. This section provides a practice and analytical methodology for western musicians (whether students, professionals or pedagogues) to master the karnatic concepts and techniques. Each practice method of the relevant chapter provides a step-by-step **explanation** of how to approach the daily practice of the **main techniques**, along with recordings and examples for almost every step. The musician should take into consideration that each technique can take, depending on the intensity of his practice and his musical background, between a few weeks to several months to master.

The goal of these techniques is to develop a higher degree of accuracy and awareness of rhythmical complexities (without losing feeling) in order to perform music of the XX and XXI centuries that use these complexities in any shape or form.

I consider the use of a metronome at all times of utmost importance in order to achieve the desired level of performance as well as to improve the sense of **inner pulse**. The latter is essential if the musician wishes to achieve the level of independence required to perform all the concepts that go against the beat, as well as playing in an ensemble or orchestral situation where different tempi/metres, or the illusion of them, work together. In addition, the use of a computer aid *(see appendix - the karnatic metronome)* can be of great help for most techniques as an intermediate step to achieving this purpose, especially for those topics using superimpositions.

A practice methodology for techniques explained in section 2 ('Exclusively creative techniques') like *yati* phrases, *moharas*, *poruttams* or *mukthays* are not explained because they are creative concepts that branch out of the fundamental rhythmical techniques; for instance, in order to perform a yati phrase, the required technique would be *jathi bhedam* (explained in chapter 7). If one would like to perform a mixed gati mohara, it is necessary to have mastered gati and jathi bhedam as well as rhythmical *sangatis* etc.

Jazz versus classical (or improvised versus written music)

As a former jazz bass player, I find it very rewarding that increasingly more musicians cross the 'borderline' of both worlds than some years ago. As a teacher and active composer I unfortunately still find a big separation between curricula in western music centres, and professional musicians who clearly proclaim their adherence to one field or the other.

It is not within the scope of this thesis to enter into the debate on what constitutes jazz nowadays, what the role of a composer in the XXI century is and the many other current debates. Therefore, the reader will find in various parts of the text that, in order to be entirely pragmatic with the current music reality, techniques are explained differently depending on the target group, and the practice method and pedagogical applications of the karnatic material follow the 'traditional' curricular division that can be found in most western music centres.

PART 1

Description of Karnatic concepts and techniques

A) Foundations

The first nine chapters expound the main concepts, the primary building blocks from which every other technique, principle or concept, whether pedagogical or creative, is derived or drawn. Together these concepts constitute the essential pedagogical tools that every karnatic musician has to master before facing any ulterior technique or concept: they form the main supporting layers for the karnatic devices, creative tools and rhythmic structures explained in sections B, C and D of Part 1.

At the same time, each concept can already be used creatively since a separation between pedagogical techniques or creative techniques is unimaginable for a karnatic musician; they are simply two sides of the same coin.

Chapter 1

TALA SYSTEM

Tala is the metric container, the framework wherein all the rhythmical concepts and techniques that will be explained in this book are utilised, and the common reference point for all music layers employed in karnatic music.

In a simple manner, tala can be translated as metre. The main (and far-reaching) difference with a western metre is that karnatic talas are constructed following specific and strict rules and the inner construction derived from these rules do really have a decisive effect on many musical decisions as to where phrases or techniques should start or finish. The main role of the tala is to provide a regularity[1] to all performers so that the continuous illusion of tempo and metre changes that the many techniques provide have a constant common denominator throughout a piece of music.

Indeed, except for a form called Talamalika and operas or dance programs, the tala and tempo in karnatic music never changes in a piece, allowing thus the proliferation of a multitude of techniques that work against the beat or tempo, many a times in different layers. Therefore, karnatic musicians prefer this regularity and common reference that the tala provides rather than changing metres and tempo during a composition or improvisation.

There are several types of talas in karnatic music, each of them with its own set of construction rules.

-Suladi
-Chapu
-Shadanga
-Shoshadanga
-Janaka
-Dhruvarupaka

The construction used the most for the last six centuries in South India is Suladi and the one employed quite abundantly by innovative musicians is the Shadanga type. Chapu talas are taken from folk music (they will be described at the end of this chapter), and Shoshadanga, Janaka and Dhruvarupaka are 'branches' of the Shadanga type and all of them will be discussed in the chapter of *Tala Prastara*.

SULADI TALAS

The construction of suladi talas responds to combinations of three *angas*. A ready-made translation for the word anga does not exist, being 'construction blocks of different size' the closest one can get to its actual meaning[2].

The conventions pertaining to every anga are as follows:

-Anudrutam: 1 beat long. It can be used one time or not at all. It has to be preceded or followed by a *drutam* and it can never be the first or last anga of a tala.

-Drutam: 2 beats long. It can be used none, one or two times. In order to use it, at least one *laghu* has to be used in the construction of the tala.

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[1] *See the concept of cycle later on in the chapter for a deeper explanation of the concept of 'regularity'.*

[2] *The term* Part *is often seen in books written in English by Indians, but I find this term rather vague.*

-Laghu: It can be 3, 4, 5, 7, or 9 beats long. It can be used once, twice or thrice. Once a number of beats has been chosen for a laghu, this number has to remain for every laghu of the tala (this is called *Jati Laghu*). Therefore, a laghu of 4 beats cannot co-exist with a laghu of 3, 5, 7 or 9 beats.

Each jati laghu has a specific name:

# Beats per laghu	Jati Laghu name
-Three	Tisra jati
-Four	Chatusra jati
-Five	Khanda jati
-Seven	Misra jati
-Nine	Sankirna jati

From this explanation it can be deduced that, hypothetically, the shortest tala would be 3 beats long (using only one laghu of 3 beats), and the longest would be utilising 3 laghus of 9 beats each, 2 drutams and 1 anudrutam. This would produce a tala of 32 beats.[3]

For instance, a tala of seven beats could be constructed it in the following ways:

-L3 D D　　-L4 A D　　-L5 D　　-L7

However, it could not be constructed following these patterns:
-L3 A L3, because there is no drutam in it to precede or follow the anudrutam
-L5 A A, because there are 2 anudrutams (one is the maximum to be used), and one of them is the last anga.
-D A D D, because there are 3 drutams (two is the maximum that can be used) and no laghu
-L4 L3, because there are two different jati laghus

However, just by following the rules scrupulously, hundreds of talas could mathematically be constructed by combining these three angas.

Yet, this is not the case in karnatic music.

Categories

In the XVI century, a composer and performer named Purandaradasa (1484-1564) organised into concrete systems talas and ragas that existed at the time in a rather confused way and varying, sometimes radically, from almost village-to-village.

At his time, the shadanga talas were the ones used commonly but, according to various sources, developments took place in such a way that made these talas unmanageable[4]. Purandaradasa decided to unify the extreme differences into one system that could be known to all musicians, and invented seven categories or combinations out of the myriad of possibilities that the theory just explained could provide.

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[3] *From now on, the following abbreviations will be used:　Laghu: L　Drutam: D　Anudrutam: A*
This abbreviation differs from the one used in South Indian books which, personally, I find it too cumbersome.

[4] *In the chapter dedicated to this type of talas (chapter 27), a historical background and some reasons why they became 'unmanageable' will be given.*

These seven combinations or categories of Suladi Talas are:

-DHRUVA: L D L L
-MATYA: L D L
-RUPAKA: D L
-JHAMPA: L A D
-TRIPUTA: L D D
-ATA: L L D D
-EKA: L

Because laghu varies its number of beats through its five jatis, five separate talas are derived from each of the seven categories. The following chart is the chart of 35 talas that Purandaradasa invented and became the tala system that nowadays is used in no less than 70% of music created in South India.

CHART of 35 SULADI TALAS

#	CATEGORY	JATI	ANGAS	TALA NAME	# BEATS
1	Dhruva__________	Tisra	L3 D L3 L3	Mani	11
2	-----	Chatusra	L4 D L4 L4	Srikara	14
3	-----	Khanda	L5 D L5 L5	Pramana	17
4	-----	Misra	L7 D L7 L7	Purna	23
5	-----	Sankirna	L9 D L9 L9	Bhuvana	29
6	Matya__________	Tisra	L3 D L3	Sara	8
7	-----	Chatusra	L4 D L4	Sama	10
8	-----	Khanda	L5 D L5	Udaya	12
9	-----	Misra	L7 D L7	Urdina	16
10	-----	Sankirna	L9 D L9	Rava	20
11	Rupaka__________	Tisra	D L3	Chakra	5
12	-----	Chatusra	D L4	Patti	6
13	-----	Khanda	D L5	Raja	7
14	-----	Misra	D L7	Kula	9
15	-----	Sankirna	D L9	Bindu	11
16	Jhampa__________	Tisra	L3 A D	Kadamba	6
17	-----	Chatusra	L4 A D	Madhura	7
18	-----	Khanda	L5 A D	Chana	8
19	-----	Misra	L7 A D	Sura	10
20	-----	Sankirna	L9 A D	Kara	12
21	Triputa__________	Tisra	L3 D D	Sankha	7
22	-----	Chatusra	L4 D D	Adi	8
23	-----	Khanda	L5 D D	Dushkara	9
24	-----	Misra	L7 D D	Lila	11
25	-----	Sankirna	L9 D D	Bhoga	13
26	Ata__________	Tisra	L3 L3 D D	Gupta	10
27	-----	Chatusra	L4 L4 D D	Lekha	12
28	-----	Khanda	L5 L5 D D	Vidala	14
29	-----	Misra	L7 L7 D D	Loya	18
30	-----	Sankirna	L9 L9 D D	Dhira	22
31	Eka__________	Tisra	L3	Sudha	3
32	-----	Chatusra	L4	Mana	4
33	-----	Khanda	L5	Rata	5
34	-----	Misra	L7	Raga	7
35	-----	Sankirna	L9	Vasu	9

A tala of 15, 19, 21, 24, 25, 26, 27, 28 or longer than 29 beats could never be used according to the conventions of the suladi tala organisation. Nevertheless, when other tala types are described, these and many other talas will come under the scope.

Possibility of changing the inner division

Although seldom used (karnatic musicians do not really feel the need for it since they focus more on how to develop ideas within the tala), it is possible to find examples in which the angas have been permutated, provided that none of the tala construction rules have been broken.

The main reason to make such a change is because of the theme construction and its possible fragmentation for developmental purposes. If the first tala, Dhruva tisra (L3 D L3 L3) is taken, the logical division in two parts of the tala would be L3 D as the first segment and L3 L3 as the second one. If the musician wants to create a first fragment of a melody of 6 beats instead of 5 for the first segment, would then deliberately change the order to accommodate the melody to the new inner construction of the tala.

However, **this change of inner division is effective for a whole piece** and is never done in one section or one measure of the piece. Once the decision is taken, the whole piece has to be developed according to the new systematic inner structure.

Influence of talas on musical development

There are many techniques which serve the purpose of articulating the tala. Phrasing around the strong points of the tala is the one more abundantly used.

The names for the strong points of a tala are
-Down beat of the tala: **tala *sam***
-Down beat of an anga: **anga sam**, usually adding the name of the anga (drutam sam, laghu sam etc)

However, and possibly due to the fact that in karnatic music there is always a ‘conductor’ (someone *keeping tala*), music has developed much more in the direction that western music has developed from the end of XIX century onwards: the metre is a framework that does not need to be articulated by means of patterns, vamps or repetitive melodies or phrases in any instrument. A wide number of music cultures shape up a metre or tala with these ways. But the fact that karnatic music is always conducted (including solos), enables the musicians to develop ideas in a much more abstract way, frequently producing polyrhythms and polypulses between the melodic layer and the percussion layer.

But, despite of this fact, there are ways to create material that works around the inner division of the tala.

-The construction of the main melody or the commencing cycles of the percussion are usually built around or articulating the tala.

-In the development of a piece, whenever a polyrhythm or polypulse of any kind is used between two layers, the resolving points should always be a tala or anga sam.

-A phrase cannot stop in the middle of an anga. Once a phrase starts, it needs to continue until, at least, the next sam of the tala.

To give at this point all the techniques that are influenced by the inner construction of a tala would be a futile exercise. Suffice to say for now that there is a constant tension-relaxation in the development of a piece and the tension is provided by techniques that go against the pulse whilst the relaxation is provided by phrasing around the tala and all layers going along the pulse[5]. Karnatic musicians do not feel the need for the tala to be continuously 'recognisable' by a listener.

Tempo

The concept of tempo -called *laya* in karnatic music- is very straightforward; tempo indications are never written, the sole indications being:

-Vilamba laya: Slow tempo (usually between ♩=20-ca. 46)

-Madhya laya: Medium tempo (usually between ♩=ca. 48-ca. 66)

-Druta laya: Fast tempo (anything above 70, rarely going above 130, exception being made with chapu talas)

Notwithstanding, laya has also two other meanings:

1) Pulse

2) Underlying *gati*[6] over which different techniques are used.

In the suladi tala system, tempos ranging from ♩=30-54 are the most commonly used; it is not rare to hear pieces set in ♩=20.

CONCEPT OF CYCLE

The real meaning of tala is not metre but **cycle** (*avartana*). The whole socio-cultural Hindu background inherited in the music, created a concept that separates itself from our concept of metre although, in fact, the concept of cycle is common to all Eastern musical cultures, from Morocco to Vietnam, in very similar ways. In the West, the closest notion to a cycle can be found in the 12-measures round of a blues, the 32 bars, with the A A B A shape, that became one of the cornerstones of the swing and post-swing eras in jazz and, ultimately, in many of the fugues and canons of Bach and his contemporaries.

Where is the line that separates cycle from metre? I do not think that a concrete set of rules can be given in an Aristotelian fashion, as opposed to most of the concepts and techniques that will be described in the book.

A cycle is, somehow, a recurring frame that is born, develops and dies. There is certain 'narrative' quality to it, quality that generally lacks the western construction of metres. The length of the tala and tempo are two important parameters that help to create the impression of 'larger and recurrent segments of music'.

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[5] *When relevant and necessary it will be explained how certain techniques need this inner division in order to create musical events or organise certain material. But, on the other hand, this book tries to describe techniques and complex concepts that will tend to, somehow, 'ignore' this inner construction. Except for a few devices that will be described in the text that need to use the tala's inner construction, there are many other ways to articulate a tala that belong to the category of 'local techniques' that, as exposed in the introduction, I find of no relevance to the purpose of this text since they are essentially good to create karnatic music exclusively.*

[6] *For the concept of* gati*, please see chapter 2.*

1) Length of talas: short talas tend to group in larger groups in which an idea is explored and resolved. Long talas (usually from 10 beats onwards), tend to resolve any musical event every one, two or, maximum, three cycles. Any technique is always thought of within the boundaries of a cycle or number of cycles, even if this technique may give the impression (until its resolution) that the tempo or the metre (or both) have been changed.

2) Tempo: it is possibly the element that enables the musician or listener to create or hear the feeling of a larger and recurrent fragment of music; this does never imply that the musical content is repeated to convey a feeling of cycle: it is the fact that any musical idea or development will always resolve at regular intervals of time. A cycle will always posses this aspect of regularity.

However, it is my perception that the concept of cycle is not a technical one that can be dissected and regulated; it somehow belongs to the realm of 'feeling' or 'intuition'.

There is a Vedantic concept that, I believe, can illustrate to a large extent this 'realm of intuition'. The concept is called *Pragnya* and it could be summarised as follows:

> *"Pragnya is the flash of intuition that comes from clarity of mind. An enlightened person comes to know things he never thought he knew. As soon as the question flashes the answer is there, coming from a deeper field of intuitive wisdom where the ordinary mind cannot reach".*

I do not mean to infer that only an 'enlightened person' can understand and feel what a cycle is. Many artists, scientists and so on experience this 'flash of intuition'. My sole intention is to give a 'philosophical' framework to illustrate the fact that the concept of cycle goes beyond any rationale and is, ultimately, a personal experience.

For a long time I (and many of my students) thought we understood this concept and we were using it. However, it was not until a few years after incorporating karnatic techniques in my music that this 'flash of intuition' allowed me to 'feel' the concept and start using it in a completely different way. Therefore, since the intuitive understanding of the concept of cycle is an empirical process, in my view and experience analysing or dissecting the concept of cycle in a Cartesian manner will always fall short of the complexity, extent and nuances of this concept that is closer to a philosophical notion than to a musical technique.

Tala Conducting

In karnatic parlance this is called *keeping tala* and the way to be reckoned or conducted is called *kriya*[7]. Musicians always keep tala by beating his hands and fingers against his lap or knee, producing sometimes some noise.

These are the different ways to keep tala, depending on the type of anga:

-Anudrutam: hand down.

-Drutam: hand down followed by hand up, except if the drutam is the last anga of the tala in which case the hand will create a wave to its right as to signal the last beat of the tala.

---

[7] *The word 'reckon' is used by all musicians and encountered in all books written in English by Indians.*

-Laghu: hand down followed by *finger counts.* Fingers hit against the thumb or the lap or knee, replacing the movement of the whole hand; most musicians start counting from the pinkie finger, going towards the right.

3 beats: hand down followed by 2 finger counts

4 beats: hand down followed by 3 finger counts

5 beats: hand down followed by 4 finger counts

7 beats: hand down followed by the pinkie, moving towards the right and using the thumb to signal the 6th beat of the laghu and the pinkie is used again for the 7th beat.

9 beats: follow the same way of counting as with seven, adding the ring and index fingers for the 8th and 9th beats respectively

CHAPU TALAS

These are talas borrowed from folk music. They are fast in tempo and reckoned with clapping on the lap on the divisions written below. No angas are used, being the tala sam the only resolving point for all devices and phrasing.

There are four varieties:

-Tisra chapu: 1+2
-Khanda chapu: 2+1+2.
-Misra chapu: 3+2+2 (sometimes vice versa).
-Sankirna chapu: 2+2+3+2

For instance, a khanda chapu would have 3 claps while conducting (on 1st, 3rd and 4th beats), and the 2nd and 5th beat will be silenced.
Depending on the tempo a, for instance, khanda chapu tala could be notated in western music as 5/8 or 5/16.

Chapter 2

GATIS

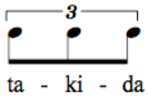
Gati is the name given to the subdivision of the beat into an equal number of units called *matras*. The beat can be divided into five different gatis.

-Tisra (triplets):	3 matras
-Chatusra (duplets):	4 matras
-Khanda (quintuplets):	5 matras
-Misra (septuplets):	7 matras
-Sankirna (ninetuplets):	9 matras, always divided 4+5 or vice versa[1].

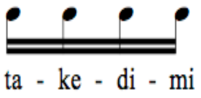
For exercise purposes, every gati has an assigned set of syllables (this system of syllables is called *solkattu* or *konnakkol)*, used to facilitate a better internalisation of the gatis by the musician.

The syllables assigned to every gati are:

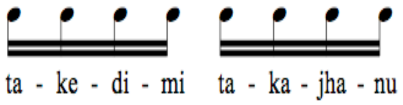
Tisra:



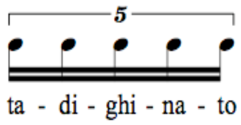
Chatusra:



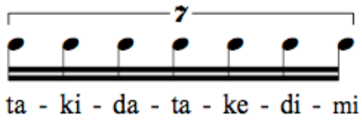
When two beats of chatusra are sung consecutively, it is customary to use the syllables


ta - ke - di - mi ta - ka - jha - nu

Khanda:

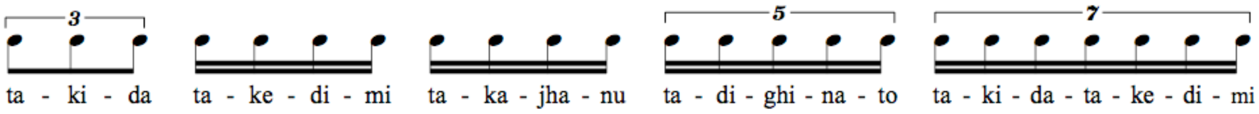

5
ta - di - ghi - na - to

Misra:


7
ta - ki - da - ta - ke - di - mi

or **ta–ke-di-mi-ta-ki-da** can also be used.

The four gatis look like this


3
ta - ki - da
ta - ke - di - mi
ta - ka - jha - nu
5
ta - di - ghi - na - to
7
ta - ki - da - ta - ke - di - mi

---

[1] *Sankirna will be seen in a separate chapter due to its special characteristics. For the purposes of explaining and describing the various rhythmical devices of karnatic music, only four gatis will be used.*

SOLKATTU SYLLABLES

Solkattu or konnakkol is the name given to the syllables used to 'sing' a rhythmical phrase[2]. In karnatic music, every musician can 'sing' a phrase using a combination of syllables that feels suitable for the given phrase before setting any melody to it.

As long as simple common sense is used for the choice (for example, using strong sounds for accents, soft sounds and different parts of the tongue and mouth for faster passages), musicians have complete freedom to apply different syllables to the same phrase.

These syllables are supposed to be the phonetisation of all the sounds employed by the main karnatic percussion instrument called *mridangam.*

List of syllables *(track 1)*

TA KI DA MI DI GHI NA
TO(N) KA JHA NU NAM RI GU
LAAN GA NU KU

The following sounds are essentially peculiar to the Sanskrit language and they seldom appear in any western European language.

NA	N is pronounced with a nasal quality and with the tongue back from the teeth
THA	TH is pronounced as the th in si**t-h**ere
DHI	DH is pronounced as the dh in re**d-h**ead
THOM	The TH is pronounced as a combination of si**t-h**ere and ca**th**ode
DHEEM	DH is pronounced as re**d-h**ead and the EE as the long E in s**ee**

PHRASING WITH GATIS

The approach in karnatic music to learning how to phrase with gatis is far removed from the way western solfege approaches this issue. It is not solely the fact that from the beginning any music student will work on four gatis without giving more importance to any particular one; the thinking behind is also radically different.

The very first step is to systematically study all the possible cells that can be created in each gati and internalise the feeling for these cells through the mathematical proportions that the note values provide. This internalisation of every cell as independent entity, without the use of rests, tie-overs or 𝅘𝅥𝅰 notes, is one of the factors that enables any karnatic musician to create phrases of great complexity.

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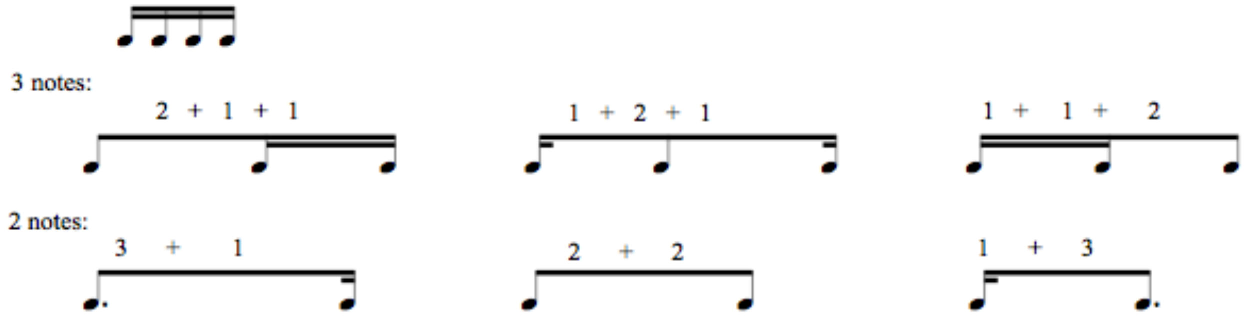
[2] *Although it is not uncommon in a number of western countries to use syllables applied to a triplet, quintuplet etc, the possibility of using a rich combination of syllables usually stops there; afterwards, reciting a rhythmical phrase is usually done with repetitions of one or a few syllables that generally do not cooperate to make a rhythmical phrase as transparent as in South Indian music.*

Every note value has an associated number; for instance an ♪ note will have the number 2 associated with it since it will always be two matras long. Musicians think in terms of numerical relationships between the note values, something of great benefit when it comes to start using rests and tie-overs to construct phrases.

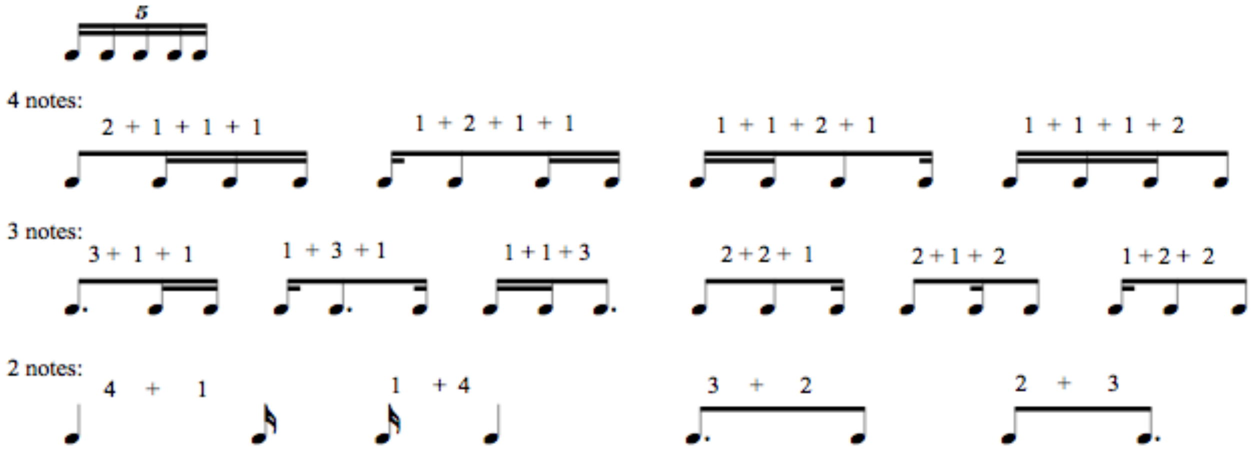
For phrasing purposes, tisra is taken as sextuplet, therefore having six matras per beat.

The number of possible cells in every gati is[3]:

Chatusra: 7 *(track 2)*


3 notes:
2 + 1 + 1
1 + 2 + 1
1 + 1 + 2
2 notes:
3 + 1
2 + 2
1 + 3

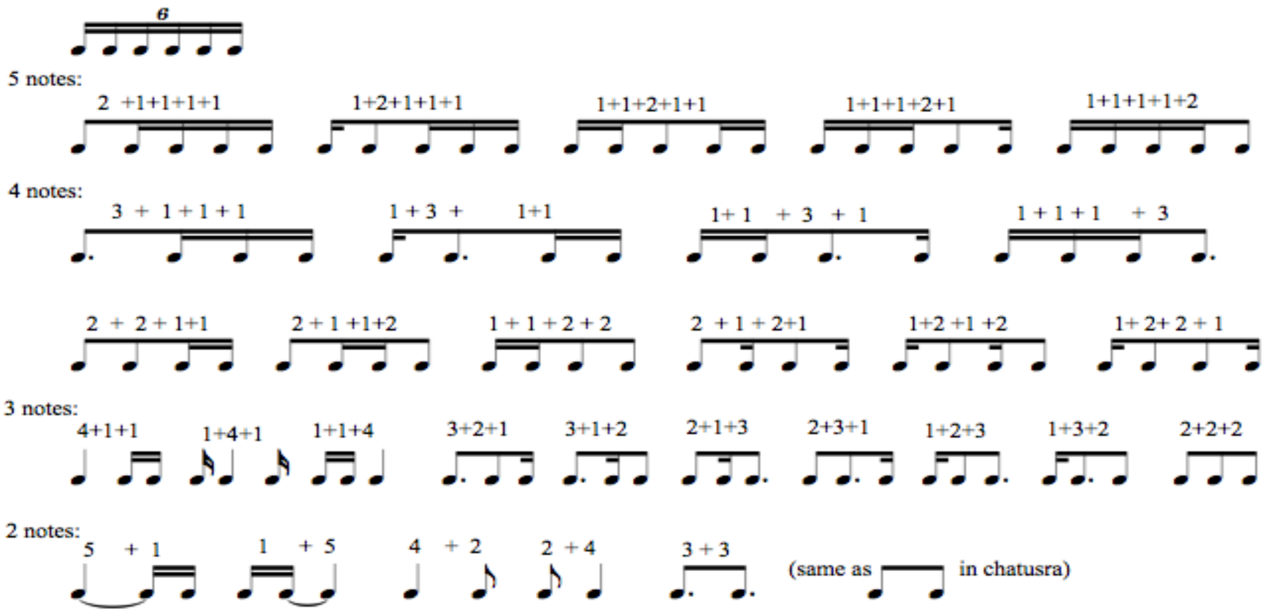
Khanda: 15 *(track 3)*


5
4 notes:
2 + 1 + 1 + 1
1 + 2 + 1 + 1
1 + 1 + 2 + 1
1 + 1 + 1 + 2
3 notes:
3 + 1 + 1
1 + 3 + 1
1 + 1 + 3
2 + 2 + 1
2 + 1 + 2
1 + 2 + 2
2 notes:
4 + 1
1 + 4
3 + 2
2 + 3

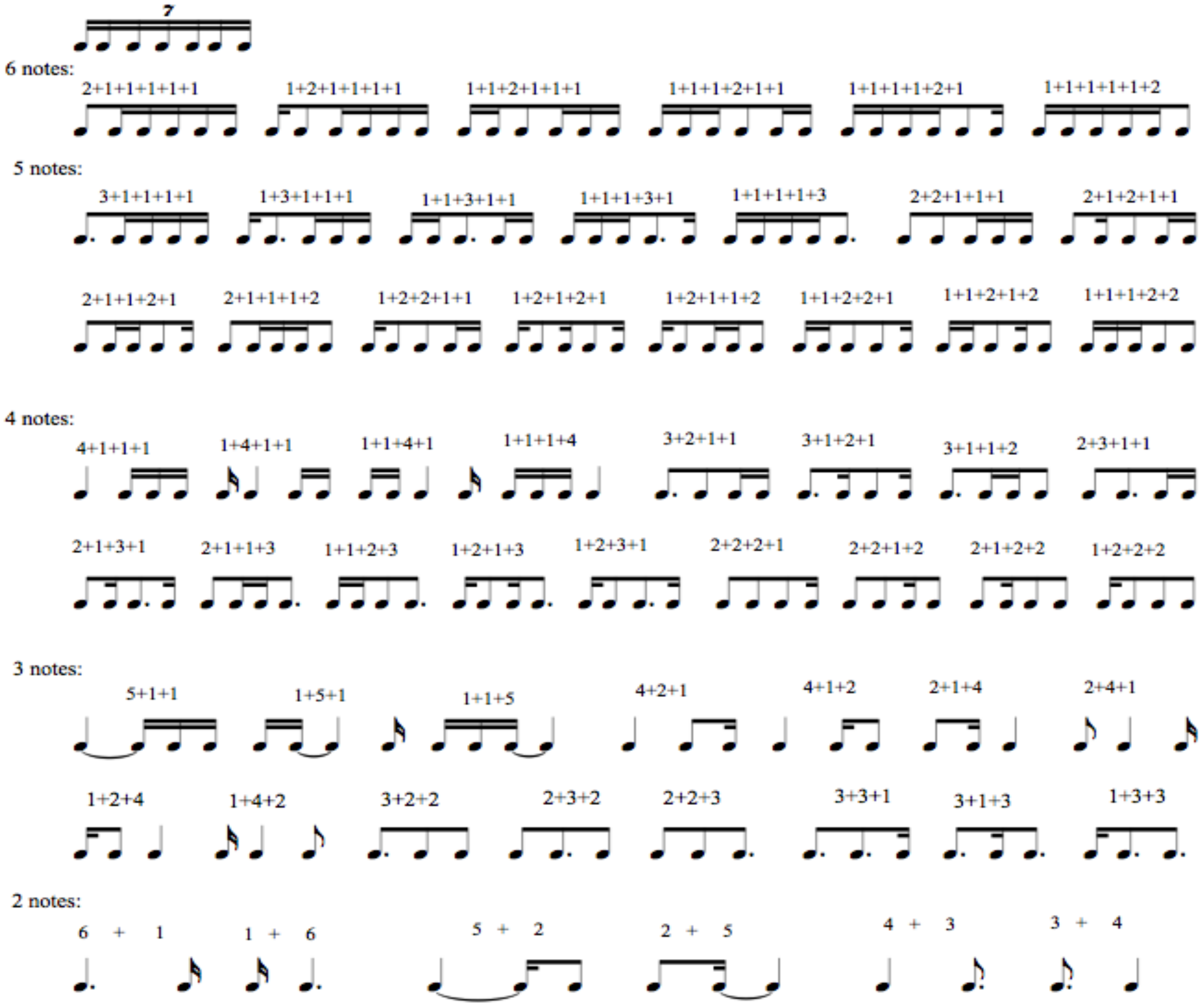
---

[3] *On the audio files, every cell is repeated twice*

Tisra: 31 (taken as sextuplets for phrasing purposes) *(track 4)*


6
5 notes:
2 +1+1+1+1
1+2+1+1+1
1+1+2+1+1
1+1+1+2+1
1+1+1+1+2
4 notes:
3 + 1 + 1 + 1
1 + 3 + 1+1
1+ 1 + 3 + 1
1 + 1 + 1 + 3
2 + 2 + 1+1
2 + 1 +1+2
1 + 1 + 2 + 2
2 + 1 + 2+1
1+2 +1 +2
1+ 2+ 2 + 1
3 notes:
4+1+1
1+4+1
1+1+4
3+2+1
3+1+2
2+1+3
2+3+1
1+2+3
1+3+2
2+2+2
2 notes:
5 + 1
1 + 5
4 + 2
2 + 4
3 + 3
(same as
in chatusra)

Misra: 60 *(track 5)*


7
6 notes:
2+1+1+1+1+1
1+2+1+1+1+1
1+1+2+1+1+1
1+1+1+2+1+1
1+1+1+1+2+1
1+1+1+1+1+2
5 notes:
3+1+1+1+1
1+3+1+1+1
1+1+3+1+1
1+1+1+3+1
1+1+1+1+3
2+2+1+1+1
2+1+2+1+1
2+1+1+2+1
2+1+1+1+2
1+2+2+1+1
1+2+1+2+1
1+2+1+1+2
1+1+2+2+1
1+1+2+1+2
1+1+1+2+2
4 notes:
4+1+1+1
1+4+1+1
1+1+4+1
1+1+1+4
3+2+1+1
3+1+2+1
3+1+1+2
2+3+1+1
2+1+3+1
2+1+1+3
1+1+2+3
1+2+1+3
1+2+3+1
2+2+2+1
2+2+1+2
2+1+2+2
1+2+2+2
3 notes:
5+1+1
1+5+1
1+1+5
4+2+1
4+1+2
2+1+4
2+4+1
1+2+4
1+4+2
3+2+2
2+3+2
2+2+3
3+3+1
3+1+3
1+3+3
2 notes:
6 + 1
1 + 6
5 + 2
2 + 5
4 + 3
3 + 4

Development of phrasing with gatis

The approach of learning only a number of cells and looking at any phrase simply as a combination of these cells whilst simultaneously, treating the rests and tie-overs as 'non-attacked' notes of a particular cell, provides the musician with a high sense of security and accuracy without losing the feeling of the gati.

-Rests: needless to say that when a note is silenced, this will produce a different phrase. And when a number of rests are used, the phrase can change entirely. However, the thinking of a karnatic musician while performing a phrase with rests does not differ from when he is doing the phrase without them. What changes in his mind is that, instead of attacking the note, this one is silenced. But he never departs from thinking in cells regardless how many rests are used in a phrase. This avoids him from plunging into trying to 'understand' a myriad of phrases.

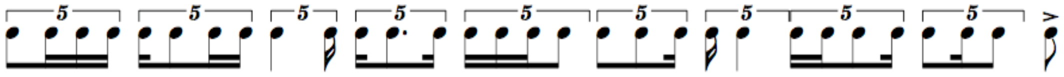
-Tie-overs*:* they are treated as rests, with the difference that a tie-over is an elongation of a note from one beat into the next.

𝅘𝅥𝅰 will be explained in the chapter of *Anuloma-Pratiloma*.

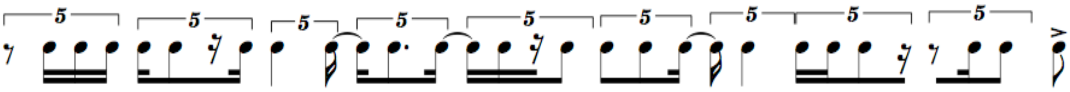
From the creative standpoint, any given phrase constructed by combining cells can produce an almost infinite number of derived phrases by applying rests and tie-overs. Depending on how many rests/tie-overs are used and where they are placed, a listener can recognise more or less proximity to the original phrase. This system is widely used in South India to develop phrasing. There is always an underlying consistency and coherence, regardless how far-fetched the new phrase may be.

The following examples will serve to illustrate what it has just been exposed. The use of rests/tie-overs on a phrase constructed by combining a few cells will make necessary the use of a completely different set of solkattu syllables and the phrase will sound different[4].

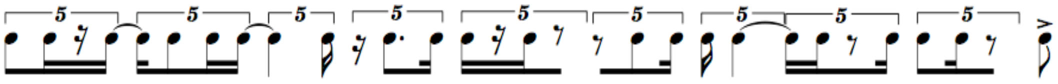
Original phrase in khanda



First development



Second development



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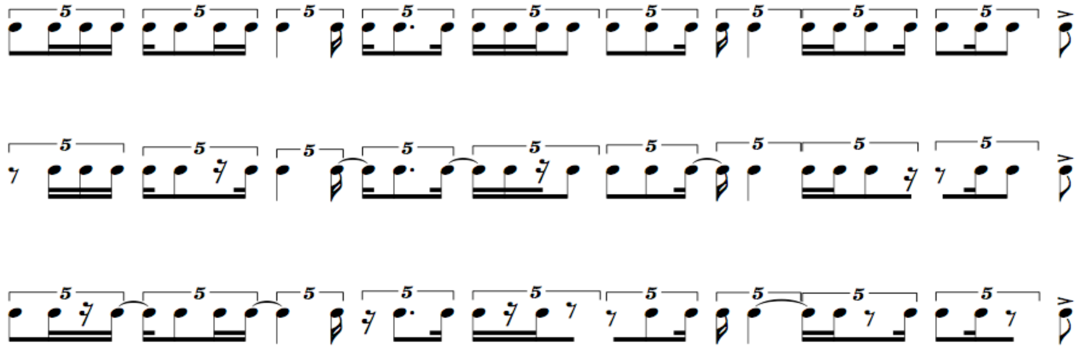
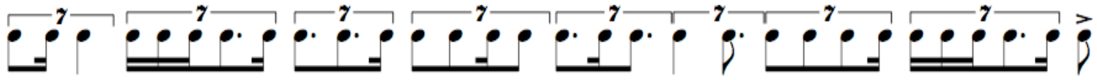
[4] *Syllables are not provided because the phrases could take many different sets of syllables. The audio example should not be considered as the best choice of syllables, but rather one of many possibilities.*

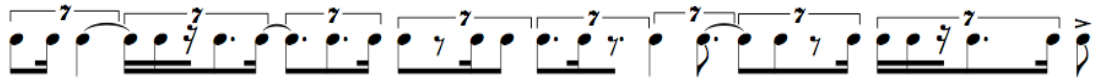
The three phrases in a row *(track 6)*



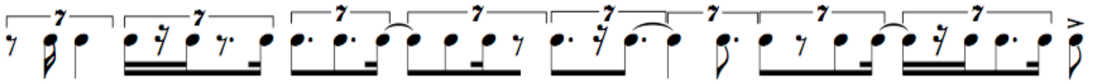
Original phrase in misra



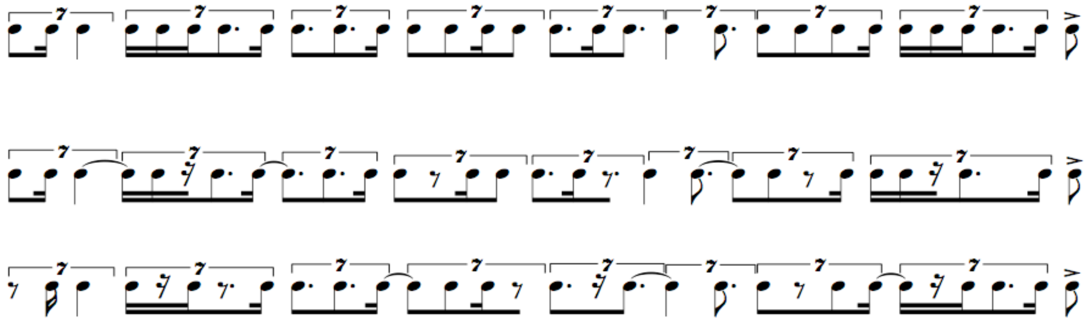
First development



Second development



The three phrases in a row *(track 7)*



Relationship of gati with tala

As opposed to western music where, in any metre, a beat in khanda can be followed by another beat in tisra and then by, for instance, a 7:6♪, in karnatic music a change of gati can occur only on tala sam. A gati has to be used for at least one whole cycle of the tala. Many techniques will be explained that will contradict this principle, but they will always follow a coherence that departs from a random change of gatis.

This seemingly restricting factor has in fact enabled karnatic music to reach the level of complexity and vast amount of creative techniques that characterise it nowadays. This will become clear as more concepts and techniques are described later on in the book.

PRACTICE METHOD

Use of Solkattu

Any technique should always be practiced (as karnatic musicians do) with solkattu before proceeding to add melodies to the phrases. This working process is of great importance and one of the keys to the accuracy demonstrated by karnatic musicians.

It is important to mention at this point that the way solkattu syllables are used in South India (and proposed for western purposes) differs considerably from the way solkattu is approached in the North. In Hindustani music every phrase has attached a fixed set of syllables, whilst in the South a phrase could have an almost infinite set of syllable combinations.

It would be convenient to start using just a few syllables with any given phrase and slowly incorporate more syllables. The most commonly used, besides those given as the characteristic syllables of specific gatis, are:

TA or THA for accents;

DHEEM for longer notes and sometimes also for accents; and

KI, KA, DA, KE, DI, MI, GHI, NA TO(N) for the rest of notes.

At an early stage syllables like MI would mostly be used when a group of four 𝅘𝅥𝅯 notes (in any gati) appears in a phrase. Similarly, GHI, NA, TO(N) are essentially used when a 5-note grouping appears in a phrase (again, regardless of the gati).

Numerous combinations are possible with these syllables alone. The musician can begin by relying on a few syllables, to prevent the range of available possibilities from becoming an obstacle rather than a helpful tool. It is also possible to write the syllables underneath a phrase in order to sing it. The most important thing is to first internalise these few syllables and use them in all contexts until they really become an intuitive part of one's musical vocabulary. Afterwards other syllables can be added gradually, preferably one or two at a time.

A) GATIS

In order to become familiarised with the four gatis and to internalise the feeling and relationships among them, performers should practice them in 3 ways:

1) By repeating a gati for 4 or 5 minutes, making sure that every matra has the same length and that the matra that falls on the beat never falls slightly before or after. In this way, the musician starts developing not only a sense for the specific gati, but also a steady feeling for pulse. While practicing, one must be very aware of whether variations on the speed happen and correct them immediately.

2) Going through all the gatis in order from tisra to misra and back to become aware of the relationship and the underlying proportionality between them. Exercise doing 4 beats per gati, then 3 etc, until changes occur every beat. Make sure that the speed of one gati does not carry on into the next gati and do not deceive oneself by correcting the remaining number of matras by creating different lengths in every matra so the gati finally falls on the beat. *(tracks 8 & 9)*

3) Once a good feeling for the relationship between gatis is achieved, a musician should practice them randomly in both number of repetitions of a gati and order. *(track 10)*

B) PHRASING WITH GATIS

1) The most important element to incorporate into one's musical vocabulary is the internalisation of all cells for each gati shown previously in the chapter.

2) Having learnt all the cells and being able to really feel the difference between, for example, a ♪. and a ♩ in khanda or misra, the next step is to start combining them in phrases where all beats are attacked and no rests or tie-overs are used.

3) Take any previous phrase and apply a variety of rests within the cells, and tie-overs between the last note of a cell and the first note of another cell (still without 𝅘𝅥𝅯 notes).

Chapter 3

JATHIS

A jathi can be defined as a **systematic accent applied to a gati**[1], producing as a result crossing accents over the beat. A jathi takes a number of matras that is always different to the number of the gati[2].

There are four jathis: 3, 4, 5, and 7, consequently every gati can use three jathis.

One of the first and most important things to know in order to use the concepts derived from the notion of jathi, is how to keep track of how many beats and accents are necessary for a gati/jathi combination to resolve[3]. This information is provided as follows:

-The number of the **gati** establishes the number of **accents** necessary for this device to meet with a beat.

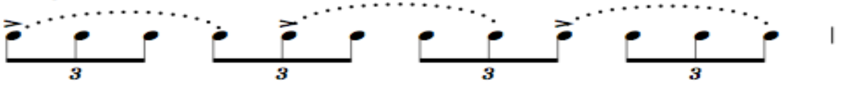
-The number of the **jathi** will provide the number of **beats** required to fall on a beat.
(i.e.: chatusra jathi 3= 4 accents in 3 beats).

Once the musician knows this, there is no need to make any further calculations and, as will be seen throughout the text, to have both elements very clear in one's mind (gati=number of accents and jathi= number of beats) will save a lot of time when working with more complex material that, in one way or another, is derived from this concept.

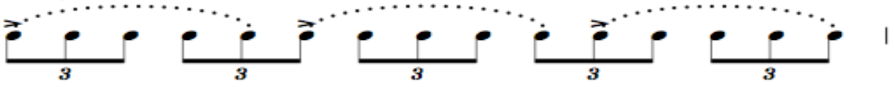
If the chart below is analysed, it will be seen that chatusra, regardless of the jathi applied to it, will always use four accents to resolve on a beat. Similarly, any gati that would take or use jathi 4 will need four beats to resolve on a beat.

This device is taught in South India even before a student learns how to phrase with gatis due to the tremendous importance that it has for the system. This importance will become clear as more pedagogical or creative techniques are explained. *(track 11)*[4]

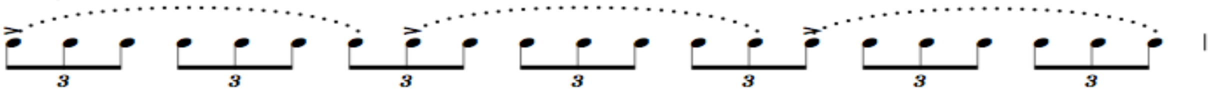
tisra jathi 4



tisra jathi 5



tisra jathi 7



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[1] *Jathi is a name applied to what might apparently be divergent concepts, although the need for these different concepts to have the same name will later become clear.*

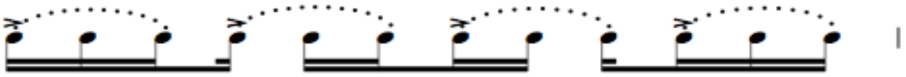
[2] *There would be no such thing as chatusra jathi 4 or khanda jathi 5, since these accents will always fall on a beat.*

[3] *As hinted in the first chapter, all structures that provoke some form of rhythmical tension need to resolve. This concept of resolution is one of the most important aspects of karnatic music.*

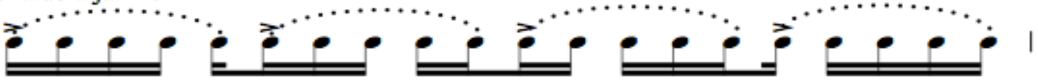
[4] *In the audio file every gati is preceded by two beats, and every example is performed twice.*

(track 12)

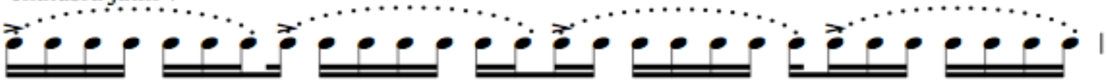
chatusra jathi 3



chatusra jathi 5

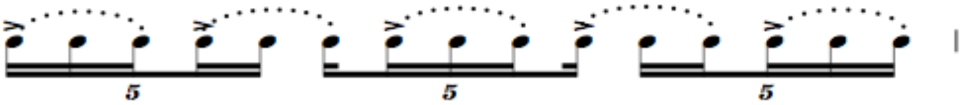


chatusra jathi 7

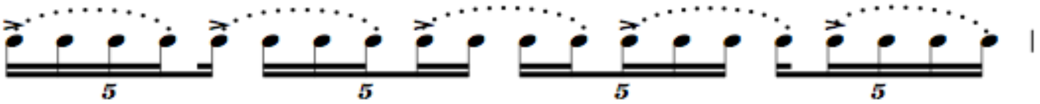


(track 13)

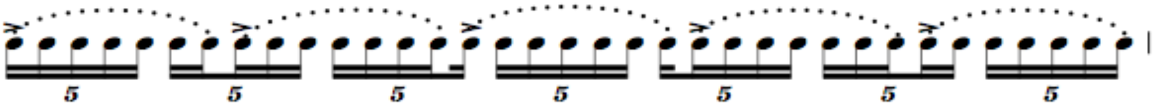
khanda jathi 3



khanda jathi 4

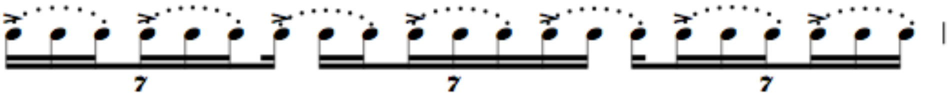


khanda jathi 7

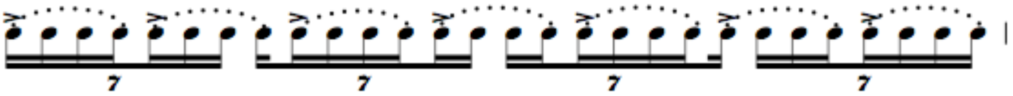


(track 14)

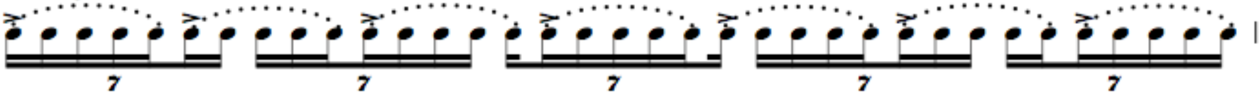
misra jathi 3



misra jathi 4

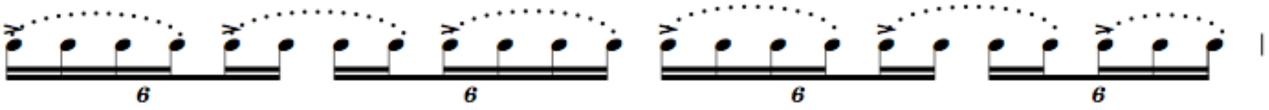


misra jathi 5

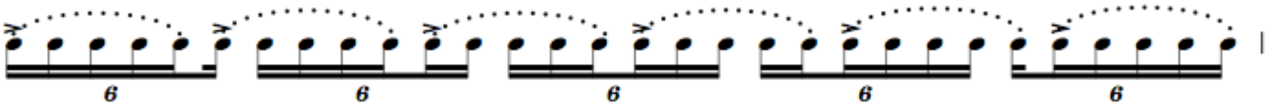


(track 15)

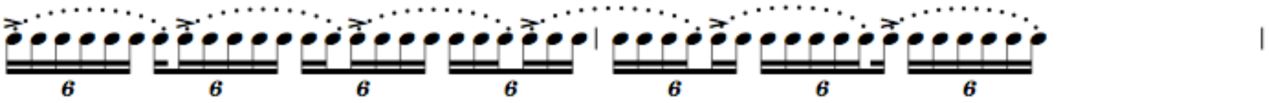
tisra 2nd speed jathi 4



tisra 2nd speed jathi 5



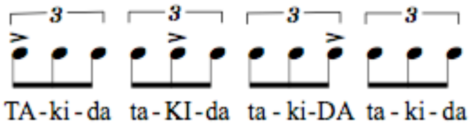
tisra 2nd speed jathi 7



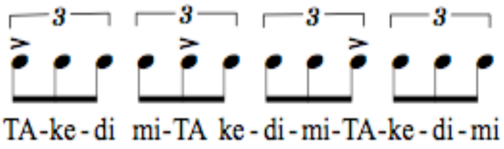
Solkattu syllables

The syllables assigned to every gati have been seen in the gati section. The syllables assigned to a jathi will always correspond with the chosen number and will never take the syllables assigned to the gati; in other words, a jathi 3 will utilise TA-KI-DA in any gati and will never use the original syllables of the gati while emphasising the syllable corresponding with an accent. The latter would not only make it very difficult for the gati/jathi combination to be internalised, but it would never capture the actual feeling that is pursued by applying a jathi to a gati.

For instance, if the following syllables are applied to tisra jathi 4:



It will never convey the feeling of 4. Consequently, feeling the flow of tisra (the *laya* of tisra) while using the syllables of chatusra will obtain the result sought for:



The only exception to this usage of solkattu syllables is while using jathi 7. This jathi changes its syllables depending on the gati in the following way:

-Tisra:	TA-KI-DA-TA-KE-DI-MI
-Chatusra:	TA-KE-DI-MI-TA-KI-DA
-Khanda:	TA-DI-GHI-NA-TO-TA-KA

VERTICAL POSSIBLITIES WITH GATI/JATHI COMBINATIONS

1) Both layers keep the same gati, but use different jathis

In this option, both performers or layers have the common denominator of sharing the same gati but, as a result of using different jathis, they produce different 'metres' or structures. For instance, if chatusra jathi 3 is used in one layer and chatusra jathi 5 in the other layer, they will effectively be producing a 3/4 working against a 5/4. Both layers will not only produce crossing accents individually, but they will indeed bring forth a polymetre or polyrhythm that will need a longer interval to meet at a given point.

As explained before, the number of the jathi will determine the number of beats required for the gati/jathi combination to resolve on a beat. In the example above (chatusra jathi 3 against chatusra jathi 5), the overall structure will need 15 beats to resolve together: jathi 3 needs to be played five times and jathi 5 will need to be played three times.

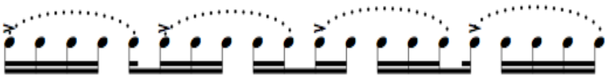
The following chart provides all possible combinations and their resulting durations.

Same gati, different jathis

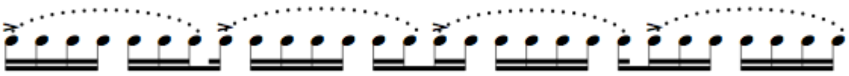
1) Chatusra jathi 3 vs. Chatusra jathi 5 = 15 beats
2) Chatusra jathi 3 vs. Chatusra jathi 7 = 21 beats
3) Chatusra jathi 5 vs. Chatusra jathi 7 = 35 beats
4) Tisra jathi 4 vs. Tisra jathi 5 = 20 beats
5) Tisra jathi 4 vs. Tisra jathi 7 = 28 beats
6) Tisra jathi 5 vs. Tisra jathi 7 = 35 beats
7) Khanda jathi 3 vs. Khanda jathi 4 = 12 beats
8) Khanda jathi 3 vs. Khanda jathi 7 = 21 beats
9) Khanda jathi 4 vs. Khanda jathi 7 = 28 beats
10) Misra jathi 3 vs. Misra jathi 4 = 12 beats
11) Misra jathi 3 vs. Misra jathi 5 = 15 beats
12) Misra jathi 4 vs. Misra jathi 5 = 20 beats

Audio examples:

1) Chatusra jathi 5 against chatusra jathi 7= 35 beats *(track 16)*

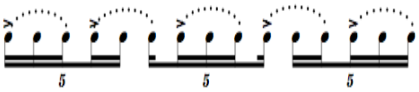


x 7 times

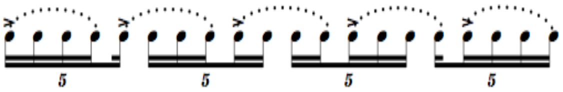


x 5 times

2) Khanda jathi 3 against khanda jathi 4= 12 beats *(track 17)*



x 4 times



x 3 times

2) Both layers keep the same jathi, but use different gatis

In this option, both performers or layers play 'the same phrase' (jathi here also means phrase) but, due to the fact that the phrase or jathi is performed in two different gatis, the listener perceives two different pulses or tempi played simultaneously.

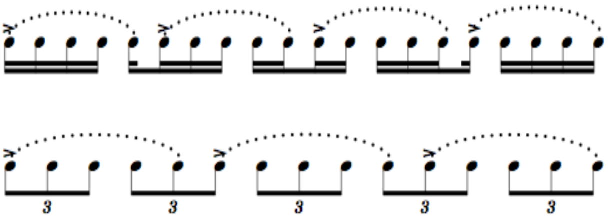
As has already been explained, every gati uses the number of accents that corresponds with its number to resolve on a beat (chatusra 4 accents, khanda 5 accents etc), but the jathi will indicate the number of beats that the gati/jathi combination needs to resolve. Therefore, if both gatis use the same jathi, they will meet after 3, 4, 5 or 7 beats; in this case there will be no polyrhythm but the sounding result will be a polypulse.

Same jathi, different gatis

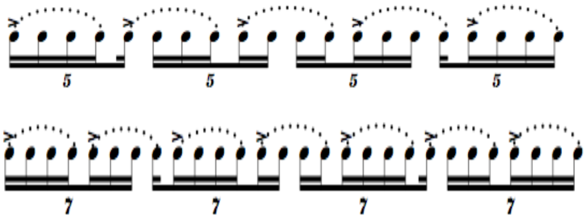
1) Chatusra jathi 3 vs. Khanda jathi 3
2) Chatusra jathi 3 vs. Misra jathi 3
3) Khanda jathi 3 vs. Misra jathi 3
4) Tisra jathi 4 vs. Khanda jathi 4
5) Tisra jathi 4 vs. Misra jathi 4
6) Khanda jathi 4 vs. Misra jathi 4
7) Chatusra jathi 5 vs. Tisra jathi 5
8) Chatusra jathi 5 vs. Misra jathi 5
9) Tisra jathi 5 vs. Misra jathi 5
10) Chatusra jathi 7 vs. Khanda jathi 7
11) Chatusra jathi 7 vs. Tisra jathi 7
12) Tisra jathi 7 vs. Khanda jathi 7

Audio examples:

1) Chatusra jathi 5 against tisra jathi 5 *(track 18)*



2) Khanda jathi 4 against misra jathi 4 *(track 19)*



3) Both layers use different gati and jathi

This option is a combination of the two previous concepts: longer structures of polymetres or polyrhythms mixed with the perception of both layers having two different tempi.

Different gati, different jathi

1) Chatusra jathi 3 vs. Tisra jathi 4 = 12 b.
2) Chatusra jathi 3 vs. Tisra jathi 5 = 15 b.
3) Chatusra jathi 3 vs. Khanda jathi 4 = 12 b.
4) Chatusra jathi 5 vs. Tisra jathi 4 = 20 b.
5) Chatusra jathi 5 vs. Khanda jathi 3 = 15 b.
6) Chatusra jathi 5 vs. Khanda jathi 4 = 20 b.
7) Tisra jathi 4 vs. Khanda jathi 3 = 12 b.
8) Tisra jathi 5 vs. Khanda jathi 3 = 15 b.
9)) Tisra jathi 5 vs. Khanda jathi 4 = 20 b.
10) Chatusra jathi 3 vs. Tisra jathi 7 = 21 b.
11) Chatusra jathi 3 vs Khanda jathi 7 = 21 b.
12) Chatusra jathi 3 vs. Misra jathi 4 = 12 b.
13) Chatusra jathi 3 vs Misra jathi 5 = 15 b.
14) Chatusra jathi 5 vs Tisra jathi 7 = 35 b.

15) Chatusra jathi 5 vs Khanda jathi 7 = 35 b.

16) Chatusra jathi 5 vs. Misra jathi 3 = 15 b.

17) Chatusra jathi 5 vs. Misra jathi 4 = 20 b.

18) Chatusra jathi 3 vs Tisra jathi 4 = 12 b.

19) Chatusra jathi 7 vs. Tisra jathi 5 = 35 b.

20) Chatusra jathi 7 vs. Khanda jathi 3 = 21 b.

21) Chatusra jathi 7 vs Khanda jathi 4 = 28 b.

22) Chatusra jathi 7 vs. Misra jathi 3 = 21 b.

23) Chatusra jathi 7 vs Misra jathi 4 = 28 b.

24) Chatusra jathi 7 vs Misra jathi 5 = 35 b.

25) Tisra jathi 4 vs Khanda jathi 7 = 28 b.

26) Tisra jathi 5 vs Khanda jathi 7 = 35 b.

27) Tisra jathi 4 vs. Misra jathi 3 = 12 b.

28) Tisra jathi 4 vs. Misra jathi 5 = 20 b.

29) Tisra jathi 5 vs Misra jathi 3 = 15 b.

30) Tisra jathi 5 vs. Misra jathi 4 = 20 b.

31) Tisra jathi 7 vs Khanda jathi 3 = 21 b.

32) Tisra jathi 7 vs. Khanda jathi 4 = 28 b.

33) Tisra jathi 7 vs. Misra jathi 3 = 21 b.

34) Tisra jathi 7 vs. Misra jathi 4 = 28 b.

35) Tisra jathi 7 vs. Misra jathi 5 = 35 b.

36) Khanda jathi 3 vs Misra jathi 4 = 12 b.

37) Khanda jathi 3 vs. Misra jathi 5 = 15 b.

38) Khanda jathi 4 vs. Misra jathi 3 = 12 b.

39) Khanda jathi 4 vs Misra jathi 5 = 20 b.

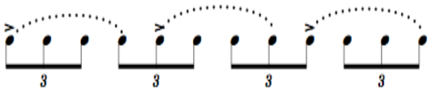
40) Khanda jathi 7 vs. Misra jathi 3 = 21 b.

41) Khanda jathi 7 vs. Misra jathi 4 = 28 b.

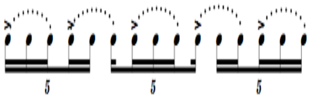
42) Khanda jathi 7 vs. Misra jathi 5 = 35 b.

Audio examples

1) Tisra jathi 4 against khanda jathi 3= 12 beats *(track 20)*

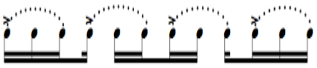


x 3 times

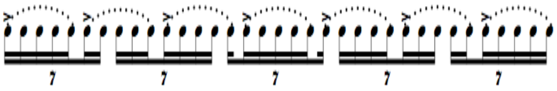


x 4 times

2) Chatusra jathi 3 against misra jathi 5= 15 beats *(track 21)*



x 5 times



x 3 times

RELATIONSHIP OF GATI/JATHI COMBINATIONS WITH THE TALA

Any of the three vertical possibilities seen above, always has to resolve on tala or anga sam and never on any other beat of the tala. The longer the 2-layered gati/jathi combination is, the more it needs to resolve on tala sam.

If chatusra jathi 3 against chatusra jathi 5 (15 beats long) is to be performed and the chosen tala is 7 beats (with the construction of Tisra Triputa- L3 D D-), calculations are needed to establish the starting point of the polyrhythm[5].

---

[5] *Karnatic musicians seem to have a built-in calculator in their brains because they are likely to instantly know the starting point for every polyrhythm in any given tala.*

1) In order to resolve on tala sam, the device should commence on the last beat of the tala and go through two cycles of tala 7. This is 1+ 7 +7 beats= 15 beats.

2) If the resolution is on the first drutam sam, the starting point would be 3 beats later, because the first anga (L3) is 3 beats long. Consequently, the starting point would be the 3rd beat of the tala. Since the tala is 7 beats long, one must count how many beats remain to finish that specific cycle, go through a complete cycle and add the first 3 beats of the tala to resolve on the first drutam sam. This is 5+7+3=15 beats.

3) If the device is to finish on the second drutam sam, one should simply add two beats to the previous starting point since the length of the previous anga (first drutam) is 2 beats. Therefore, the starting point will be the 5th beat. Using the calculation method explained above, one should count the remaining number of beats to complete the cycle, go through one entire cycle of 7 beats and add the first 5 beats of the tala to resolve onto the second drutam sam. This is then 3+7+5= 15 beats.

INDIVIDUAL STRUCTURES OF POLYRHYTHMS

In practice, these long structures of polyrhythms are rarely used in karnatic music, not only because much of karnatic music is improvised, but more importantly, because karnatic musicians consider these long chunks of crossing structures tedious and repetitious; karnatic musicians prize more a constant change of techniques and variety over a long segment of music with crossing accents, regardless how much tension this could create in the music. It is therefore exclusively used in composed parts of their music and quite sparingly.

For all practical purposes, all of the above has a more pedagogical value in order to develop the principles of

a) Internalising every gati/jathi combination in order to increase a better sense of pulse and the gatis per se

b) Gain independence while playing different gatis and/or devices

c) Build a clear understanding as to where accents fall within the beat so that this system can be the foundation for other concepts or techniques that use the gati/jathi combinations as a reference frame or starting point.

Karnatic musicians tend to use the concepts exposed in this chapter by having **both layers start in different places and resolve together**. This provides much more freedom for using different gati/jathi combinations against one another.

In all the examples explained above, if one layer performs a jathi 3 and another one a jathi 5, both starting on the same beat, they would have to complete a whole fragment of music of 15 beats in order to meet or resolve together.

But if the two layers start at different points they would have many more options as to how many times a particular gati/jathi combination could be used.

If jathi 3 against jathi 5 are taken, the layer in jathi 3 could, for instance, simply perform it twice (6 beats) while the second layer could perform it only once (5 beats), starting a beat later than the first layer and resolving together on a tala or anga sam.

This occurs many a time in the improvised sections of karnatic music[6]. As said before, every musician seems to be aware of every finishing point of any number of repetitions of any gati/jathi combination in any tala. So, once the performer of the second layer hears the first musician starting a gati/jathi in a given point of the tala, this second-layer-performer will immediately know how many times the first layer will repeat his polyrhythm and where he will resolve it. Subsequently, the second-layer performer is free to choose any of the three vertical options, choose the number of times that the gati/jathi combination will be performed (and depending on this choice, the beat in the tala he should start) and make sure that both layers finish together.

This idea expands the concept of polyrhythms and polypulses to a higher dimension since the number of options becomes almost infinite, as opposed to the very few structural combinations seen above. Variety indeed can be increased and the possible tediousness or predictability that a fragment of 21 or 35 beats could give to the music can be avoided. The same jathis can be used, but maybe once, twice or thrice rather than five or even seven times if jathis 5 or 7 are used in one of the layers. Furthermore, the fact that both layers start in different points in the tala provide a surprise factor to the listener, especially when, after a very short passage, they resolve together.

PRACTICE METHOD

1) Practice every single gati/jathi combination presented in pages 30-32 until the student acquires a high level of precision and a good feeling for whether he is speeding up or slowing down. **Visualising and memorising where the accents fall in relationship to the beat** is an essential part of the training and of great importance for techniques that use gati/jathi combinations as their reference frame or starting point.

Before starting any gati/jathi combination, is convenient to perform all the matras of the gati for a few beats in order to get the feeling for the beat and gati. Subsequently proceed to the jathi, making sure that the only matras accented are the ones corresponding to the jathi and never emphasise any matra falling on a beat. If one practices, for instance, chatusra jathi 3, it should simply sound as though one is performing tisra, while being in the laya of chatusra.

As opposed to what one may think, starting to practice this chart before the gatis have been completely internalised does actually help to perfect the feeling of the gati itself[7].

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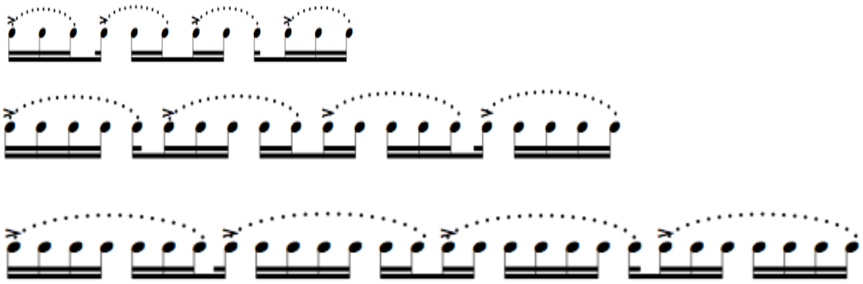
[6] *The fact that this technique is used in improvised parts of their music does not imply that it can be used exclusively by improvisers. The important element here is the concept of two individualised gati/jathi combinations starting separately, but finishing together.*

[7] *It is my experience that many students who could not do khanda or misra at an adequate level after a few weeks, acquired a much higher level of feeling for the mentioned gatis by means of practicing these particular gatis with all their possible jathis.*

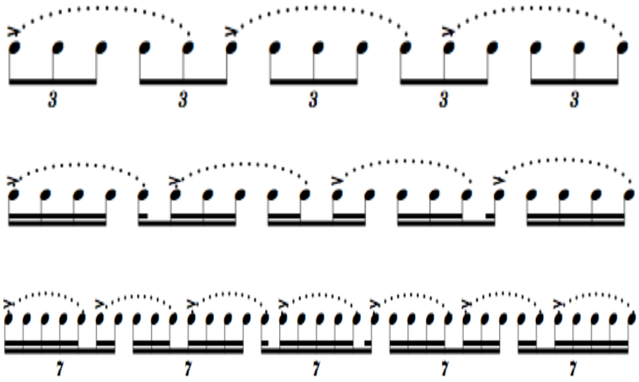
2) Staying in the same gati, go from one jathi to another. First, in an increasing and decreasing way and, after some time, changing jathis randomly.

Example: chatusra jathi 3 going to jathi 5 and jathi 7. *(track 22)*



3) Keeping the same jathi, go from gati to gati. As for the exercise proposed above, first proceed in an orderly fashion to then changing randomly.

Example: tisra jathi 5 going to chatusra jathi 5 and then misra jathi 5. *(track 23)*



4) Practice the **three vertical techniques** explained previously in the chapter[8]. If the musician cannot meet with anyone to practice together, to use a computer aid or similar device would be of great help.

As mentioned previously, these vertical possibilities enable the performer to

a) Internalise every option more deeply.

b) Gain independence, not only related to the beat but, moreover, to another player or group of players who may be performing a different gati or gati/jathi combination (or, ultimately, any other technique).

c) Build a clear understanding as to where accents fall within the beat.

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[8] *See all possibilities in pages 21, 22 and 23.*

Chapter 4

GATI BHEDAM

The Sanskrit term *Bhedam* roughly translates as 'change through destruction' (it has clear spiritual-religious connotations, referring to the destruction of inner energies, attitudes or negativities in order to change). When used in combination with any other musical term, it will always affect the concept that precedes it in one way or another.

Gati Bhedam is a technique by which the **phrasing in a gati/jathi combination is constructed around the jathi rather than the gati**. When the phrase is structured on the jathi it creates the illusion that the phrase is in a different gati and tempo than the *laya* (here laya means both pulse and gati going along the pulse).

Hence, a phrase in, for example, khanda jathi 3, should sound as if the performer is playing a phrase in tisra. The listener should not only perceive that the performer is playing a phrase in tisra, but simultaneously, because the underlying pulse (laya) is khanda, it should also appear that the phrase is being performed in a different tempo.

This concept of phrasing according to the jathi, and not the gati, is so engrained in karnatic music, that in khanda jathi 3 they would never conceive phrasing in khanda and giving accents every three matras to provide some sort of 'colouring' of tisra.

In fact, the term khanda jathi 3 is a term I have coined myself for clarity's sake in order to make the concept and terminology of gati/jathi combination more clear and understandable to westerners starting to study this material. A karnatic musician would never say khanda jathi 3 but **Tisra in Khanda**, which denotes quite emphatically the notion behind: to give the impression of being in tisra while the underlying gati is khanda[1].

NOTATION

Western notation was born and developed because of specific musical parameters. However, it can be argued that this western notation falls short when concepts like that of gati bhedam and other related techniques are to be conveyed[2]. Hence, in order to be able to incorporate this concept into our musical system, a notation should be devised that would convey the aforementioned feeling.

Therefore, it is quite necessary in this chapter to explain how, based on my own study and experience I arrived at creating an alternative notation, since this will become a key issue in order to show many of the concepts of this text.

After years of composing using the traditional western notation, where the phrase is always 'divided' according to an imaginary 'beat-line' notion, and experimenting with all sort of accents, double accents, slurs, dotted slurs etc, I realised that this traditional notation could never convey to the performer this feeling of being in a different gati than the laya (trying to convey a feeling of tisra whilst being in khanda).

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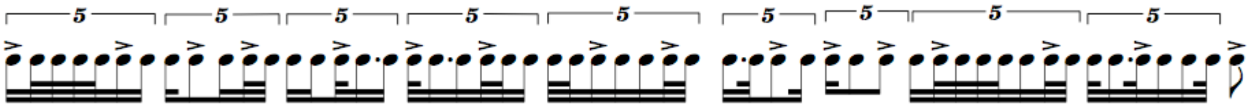
[1] *For the purposes of this text the term khanda jathi 3 will be kept in detriment of the real karnatic term to avoid confusion.*

[2] *As it could also be the case with other music cultures.*

Rather, what I obtained from the performer was the feeling of the gati with a dynamic accent on specific notes but failed to be felt as a cyclic accent that should provide the feeling of being in a different gati and tempo.

If the following phrase in khanda jathi 3 is written according to the notation rules of traditional solfege, it can be argued that a western player, without the knowledge of the concept of gati bhedam and its ulterior practice, could perform the phrase with the feeling of tisra as a karnatic musician would.



After reviewing scores by Ives, Bela-Bartok, Messiaen or Xenakis, I realised that there have already been attempts in western contemporary music to notate the phrase according to the phrase, and not breaking it in order to adapt it to the 'beat-line' division of traditional solfege. Therefore, I decided to experiment with the way karnatic musicians notate their phrases.

When using gati bhedam, phrases are always notated every 3, 4, 5 or 7 matras within any given gati. Ignoring the beat-line that characterises our notation system, each phrase is separated by the sign -.
For instance, the first three beats of the previous phrase would be written as follows:

Khanda[3]

Tha gadadina- ka di gu- dheem. ga- taka di mi- tadheem.. gu-//

Explanation of Symbols:

-One syllable (Tha) = One 𝅘𝅥𝅯

-One syllable followed by a dot: the note value is doubled

-dheem. = 𝅘𝅥𝅮

-One note followed by two dots: the note value is tripled

-dheem.. = 𝅘𝅥𝅮.

-A syllable or group of syllables underlined: the note value is halved

-gadadina = 𝅘𝅥𝅰 notes

-dheem.. = 𝅘𝅥𝅯.

-tadheem.. = A 𝅘𝅥𝅰 followed by a 𝅘𝅥𝅯.

The sign – : signifies the end of the phrase while the sign // signifies a bar line.

---

[3] *Karnatic musicians always write the name of the gati, instead of a sign or bracket like our quintuplet.*

In karnatic notation, no symbol for accent is employed. The sign **–**, that signifies the end of a phrase, also implies that the first note of the next grouping is to be **emphasised** (which is, in essence, what the concept of accent is all about) **AND,** very importantly**, performed with a downbeat feeling** (possibly here lies the Gordian knot of how accents - or its concept - are approached in western and karnatic music).

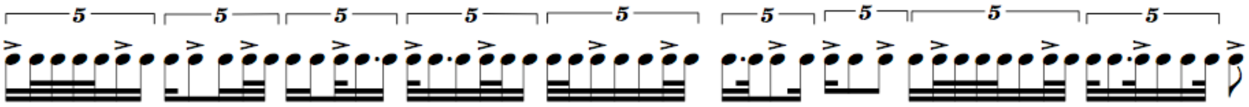
As we shall see throughout this text, an accent in karnatic music is always to be performed with a down-to-earth feeling, and with the intentionality of being the first note of a phrase (similar to the intentionality we may have in western music with the down beat of a metre), whereas in western music accents are related to the level of dynamic expressions or to provide a feeling of syncopation or anticipation.

Accordingly, I decided to find or create a notational device that would enable me to convey the feeling of the jathi. I found that, in most cases, by:

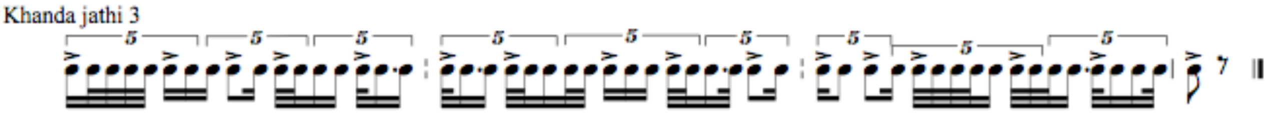
a) **Beaming** the phrase together every 3, 4, 5 or 7 matras; and
b) **Using an accent** on the first note of a grouping of jathi 3, 4, 5 or 7;

most western musicians received a clear visual impression that made them understand and try to convey what was meant by beaming the notes together.

Therefore the phrase in khanda jathi 3 written above



became *(track 24)*



Something that I found quite surprising was the fact that, almost invariably, gati bhedam phrases in khanda, tisra or misra (with any jathi) were performed with more accuracy that phrases in chatusra. I attributed the problem to a simple fact: when beaming a phrase in a way that does not correspond to the traditional beat-line, the usage of brackets, as normally employed in tisra, khanda and misra, enabled the performer at all times to know how every note related to the beat, whereas when the bracket was absent (as it was the case in chatusra), the performer had more problems in relating to the beat.

Subsequently, I concluded that when using the concept of gati bhedam the best way was to be coherent with all gatis and use brackets on all of them. I started placing a bracket with the number 4 when using chatusra, something that has proven very helpful with gati bhedam as well as many other techniques that call for the beaming of phrases in this 'unorthodox' manner.

At approximately the same time, I encountered the second problem; this one occurred when, for instance, a note in the phrase (i.e. ♪) did not fall entirely within one beat but fell on either side of the beat (i.e. a 𝅘𝅥𝅯 before the beat and another 𝅘𝅥𝅯 after the beat).

I decided then to compromise between the karnatic and western notations for the sake of clarity, and proceeded as follows:

a) I divided the note value into two notes at either side of the beat and brackets;

b) Used a tie-over linking both notes; and

c) Kept both notes under the same beaming.

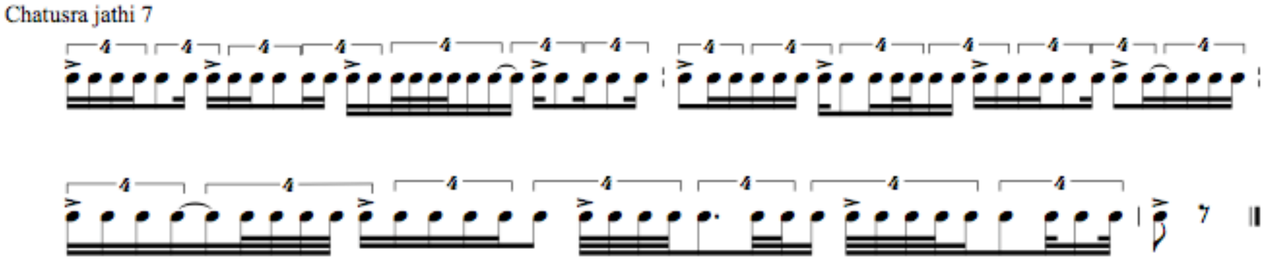
Another element I started using to increase the clarity of the phrase, was dotted slurs. I used this articulation technique in two cases:

a) When notes longer than ♪. are part of the phrase and, therefore, no beaming can be applied; and

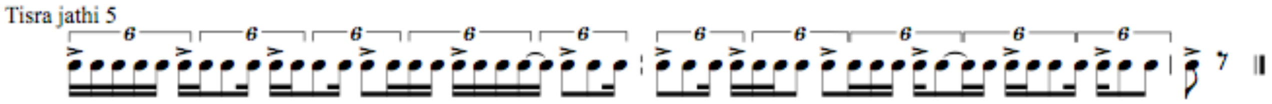
b) When phrases are longer than nine matras.

Reading phrases longer than nine matras in one beaming seems to be visually too cumbersome for the performer. Most of these phrases longer than 9 matras are the result of applying specific techniques (not explained yet), and I found that the best way of notating them was to 'break' them according to the technique's construction logic whilst a **dotted slur** embraced all the smaller groupings.

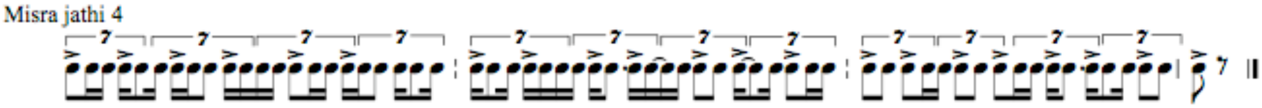
In the following example in chatusra jathi 7, the reader can see the use of the bracket on chatusra, which makes the reading of the phrase and the relationship of every note to the beat much clearer. Also, the above-mentioned problem of splitting one note into two (between 5th and 6th beats, 13th and 14th beats and 15th and 16th beats) can be observed. *(track 25)*



In order for the reader to get a glimpse of each gati and each jathi, two more examples are given below. *(track 26)*.



(track 27)



CREATIVE APPLICATIONS

From a creative standpoint, when using the vertical possibilities seen in chapter 3 in conjunction with the gati bhedam concept, karnatic musicians emphasise the need to construct phrases that would work well against each other, in order to avoid blurry passages when clarity in the polypulses is desired.

In order to create music with this device it is important to keep in mind that its essential purpose is to create an illusion of polypulses or polytempi. The phrase is always created around the accent provided by the jathi. A possible danger is to start skipping accents.

When accents are skipped, the feeling of being in a different gati vanishes; therefore using the notation proposed for gati bhedam does not make any sense. If a gati bhedam phrase in combination with skipping accents is desired, using the regular, traditional notation, would probably be more sensible[4].

Karnatic musicians clearly state that gati bhedam exists only when all the accents are attacked and the phrase is created around the jathi.

Having said this, something that occurs in karnatic music is that **once the feeling of the polytempi has been established**, a few accents can be skipped now and again, provided that the feeling of the jathi is still kept intact. There are only two simple rules to avoid losing the feeling of the jathi:

-Never skip two accents in a row.
-Never skip the accent that falls on the beat.

The point at which a feeling of polytempi is established is a very subjective issue, and possibly one can establish a feeling more easily with chatusra jathi 3 than with khanda jathi 7. Nevertheless, one should remember that, as with any other technique presented in this text, gati bhedam calls for specific 'rules' in order to be what it is. Departing from the basic principle of gati bhedam too often and/or too soon simply cancels the technique as such and the possibility of creating illusions of polytempi that it offers.

Below is a transcription of part of a piece in 5/8 or khanda chapu in which the singer is continuously making phrases with jathi 2, 3, 4 and 6. It can be looked at as if the metre was a gati and every bar a beat of khanda with the phrases being perceived as jathis on khanda. Alternatively, it can be analysed as it is notated, a metre of 5/8 with all phrases in chatusra and the above mentioned jathis applied to chatusra gati.

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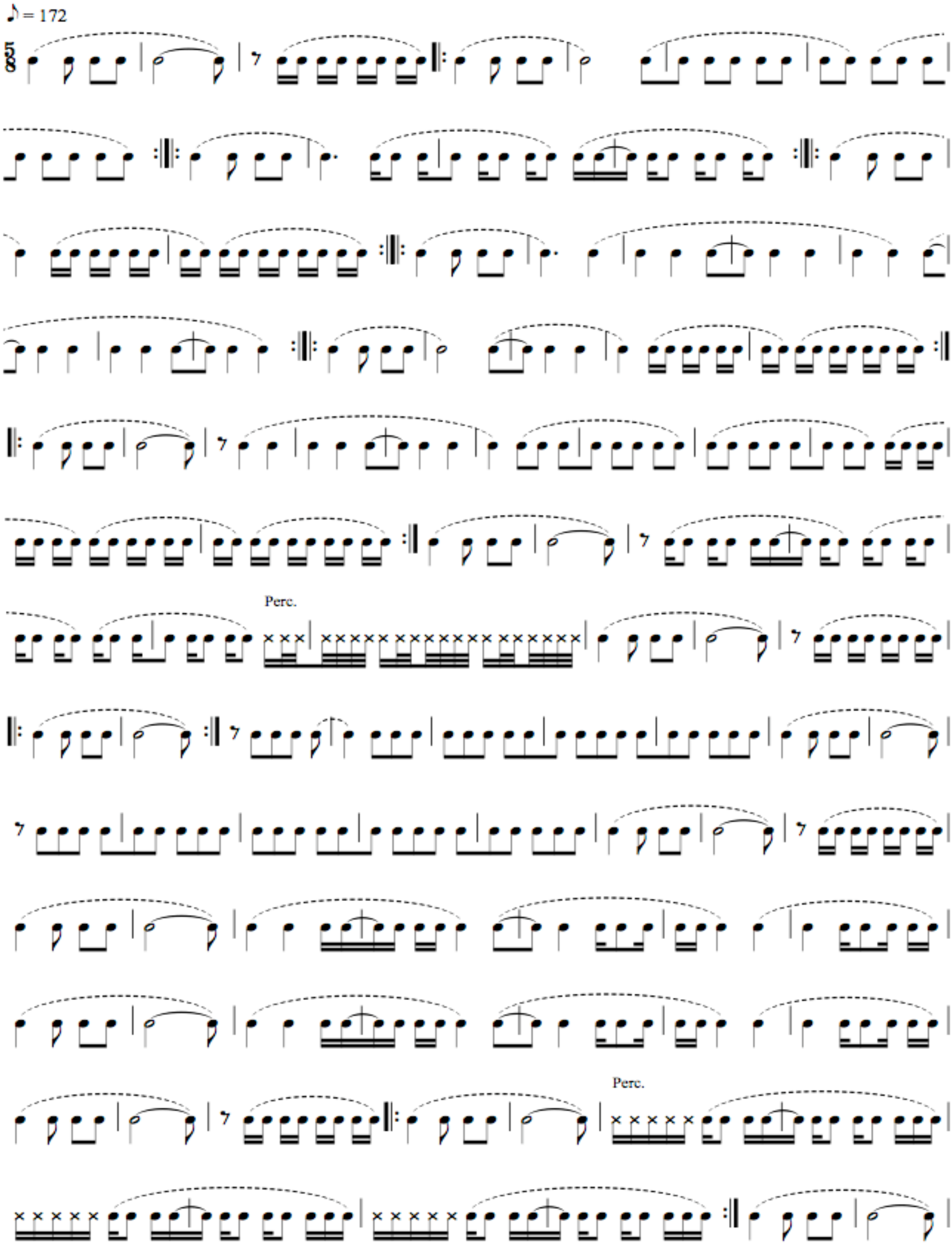
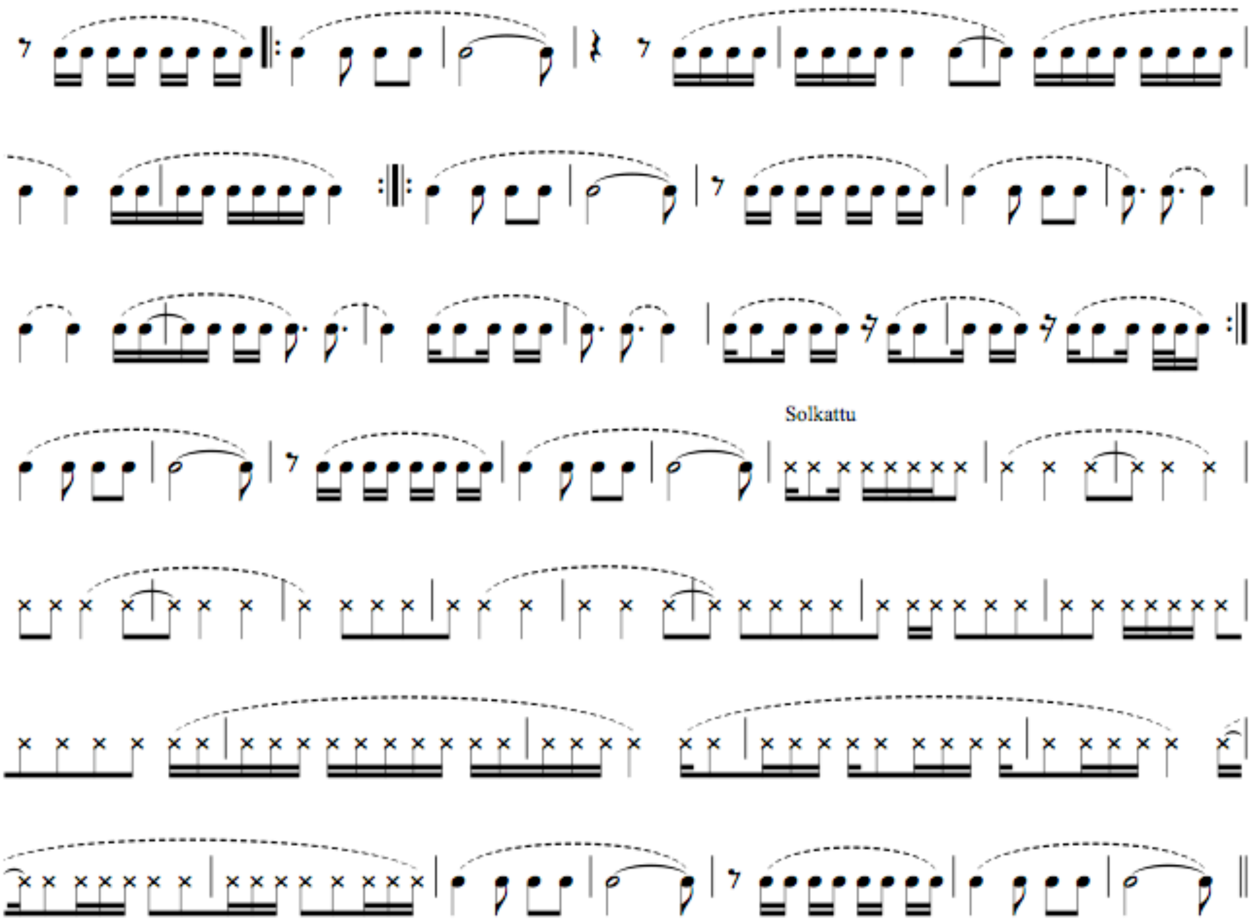
[4] *Since for karnatic musicians, gati bhedam is the sole way of phrasing within a gati/jathi combination, a concept that is not engrained in western culture, I would suggest that one should use the concept of gati bhedam and the proposed notation solely if the purpose is to create the illusion of polytempi.*

(track 28)

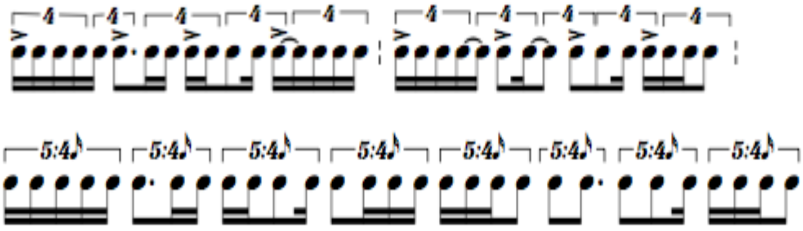

♪= 172
5
8
Perc.
Perc.



PRACTICE METHOD

It is very important at this point to have acquired a very clear understanding of and command on all the gati/jathi combinations, and be well aware of where all the accents fall in relationship to the beat.

1) Start practicing the phrases as if they were a gati and sing them along the pulse (i.e., for a phrase in chatusra jathi 5, sing it first as a phrase in khanda on the pulse). In this way one can become familiarised with the phrase more easily and give it a better feeling when performed as a jathi in any other gati.

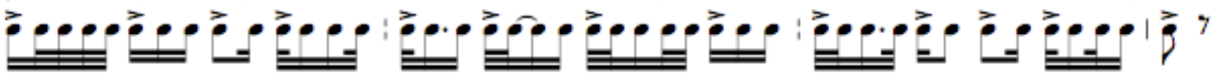


2) Avoid emphasising notes that fall on beats or perform an accent in a syncopated manner. Every accent has to be felt as the downbeat of a 3/16, 4/16, 5/16 or 7/16 metre. Subsequently, always make sure that the feeling of the original gati is avoided. It should at all times sound as if the jathi is actually a gati with its own pulse (the pulse to lean on is the accents of the gati/jathi combination).

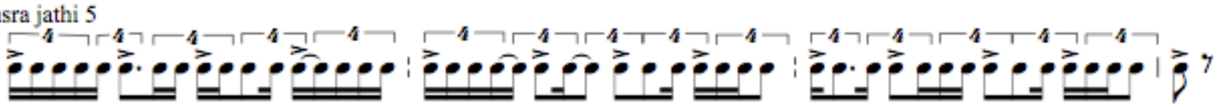
3) Once phrases using all gati/jathis combinations have been perfected, proceed to exercise them as follows:

a) Staying in the same gati, go from jathi to jathi, first in an increasing and decreasing fashion, and afterwards, randomly. Example: chatusra jathi 3 going to jathi 5 and jathi 7

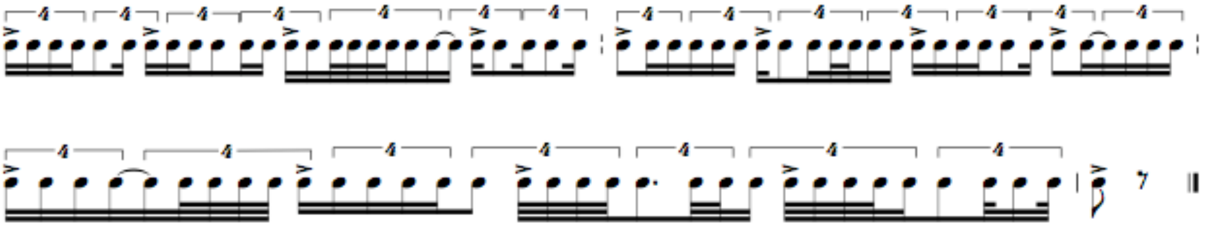
Chatusra jathi 3



Chatusra jathi 5

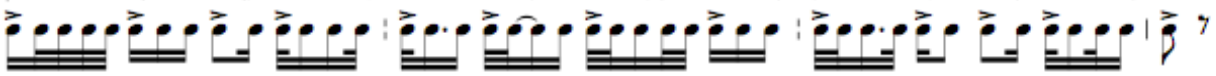


Chatusra jathi 7

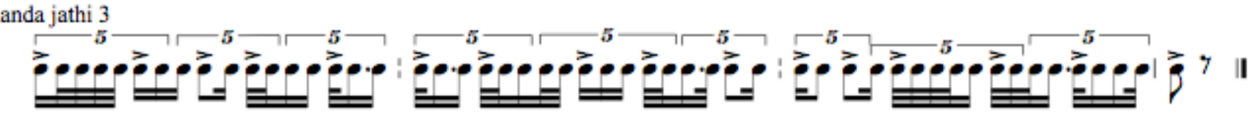


b) Keeping the same jathi, go from gati to gati. First proceed in an orderly fashion to then change randomly. Example: jathi 3 in chatusra going into khanda and misra.

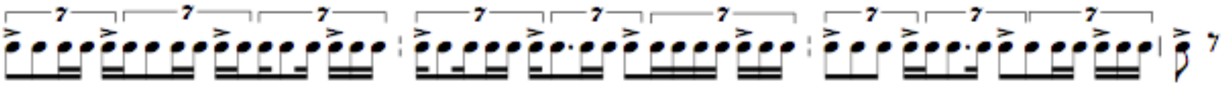
Chatusra jathi 3



Khanda jathi 3



Misra jathi 3



4) Perform all the vertical possibilities explained in chapter 3 (Jathis) but replacing the use of only matras by gati bhedam phrases. Although the phrases presented at the end of this chapter are thought to be used in linear fashion, performing them with all the possibilities already practiced can enhance the internalisation of the gati/jathi combinations as well as the phrasing of gati bhedam.

5) Eventually, construct trees of gati bhedam (as explained in the following chapter 5) as source to deepen in the understanding and proficiency of the gati bhedam phrasing.

Chapter 5

TREE OF GATI BHEDAM

GATI VRUKSHA

A Tree of Gati Bhedam is essentially the development of ideas by connecting two musical objects via a **common denominator**, or an element that links these two musical events in a very logical manner. Many techniques that will be seen later on can be used as part of a Tree but the elements explained thus far are sufficient to start working with this creative tool.

A Tree of Gati Bhedam is a concept that can be applied to a short section, longer segments, or even a whole piece of music. In the latter it can be used to map out key changes throughout the piece, whether composed or improvised.

When used as a sequence in a short time-span, the rules explained below are the only ones to be observed for its construction. If utilised in a longer segment or for a whole piece, it simply is thought of in a conceptual fashion as a way of connecting ideas at specific points of a segment or a piece.

Before the tree of gati bhedam as such is explained, it is first necessary to explain the possibilities for connecting two musical objects. So far, the only material seen, besides the suladi tala system, is phrasing in gatis, gati/jathi combinations and gati bhedam phrasing. These elements, which are ultimately the main ones required to construct a tree, can obviously be used in many different contexts as well.

1) Gati/jathi combination as starting point

If, for example, chatusra jathi 3 is taken as the starting point, from this gati/jathi combination one could go to any of the following four options:

a) Regular chatusra phrasing (without jathi)

b) Chatusra jathi 5 or 7

c) Tisra

d) Khanda or misra jathi 3.

Two of these options are connected by having the gati element as common denominator: it is possible for chatusra jathi 3 to either go to chatusra without any jathi or go to any other jathi within chatusra. The other two options are connected through the jathi element: jathi 3 can become a gati (tisra) or the jathi of the other two remaining gatis.

Therefore, from this particular case, the following general rule can be established: any given gati/jathi combination could only go to four musical objects, two of them providing two options:

a) Regular phrasing of the chosen gati

b) Any other jathi within the chosen gati (two possibilities)

c) The jathi becomes a gati

d) The number of the jathi remains the same in any other gati (two possibilities)

Therefore, from chatusra jathi 3 one cannot go freely to, for instance, khanda or misra unless the music passes through khanda or misra jathi 3 before. Similarly, it could not go to tisra jathi 4, 5 or 7, unless it passes through regular tisra first.

2) Regular gati as starting point

If chatusra is taken as the starting point, this gati could go to:

a) Chatusra jathi 3, 5 or 7

b) Tisra, khanda or misra jathi 4

c) Regular tisra, khanda or misra

In this context, since the starting point contains only one element, everything has to be connected using either chatusra or the number four. Consequently, either the gati remains, using any of its possible jathis, or it becomes the jathi in any other gati; lastly (which within this context, seems to be the most far-fetched option), the gati goes to any other gati.

From this example a general rule can be concluded: when the musical object is a regular gati, it can go to any of the three following concepts, resulting in nine possibilities:

a) The regular gati can stay in the gati, using any of its jathis (three possibilities)

b) The gati becomes the jathi in any other gati (three possibilities)

c) The gati goes to another gati without any jathi (three possibilities).

With this logic of connecting steps, chatusra would therefore never go to any other gati using a jathi, other than jathi 4 (for instance, chatusra could never go to tisra or misra jathi 5 since there is no common denominator between the two of them).

The following is a tree of gati bhedam (still without any relationship to any tala), in which the connections are chosen with the goal of using all the linking options provided above. The explanation given for the first three connections will serve to illustrate the selection process:

Chatusra jathi 3 could go to:

-Regular chatusra -Chatusra jathi 5 or 7 -Regular tisra -Khanda or misra jathi 3

Chatusra jathi 7 is chosen. After performing chatusra jathi 7 an x number of times, this musical object could go to:

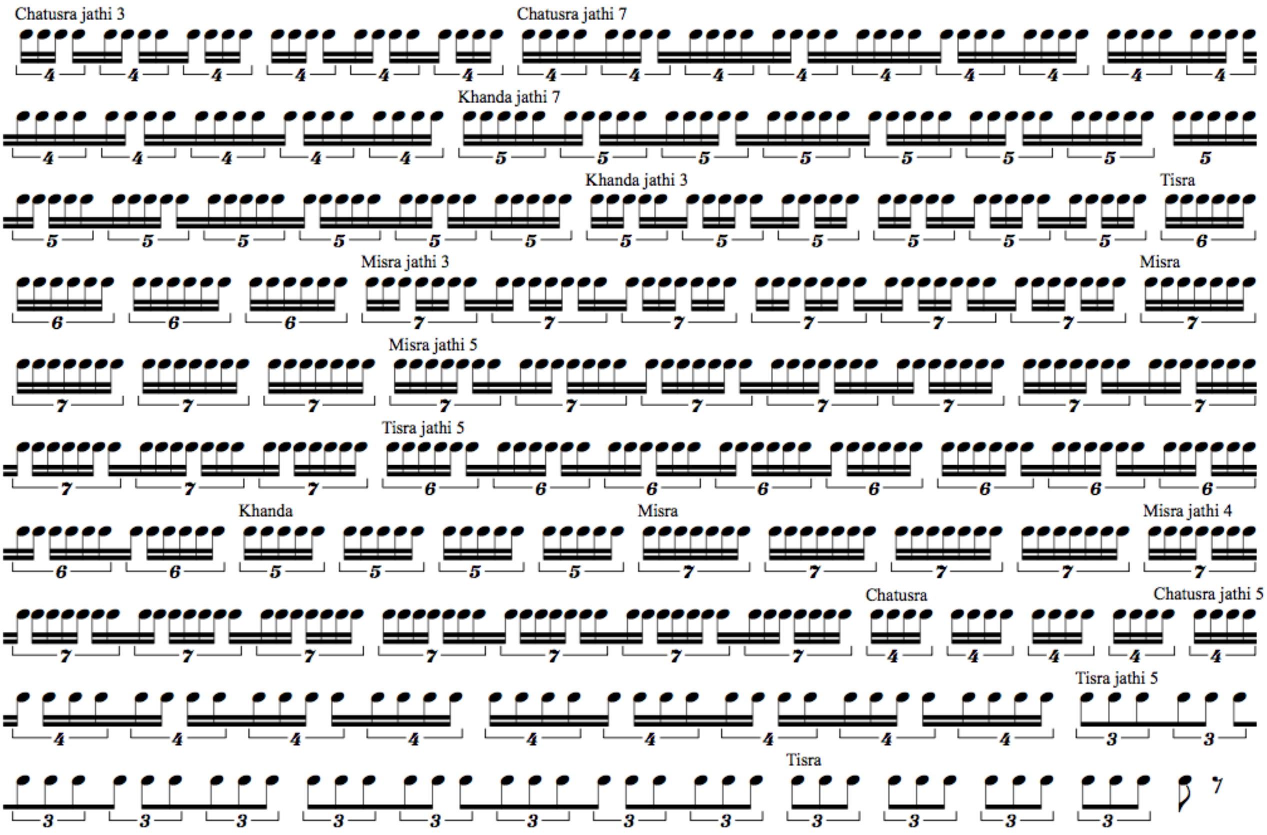
-Regular chatusra -Chatusra jathi 3 or 5 -Regular misra -Khanda or tisra jathi 7

Khanda jathi 7 is the chosen object. After performing it an x number of times, this musical object could go to:

-Regular khanda -Khanda jathi 3 or 4 -Regular misra -Chatusra or tisra jathi 7

This tree is just one possible outcome designed to incorporate all the possibilities explained, rather than thinking musically.

(track 29)



Chatusra jathi 3
Chatusra jathi 7
Khanda jathi 7
Khanda jathi 3
Tisra
Misra jathi 3
Misra
Misra jathi 5
Tisra jathi 5
Khanda
Misra
Misra jathi 4
Chatusra
Chatusra jathi 5
Tisra jathi 5
Tisra

RELATIONSHIP TO THE TALA

Connections between two musical elements, the number of repetitions of a gati/jathi combination and the choice of the number of beats for a regular phrase will never happen randomly in a tree of gati bhedam; they need to be related and adjusted to the tala or anga sams of a tala and some calculations are required.

There are three basic rules as to where changes can take place:

1) While staying in the same gati and moving between any of its jathis or regular phrasing without jathis, changes can happen anywhere in the tala. For instance, chatusra can go to chatusra jathi 3, 5 or 7, and any of these jathis can go to another jathi (while staying in chatusra) or go to regular chatusra at any point of the tala.

An exception to this rule occurs when, at a particular moment, a gati/jathi combination creates a polyrhythm or polypulse with another layer, in which case the rules seen in previous chapters apply and the gati/jathi combination should resolve on a tala or anga sam.

2) A gati/jathi combination can go to any other gati/jathi combination (provided the same jathi is preserved), or go from any gati without jathi, to another gati without jathi **exclusively** on tala sam. For instance, khanda jathi 4 can go to misra or tisra jathi 4 (and never to any other gati with a different jathi than 4), or any gati can go to any other gati provided that this change occurs on tala sam.

3) When a gati becomes a jathi (chatusra going to any other gati with jathi 4), or a jathi becomes a gati (any gati with jathi 4 going to chatusra), the change can also happen on an anga sam.

As mentioned at the beginning of the chapter, a tree can be used in three different ways: as a short sequence, as source for changes in a bigger segment of music, or as a tool to map out key changes in a whole piece.

With the elements seen so far in the text and in this chapter, the most feasible option is to create a short sequence. Taking the sequence written above, almost infinite musical and structural variations could be created.

The following is an example that shows how the sequence and the tala can interrelate. It is the transcription of a tree of gati bhedam by B.C. Manjunath.

Tree of Gati Bhedam in Tala 7 (L3 D D)

1) Chatusra x 8 beats 2) Chatusra jathi 3 x 4=12 beats 3) Chatusra jathi 5 x 3=15 b.
These first 3 steps resolve on tala sam after 5 cycles of Tala 7 (8+12+15=35 beats)

4) Khanda x 5 b. 5) Khanda jathi 3 x 3=9 b.
These two steps resolve on tala sam after 2 cycles (5+9=14 beats)

6) Khanda jat 4 x 2=8 b 7) Khanda x 6 b.
These two steps resolve on tala sam after 2 cycles (8+6=14 beats)

8) Tisra jat 5 x 3=15 b. 9) Tisra x 6 b
These two steps resolve on tala sam after 3 cycles (15+6=21 beats)

10) Misra x 7 b. *(one cycle)*

11) Misra jat 3 x 4=12 b 12) Misra jat 4 x 4=16 b.
These two steps resolve on tala sam after 4 cycles (12+16=28 beats)

13) Chat x 7 b *(one cycle)*

It can be observed that the number of times that a particular gati/jathi combination is performed has an effect on the way the phrases are constructed. If jathi 5 is chosen and the number of repetitions of the gati/jathi combination is 3, the phrase is constructed around three cells of jathi 5, which adds another subtle layer of polyrhythm to the already existing feeling provided by the gati/jathi combination. The dotted slur in the notated transcription clarifies these cells. However, this phrasing choice is just one of the multiple possibilities to create phrasing in a tree of gati bhedam[1].

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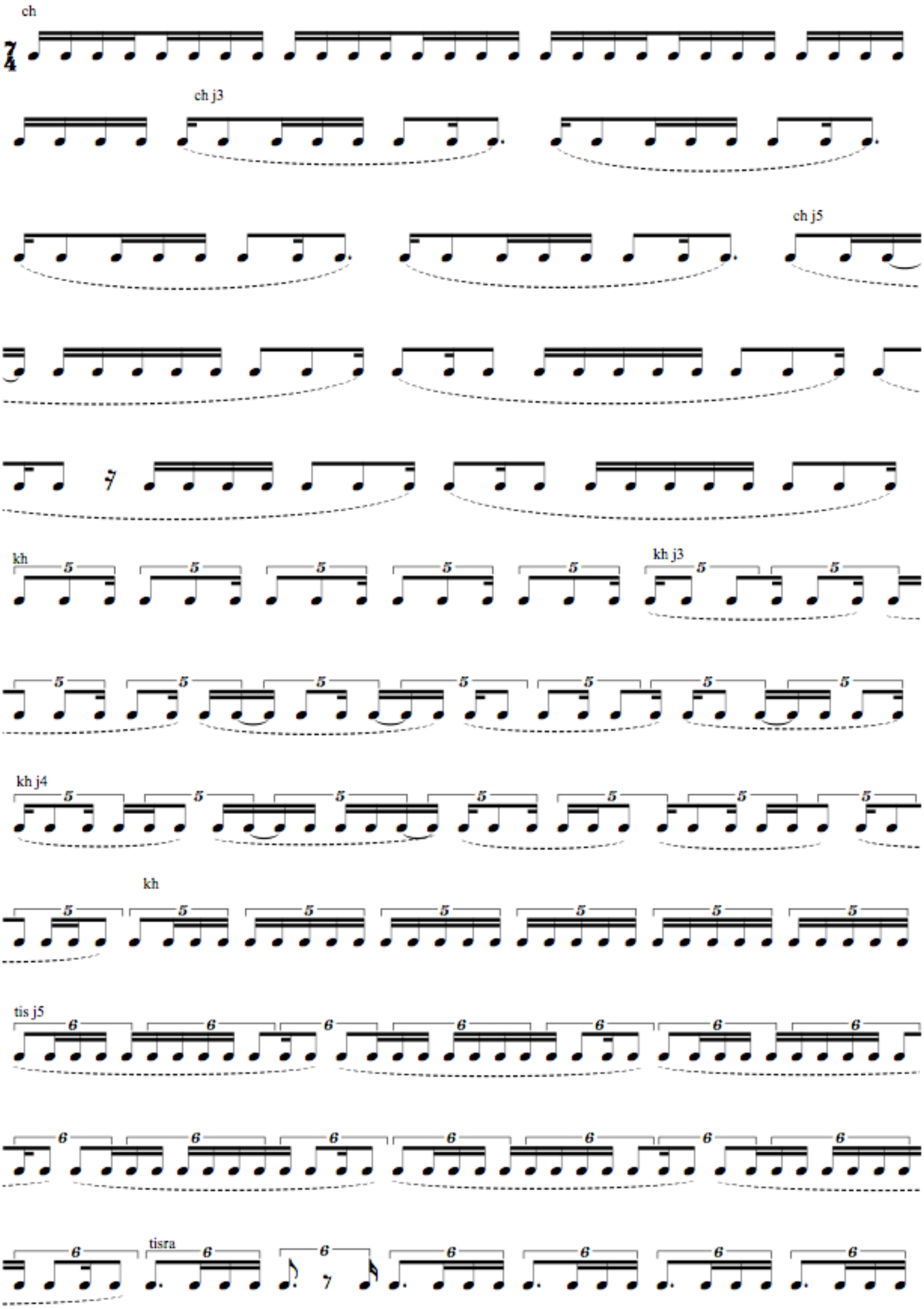
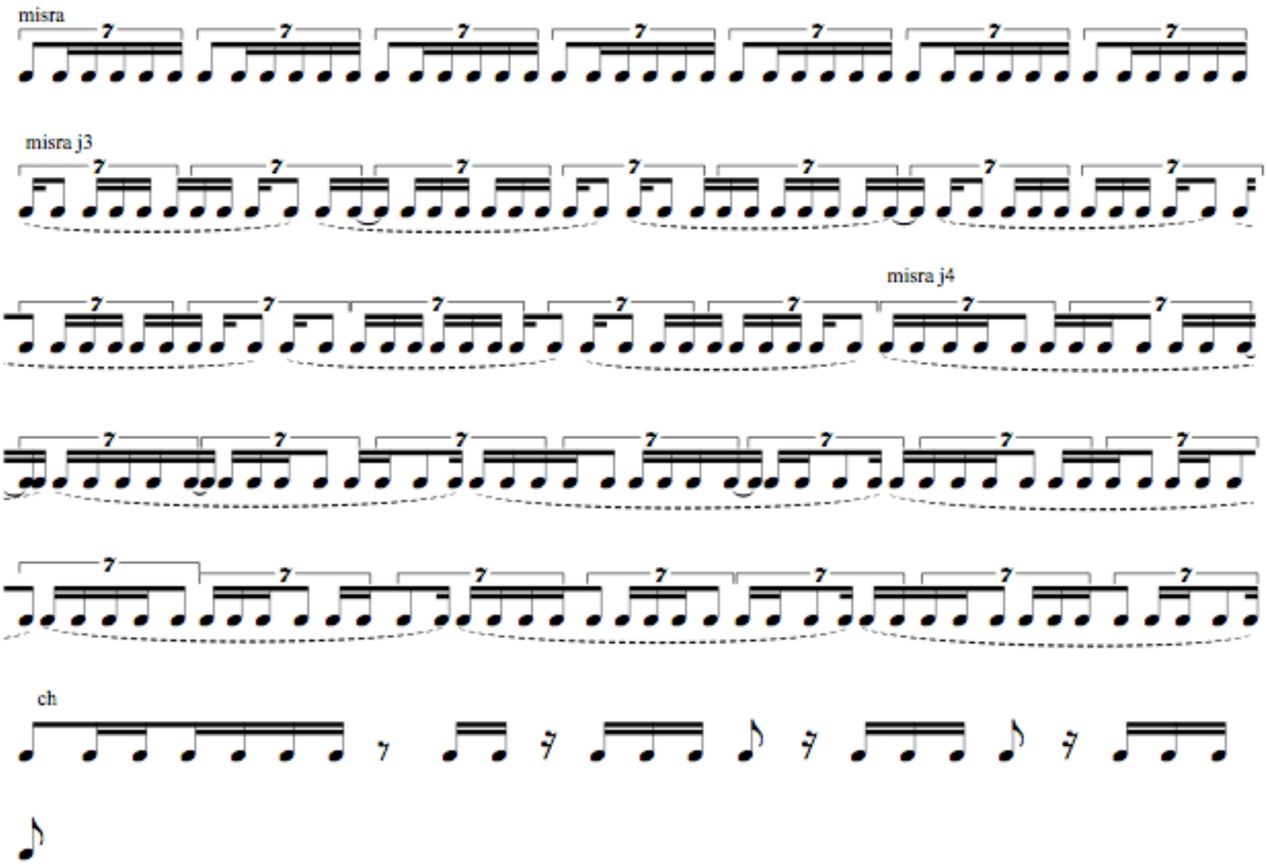
[1] *In the chapter on* Rhythmical Sangatis, *more options will be given as to what sort of phrasing and development can also be used in a Tree.*

(track 30)


7/4
ch
ch j3
ch j5
kh
kh j3
kh j4
kh
tis j5
tisra


misra
misra j3
misra j4
ch
7

At the very end of the example, in the Misra jathi 4 phrase, the listener can hear a subdivision of 6+5+5 rather than a jathi 4. This 'exception' will be understood when the chapter of Jathi Bhedam *is explained.*

Chapter 6

RHYTHMICAL SANGATIS

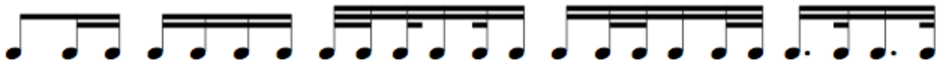
A Rhythmical Sangati is when a phrase that has previously been performed in one gati, is realised or 'transformed' into a different gati.

There are three possible ways to make this change of gati.

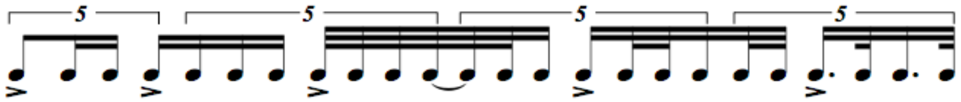
1) The original gati becomes the jathi in the new gati

If, for instance, a 5-beat phrase in chatusra is taken as starting point and 'transferred' to khanda, the jathi 4 will be applied and the phrase will simply sound like the original but in a faster tempo.

The original phrase in chatusra *(track 31)*



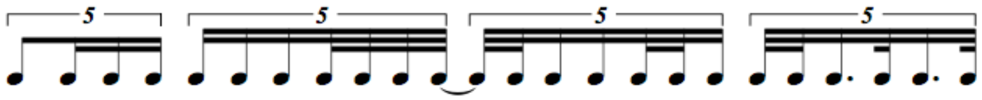
When transferred to khanda jathi 4 will look like this *(track 32)*



2) Keeping the flow of the new gati

In this option, what remains of the original is the note value and order of these note-values, but the flavour of the original phrase and gati will disappear, whilst the feeling of the new gati (khanda in this example) should be present. What was grouped every four matras is now grouped and beamed every five matras. Nonetheless, a listener can perceive a relationship with the original phrase.

Taking the previous phrase in chatusra, the new phrase looks like this *(track 33)*



If the reader proceeds to compare the original phrase note by note with the new one, it can be seen that every note in khanda perfectly matches the length and order of the phrase in chatusra, but the musical result, as consequence of the re-grouping into the khanda flow, will differ from that of the original.

3) Using a different jathi

With this option, the original phrase is further modified since two elements are applied to it: the change of gati and the use of a jathi different to 4 (if we take the chatusra example). There will then be two possible jathis to choose from (in this example, it could be jathi 3 or 7).

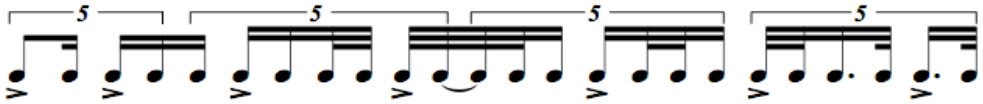
However, this option encounters a 'problem'.

In the two previous examples the number of beats and accents were complete; in khanda jathi 4 there were 5 accents in 4 beats, and in the second example the phrase was four beats long.

When a different jathi is used, the number of accents that the new jathi requires to resolve on a beat cannot be completed with the original length of the phrase (in this case five beats of chatusra or 20 matras). If the phrase is to be performed in, for instance, khanda jathi 3, the 20 matras of the original phrase will provide six accents of 3 matras and there still will be two matras left that, obviously, could not take a jathi 3.

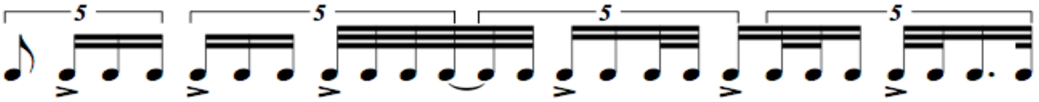
There are three solutions to this dilemma:

A) Start the phrase on the beat and after the six accents of jathi 3, conclude the last two matras of the phrase as a jathi 2. *(track 34)*

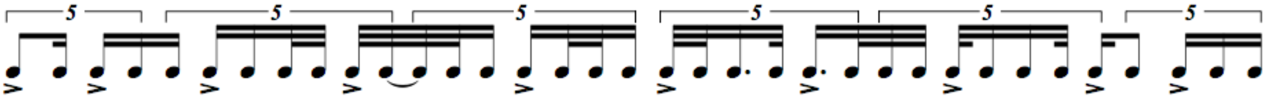


The main problem with this option is that could eventually sound as though the last grouping of 2 matras is in reality a mistake committed by the performer in order to meet the beat or conductor. Karnatic musicians seldom use this option.

B) Start the phrase with the jathi 2 at the beginning and proceed with the jathi 3 right afterwards. In this way the tension created by the jathi 3 will be resolved on a beat[1]. *(track 35)*

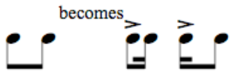


C) This is the most common option that, simultaneously, opens up a wide range of developmental possibilities. Jathi 3 is used from the beat (and not off-beat as in the previous example), and on arriving at the problematic point of the 2 matras, extend the phrase using jathi 3 until it resolves on a beat. *(track 36)*



The first 2 matras of the 7th accent (where the original phrase finished previously in the example 'A'), by virtue of the addition of two 𝅘𝅥𝅯 are now part of a jathi 3 phrase. Further, the phrase has been extended by adding three groups of jathi 3 to ensure that it finally resolves on a beat.

When using this third option, it is often impossible to apply the chosen jathi in a 'clean' way, generally because of the length of note values of the original phrase. If there were two ♪ and jathi 3 were to be applied to them, this would obviously be impossible, since they are two notes of two matras. What karnatic musicians may do in this situation is to divide the second ♪ into two different notes (two 𝅘𝅥𝅯) with separate attacks: the first one would become the 3rd matra of a grouping of jathi 3 and the second one would be the 1st matra of the next grouping of jathi 3.



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[1] *This possibility has very interesting ramifications when using polyrhythms and while developing phrases in a Tree. These will be explained later on.*

While this does occur and is 'allowed' in karnatic music, musicians are rather reticent to use this possibility. The reason for this is that the underlying relationships established by the note-values and the mathematical proportionalities that any phrase creates is broken if a note is divided into two. Hence using it more than a couple of times in a phrase (the number will depend on the length of the phrase), is highly discouraged.

DEVELOPMENTAL RAMIFICATIONS

While the first two techniques of rhythmical sangatis are quite self-explanatory and do not open many possibilities beyond the technique in itself, the third option of applying a different jathi has opened up a wide array of questions and possibilities that can also be applied to the first two adapting options.

The solutions to the problem created in a khanda jathi 3 version of a 5-beat long phrase in chatusra can be taken further into other contexts.

The example given in this chapter (5 beats in chatusra taken into khanda) enabled the khanda phrase to be 4 'neat', complete beats long. But, what happens when a creator wants to take, for instance, a 4-beat phrase in chatusra (16 matras) into tisra, or a 7-beat phrase in khanda (35 matras) into chatusra?

Any phrase in any gati, regardless of its length, can be taken into any other gati, and any of the possibilities explained above can be applied (keeping the flow of the original phrase, keeping the flow of the new gati or using a different jathi besides the new gati). Now in a different context these options can be defined as follows:

The rhythmical sangati concept is not an end in itself, but a developmental notion to bind gati and/or jathi changes and to try to provide cohesion to these changes.

Starting point of a rhythmical sangati

Any rhythmical sangati phrase can have two starting points:

1) Start on a beat and finish wherever in the beat the length of the original phrase permits. Taking the two examples mentioned above - 16 matras in chatusra taken into tisra and 35 matras of khanda taken into chatusra- would simply imply that the first phrase will finish on the 1st matra of the sixth beat. Further, the 35 matras of khanda will result on a phrase in chatusra that will finish on the 3rd matra of the 9th beat.

Not finishing neatly on a beat does not mean that phrasing in the new gati has to come to a stop.

Consequently, the rhythmical sangati serves the purpose of commencing a phrase in a new gati, connecting it to a new idea whilst binding the gati change. Once the rhythmical sangati phrase has finished, regardless of its position in the beat, the creator can simply incorporate new rhythmical phrases or ideas afterwards. This is basically the notion explained in the above example of khanda jathi 3 that extended the phrase until the jathi 3 resolved on a beat (although, without necessarily having to resort to using this way of adapting a phrase).

Subsequently, the phrase in tisra of 5 beats and 1 matra can use any of the adapting techniques: keeping the flow of the original phrase – therefore, using jathi 4 in this case; keeping the flow of the new gati – tisra in this case; or lastly apply a different jathi to tisra – jathi 5 or 7 in this case. Although the musical result of the chosen adapting technique will in each case be different, the resulting phrase can connect with any other musical idea within tisra immediately afterwards.

2) Start off the beat and finish on a beat. For this possibility, calculations are required.
-If 16 matras in tisra: leave 2 matras off the beat and start on the 3rd matra. The phrase will 'resolve' on a beat.

-If 35 matras in chatusra: leave 1 matra off the beat and start on the 2nd matra.

'Leaving' matras off the beat does not mean either that there has to be a silence of that length before the rhythmical sangati starts; any phrase can **precede** the rhythmical sangati phrase without any disruption. This notion can be found in the example of khanda jathi 3 when the two remaining matras were used to start the phrase.

A complete classification of options would be excessively long, and possibly futile, but as long as the following points are clear, it is now up to the creator to explore the many possibilities opened up by this concept with its many options and ramifications:
-The main idea of what constitutes a rhythmical sangati;
-The three ways of adapting a phrase into a new gati; and
-The developmental purpose of rhythmical sangati as binding element.

'Incomplete' gati/jathi combinations

Until now, any gati/jathi combination was thought of in terms of how many times the whole combination would be performed: a chatusra jathi 3 was always characterised by four accents in three beats and the calculations were based on these number of beats. Consequently, this combination could result in three beats or any multiple of three.

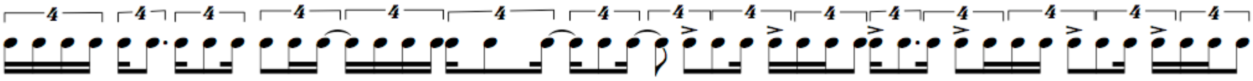
However, as was also seen with the polyrhythms starting on different beats, **a gati/jathi combination does not necessarily have to start on a beat.**

In a tree of gati bhedam, when linking regular phrasing with any jathi of that gati, the regular phrasing can be followed by a jathi that starts on any of the accents of that particular combination.

For example, if a chatusra phrase is to be followed by chatusra jathi 5, this device could start on any of the other three accents of this gati/jathi combination. Needless to say, the original structure of where every accent falls within the beat, should be kept intact. Starting off the beat does not imply starting anywhere in the beat, but starting on any of the possible accents of a particular gati/jathi combination.

For example, a chatusra jathi 5 structure could also start on
-2nd matra after the 2nd beat
-3rd matra after the 3rd beat
-4th matra after the 4th beat

In the following example there are seven beats of regular chatusra followed by chatusra jathi 5. The phrase of this gati/jathi combination commences on its 3rd accent, the one that would fall on the 3rd matra after the 3rd beat. Therefore the chatusra jathi 5 combination contains 6 accents and lasts for 7 + ½ beats *(track 37)*.



In this fashion, gati/jathi combinations become a much more flexible tool that do not need to be counted in terms of complete number of beats, or even number of blocks, but can appear fragmented and mixed with regular phrasing. Simultaneously, it provides more freedom while using rhythmical sangatis within any musical context, but more significantly, within a tree of gati bhedam where gati bhedam is possibly used more abundantly than anywhere else within karnatic music.

Rhythmical sangatis can be used as a developmental technique:

-In any context, anywhere in the creation of a piece, or in an improvised solo.

-With specific creative techniques that will be explained further on in the text.

-As the main source of ideas within a Tree of Gati Bhedam

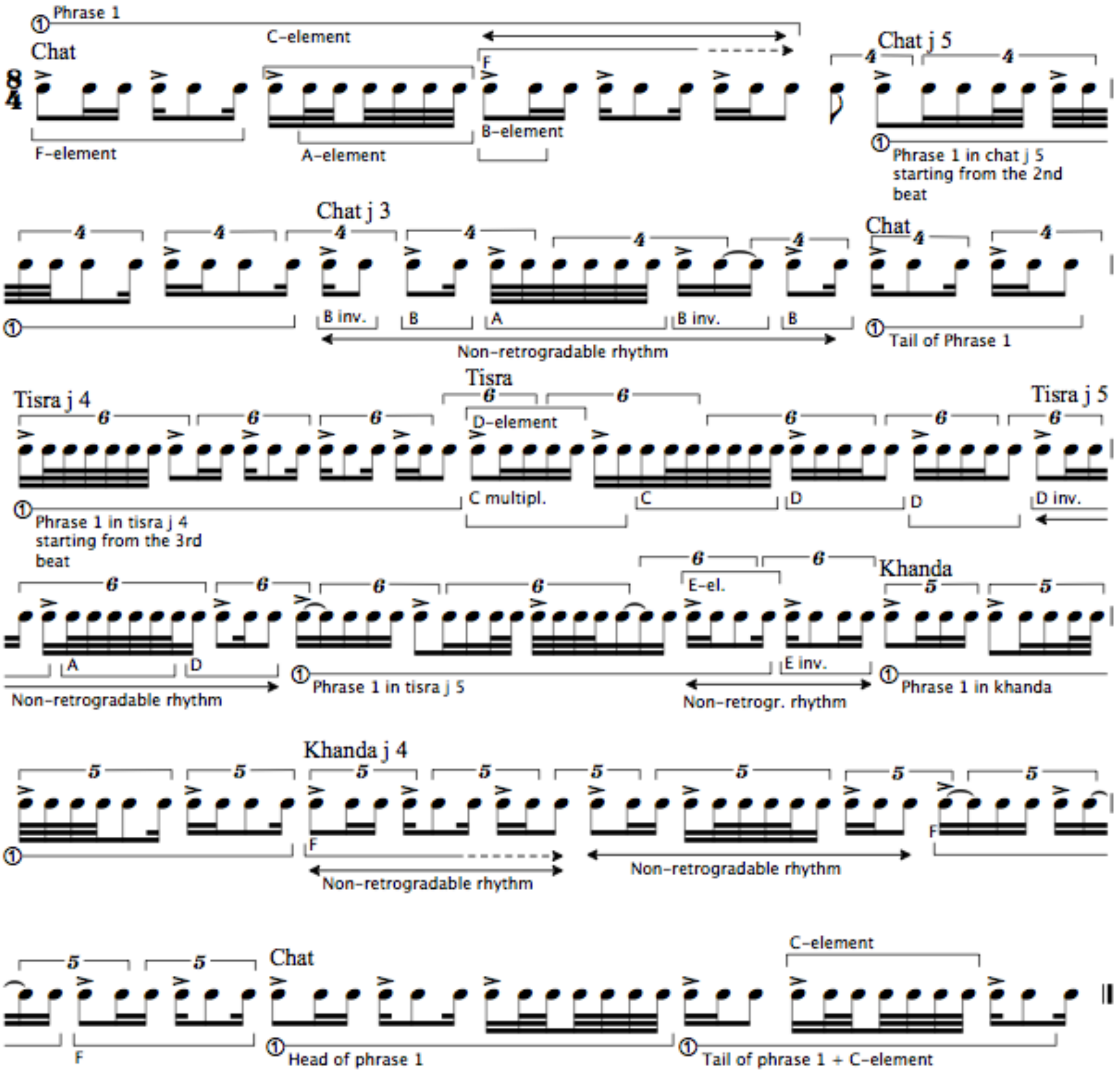
Although not exclusively the only technique used to develop phrases in a tree, rhythmical sangati is indeed the 'trade mark' of a tree.

Below is a short example of a tree of gati bhedam using primarily rhythmical sangatis.

Commencing with a short phrase of usually 4-6 beats, the various ways of adapting phrases characteristic of rhythmical sangatis and the connection of any rhythmical sangati to any other phrase, enables the creator to shape up a spider net of interrelated ideas that can be further modified, distorted etc.

Depending on the taste of the creator for 'closeness' or distance to the raw material, during the development of a tree one can find recurring phrases in different gatis, or phrases that hold similarities and subliminal cohesion with one another, while the musical result is a continuous exploration of ideas.

(track 38)



① Phrase 1
Chat
C-element
F
8/4
F-element
A-element
B-element
Chat j 5
4
4
① Phrase 1 in chat j 5 starting from the 2nd beat
4
4
Chat j 3
4
4
4
4
①
B inv.
B
A
B inv.
B
Non-retrogradable rhythm
Chat
4
4
① Tail of Phrase 1
Tisra j 4
6
6
6
Tisra
6
D-element
6
6
6
Tisra j 5
6
① Phrase 1 in tisra j 4 starting from the 3rd beat
C multipl.
C
D
D
D inv.
6
6
6
6
6
6
E-el.
Khanda
5
5
A
D
Non-retrogradable rhythm
① Phrase 1 in tisra j 5
E inv.
Non-retrogr. rhythm
① Phrase 1 in khanda
Khanda j 4
5
5
5
5
5
5
5
5
5
①
F
Non-retrogradable rhythm
Non-retrogradable rhythm
F
5
5
Chat
C-element
F
① Head of phrase 1
① Tail of phrase 1 + C-element

Chapter 7

JATHI BHEDAM

This technique is the karnatic replica of the western concept of continuous metre changes or, as some musicians prefer to call it, *amalgamation*, (of which Stravinsky's 'Le Sacre du Printemps' is possibly the first and most known example).

Jathi bhedam is a concept whereby accents embracing groups of matras of different length succeed one another. It could be defined as a **sequence of irregularly distributed accents** that has as a goal to provide the impression or illusion of an **inner amalgamation** or continuous change of metres within the tala. Simultaneously, it also is a very important creative device in karnatic music, from which many other creative techniques are derived.

As opposed to the western version of amalgamation, where the metre changes usually apply to all instruments (exceptions to this generality can be found in pieces by, inter alia, Charles Ives), in karnatic music a jathi bhedam sequence can be performed in one layer only, whilst another layer could be doing something entirely different. Furthermore, the calculations for a jathi bhedam sequence will always be thought of within the boundaries of the tala, be it one, two or more cycles long.

As with gati bhedam, where the feeling of the jathi prevailed over the gati and the phrases needed to be felt and performed as 3/16, 4/16 etc, in jathi bhedam the feeling of the chosen numbers need also to be felt as though they were a metre of 5/16, 7/16, 3/8 etc. Consequently, a jathi bhedam sequence could eventually be structured in such a way that an accent may never fall on a beat, except when resolving on tala sam.

CONSTRUCTION OF A SEQUENCE

In order to construct a sequence of jathi bhedam, more accent possibilities are available than in gati bhedam. Accents may occur every 1, 2, 3, 4, 5, 6, 7, 8 or 9 matras[1].

Method of construction

1) Decide the gati and number of cycles to be used for the sequence, and calculate the number of resulting matras.

In the example below, the tala is 9 beats long and the gati is chatusra, which results in 36 matras.

2) Choose numbers[2] that, after adding them all up, would equal the resulting number of matras. The choice of these numbers, and more importantly, the ordering of these numbers to construct the sequence need to be thought of quite carefully for reasons that will become more apparent later on in the chapter.

---

[1] *For the same reasons that applied to gatis and jathis, for the time being number 9 will be excluded while constructing a sequence of jathi bhedam. Also, it is important to keep in mind that when using 6 or 8, the phrase has to be felt as such and never as two times 3 or 4.*

[2] *Numbers and accents mean exactly the same in the context of jathi bhedam.*

In the following example the numbers are

-3 x four times -5 x two times -1 x one time -2 x one time -4 x one time -7 x one time

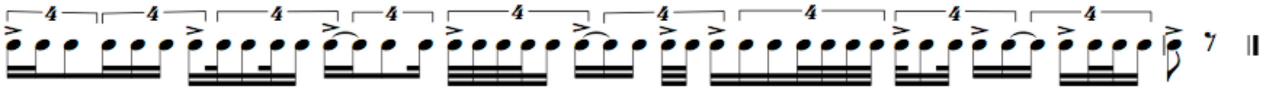
3) Establish an order with the chosen numbers. To do so, a series of rules should be observed by any karnatic musician. However, out of the many rules that karnatic music has to construct the sequence, I consider only the following of relevance for the purposes of laying the foundations of a jathi bhedam sequence in a western context:

> a) No accent should fall on a beat until at least the 4th accent of the sequence has been reached (the importance of the number 3 in karnatic music will become clear later on).
>
> b) Never accent two consecutive beats (consequently, avoid the number 4 in chatusra where the previous accent falls on the beat, 5 if khanda etc).
>
> c) Do not place the same number more than three times in a row in order to avoid any feeling of regularity or gati bhedam.
>
> d) If two or more cycles have been chosen for the sequence, never accent any of the intermediate tala sams until the resolving tala sam.

In the example below, a few potential problems need to be taken into consideration:

> -The number 3 has been chosen four times. Repeating this number four times in a row should be avoided if the third 'rule' is to be respected.
>
> -The sequence starts with the number 7; subsequently, if the first rule is to be respected, the numbers 1 or 5 should be avoided as the second accent in the sequence (7+1=8 matras// 7+5=12 matras).
>
> -The 4th and 8th accents fall on the 5th and 8th beat respectively. Accordingly, the number 4 should not be used on those points.

The final sequence (7 4 5 3 3 1 5 2 3 3) and a phrase that articulates this sequence is thus *(track 39)*



It is important to emphasise that jathi bhedam phrasing always revolves around the accent. In fact, the phrase ***IS*** a result of the chosen numbers and no accent should be skipped or silenced. Doing the latter would simply result in a different sequence to the one worked out in advance.

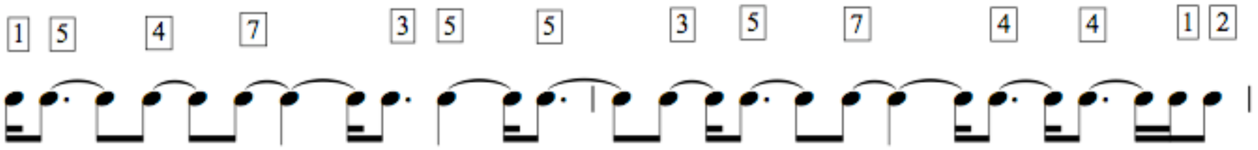
Also, it is necessary to comment on the notational aspect: it can be observed that the notation devised for gati bhedam (beaming the phrase across the beat-line and placing brackets over 4, 5, 6 or 7 matras – depending on the gati) is also applied here. If traditional notation is utilised, it would be very difficult to transmit the idea of inner amalgamation in a context of continuous accent changes. In fact, the 'style' proposed in chapter 4 and employed above has become one of the notational cornerstones in my music and that of many of my students in order to translate karnatic techniques into a western readable notation that conveys the desired feeling behind this and derived creative techniques.

Phrasing possibilities

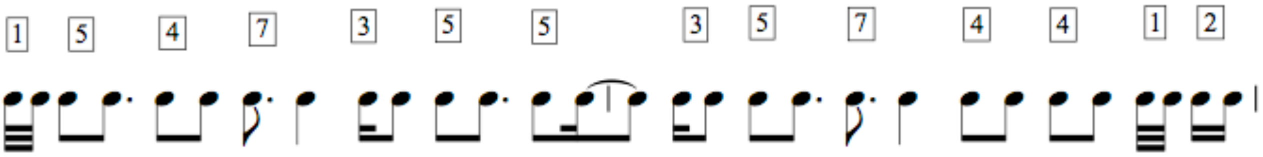
There are two ways to create phrases in a jathi bhedam sequence.

1) Apply the same number of notes per accent: in this particular case, every accent is taken as a 'cell' against which the same number of notes is utilised. Mostly, the choice is 2, 3 or 4 notes per cell.

In the following example, two cycles of tala 7 are used for the sequence. The first option is solely performing the accent without any other added note (therefore, one note per cell). *(track 40)*

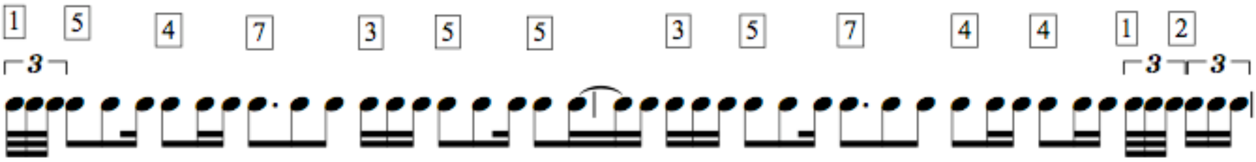


In the second option, the choice is two notes per cell. Although in this example every accent of 3, 5 or 7 uses the same phrase, this does not have to be the case. When using this phrasing possibility, every 'repetition' of a number can take a completely different phrase as long as the same number of notes is respected. *(track 41)*



In the third option, the choice is of three notes per cell. It can be observed that the gati used on the cells of 1 and 2 matras is not chatusra but tisra (against 1 and 2 matras respectively). This, in principle, contradicts what it has been said so far about not mixing two or more gatis in one cycle.

However, this gati mixing is just a glimpse of a far-reaching and complex approach to what in the West is generally called 'irregular groupings', and it will be further explored and explained in the chapter of 'Combinations *Anuloma-Pratiloma*'. Suffice it to say that, when using this phrasing possibility, and due to the systematic choice of the number of notes per cell (three in this case), a triplet could eventually be used against each cell (and not only against 1 or 2 matras). *(track 42)*



2) 'Free phrasing': This concept is quite self-explanatory; as long as the phrase is created around the accents, the phrase can be done with any number of notes per cell[3]. *(track 43)*

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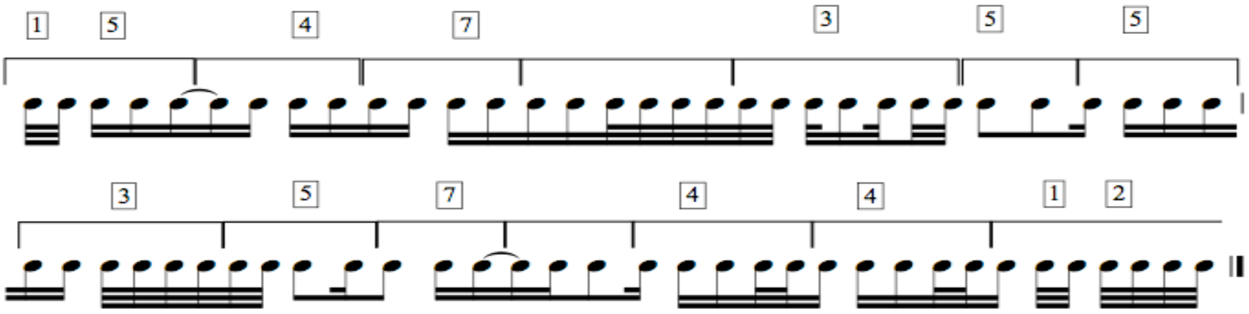
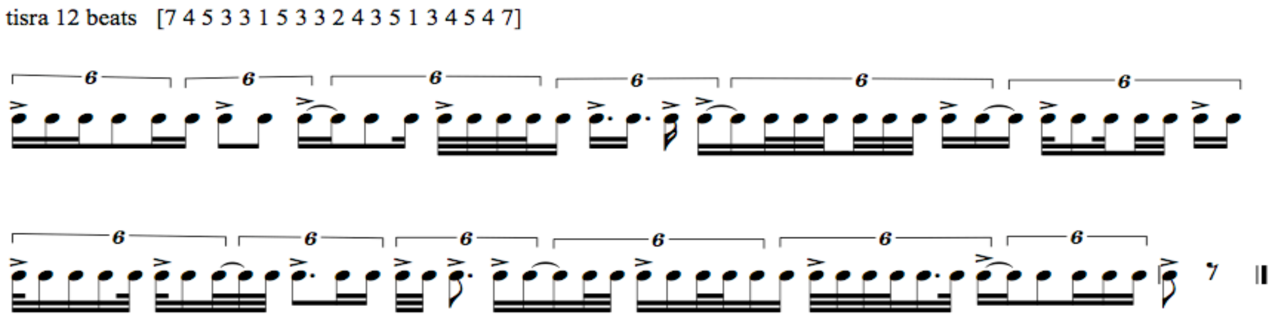
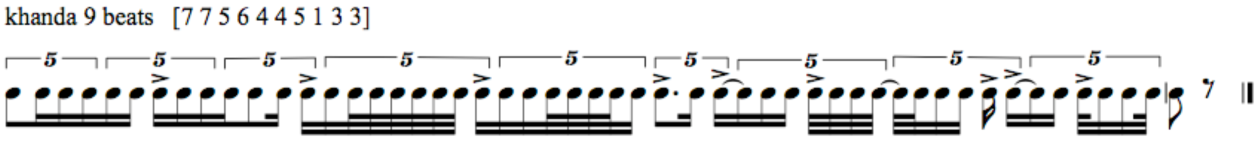
[3] *To avoid confusion with numbers in the example, the squared numbers are those chosen for the sequence, and the bracket embraces every four matras since the phrase is in chatusra.*


1
5
4
7
3
5
5
3
5
7
4
4
1
2

For the purposes of acquiring a bigger picture of phrasing possibilities, the following two examples are provided with the audio tracks. *(track 44)*


tisra 12 beats [7 4 5 3 3 1 5 3 3 2 4 3 5 1 3 4 5 4 7]
6
6
6
6
6
6
6
6
6
6
6
6

(track 45)


khanda 9 beats [7 7 5 6 4 4 5 1 3 3]
5
5
5
5
5
5
5
5
5

If the two previous examples are translated into western outer amalgamation, the time signatures would be similar or the same to the ones created by B. Ferneyhough, in which the denominator denotes ♪ or 𝅘𝅥𝅯 of triplets or quintuplets, such as 7/24, 2/12, 5/24 (as the first three numbers of the example in tisra would suggest), or 7/20, 3/10 and 4/20 as the first, fourth and fifth cells of khanda would imply[4].

DEVELOPMENTAL (CREATIVE) POSSIBILITIES OF A SEQUENCE

A sequence of jathi bhedam in karnatic music is almost as important as the motivic material could be in be-bop or much of XIX century classical composition.

However, any development on the sequence would exclusively be based on numerical relationships within the sequence and will never have a 'phrase-development' character. Consequently, in order to create phrases, a karnatic musician will take into consideration the two phrasing techniques described previously and, more importantly, the musical context where the sequence is utilised.

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[4] *In this sense one can infer that the notion of jathi bhedam, long ago went beyond the time signature changes concept that started around the beginning of the 20th century in the West, since from its birth, the jathi bhedam concept has been applied to all gatis.*

The first step (the step that is actually thought out while creating the original sequence) is to split the sequence into 2, 3, or maximum 4 fragments that will become independent units.

The parameters to determine which number can or should be the first or last of a fragment, or how many cells should be part of every fragment might seem rather subjective. The only element found systematically is the avoidance of the accent of 1 matra as the last accent of a fragment, possibly due to the 'pushing forward' character of this accent. Another element is that fragments of similar length are rarely employed.

However, the establishment of a certain feeling for numerical patterns and a clear logic behind decisions is of utmost importance. It is my conviction that the highly mathematical character of karnatic music enables musicians to see relationships that may easily escape our eye or mind frame so that what is 'clear' logic to them may be quite obscure to us.

If the first sequence in chatusra is taken and two fragments are chosen

7 4 5 3 3 1 5 2 3 3

the division into 7 4 5 3 3 (A) 1 5 2 3 3 (B)
seems like the most logical choice, because of the repetition of 3 3 at the end of every fragment and because 1 starts the second fragment, something that usually gives character or a 'push' to the numerical sequence.

Dividing this particular sequence into three fragments would probably result in very few developmental options due to the fact that making fragments of 3 cells diminishes the number of possible variations within the fragments. In addition, karnatic musicians would probably find them too random and not sufficiently logical.
-7 4 5   3 3 1 5   2 3 3
-7 4 5 3   3 1 5   2 3 3

If the second numerical sequence in chatusra is taken (2 cycles of tala 7)
1 5 4 7 3 5 5 3 5 7 4 4 1 2

a clear logical numerical pattern may not be easy to find at first sight, but a few options could be
-1 5 4 7 3   5 5 3 5 7   4 4 1 2
-1 5 4 7   3 5 5 3 5   7 4 4 1 2
-1 5 4 7 3 5   5 3 5 7   4 4 1 2

The last one seems to contain more logic due to the relationship of the last 3 5 of the first fragment with its retrograde 5 3 of the second fragment and the 7 being placed at similar points in relation to the 3's and 5's in first and second fragments.

On the other hand, the second option accumulates all 3's and 5's in the second fragment, while using 7 to finish and start the first and third fragments respectively.

As mentioned before, the reasoning behind can become extremely subjective, but after one of the possible developments is described below, it will become clearer why the third option is a better one[5].

TECHNIQUES

A) When the development occurs in the same gati as the original

1) Keeping the original order of the fragments.

Keeping the fragments A, B and C in the same order, enables the 'inner content' or sequence of numbers to be **retrograded,** but, more interestingly, enables **two consecutive numbers to exchange their position in the sequence.** Both concepts can be used in the same development but applied to different fragments. All the possibilities are thus

Original	1 5 4 7 3 5	5 3 5 7	4 4 1 2
Exchange 2 consecutive numbers:	5 1 4 7 3 5	3 5 5 7	4 1 4 2
	1 4 5 7 3 5	5 5 3 7	4 4 2 1
	1 5 7 4 3 5	5 3 7 5	
	1 5 4 3 7 5		
	1 5 4 7 5 3		
Retrograded version	5 3 7 4 5 1	7 5 3 5	2 1 4 4

2) Keeping the original order of the cells

If the 'inner content' or original sequence of the numbers remains intact, one can

-Re-organise the order of the fragments

-Repeat and/or omit fragments

Through these options, and since the three possibilities can co-exist in any development, the number of variations would go beyond any classification. Here there are just a few examples:

-B B A C A   -A C A B   -A B A B   -C A   -C B C A B

A repetition and/or omission of a fragment will result in lengthening or shortening the original sequence; therefore, the developed sequence would not fit into the original number of cycles of the tala. When this is the case, what is customary is to finish the sequence on tala sam by adding what is called a ***short mukthay***.

Mukthay is one of the longest, most varied and most fascinating subjects in karnatic music and short mukthays are just the simplest form of all of them. For the purposes of completing the information needed for this chapter suffice it to say that a short mukthay is a phrase repeated three times, every repetition usually separated by a 'gap'[6].

---

[5] *From now on, the fragments will be called A, B and C*

If the third example is taken (A B A B) and, since A is 25 matras long and B is 20, the total length would then be 90 matras. This number of matras would not fit into any multiple of tala 7. One should consequently establish how many cycles of the chosen tala would be the closest to the resulting number.

90 matras in chatusra equals 22 beats plus 2 matras. One, two or three cycles of tala 7 would come short of this number of beats. Four cycles seems to be the most logical choice, since it would be 28 beats or 112 matras long.

In order to decide the length of the short mukthay, one must subtract 90 matras (length of sequence A B A B) from 112 matras (4 cycles of tala 7) which will give 22 matras.

These 22 matras will be the total length of the short mukthay. Since a mukthay is a phrase repeated three times, 22 matras must be divided by three. This would give three phrases of 7 matras each, plus one matra left over for the gap. Considering that there are two gaps (between first and second phrase and second and third) and **every gap has to have the same length**, every gap would be ½ matra long (or a 𝅘𝅥𝅯). The phrase to be used can be as close to or contrasting with the previous material as the creator would like it to be.

So the whole sequence would look like this
A (25 matras) B (20 matras) A B + short mukthay (7, ½, 7, ½, 7) | T.S.

Summarising: there are two elements that can be used for the development of a jathi bhedam sequence: the 'inner content' of the fragments (or sequence of numbers), and the order of the fragments itself. **Only one of them can be changed.** If one decides to make any alteration to the original order of the fragments in the sequence, the order of the numbers must be left intact and vice versa; if one wants to change the order of the cells, the original order of fragments must be kept intact.

B) When the development occurs in a different gati to the original

1) The number representing the new gati becomes an important element for resolving the sequence on tala sam.

If the original sequence of 2 cycles of tala 7 is performed in, for instance khanda, the result will be that the 56 matras in chatusra of the original sequence become 11 beats plus 1 matra in khanda. Consequently, 2 beats and 4 matras are 'missing' in order to resolve the whole sequence onto tala sam.

These two beats need to represent the choice of the new gati, therefore the number 5 should be chosen two times (as a general rule, the number representing the gati should be used as many times as the number of beats remains to complete the tala).

---

[6] *A gap is a literal translation of the word* **kaarvai**, *used to describe the separation between phrases. The reason why karnatic musicians call it a gap and not a silence or rest will become more clear in chapter 8.*

Eventually, as is the case in this example, there could be a number of matras left that do not complete a beat. This number will be used as such for the completion of the sequence and never split into further cells.

Thus the sequence of 56 matras will require of a cell of 5 matras x two times, plus a cell of 4 matras. This can be done in any of the following ways:

-5 5 4 -5 4 5 -4 5 5 [7]

-Placement of added cells

a) At the beginning of the tala followed by the sequence: **5 5 4 A B C**

b) After the sequence ends **A B C 5 5 4**

In these two cases, the cells inside every fragment can be developed as explained previously, as long as the order of the fragments is kept intact. Fragments are always kept in the original order, although eventually, a simple exchange between A and B or B and C can be found in karnatic music. No repetition or omission of fragments is ever done when the sequence is taken into another gati.

c) Inserting the added cells in between the fragments

This option is possibly the most interesting and far-reaching, since all the new cells do not appear as a block and the number of options increases.

Some examples could be

A 5 B 4 5 C **-4 A 5 B 5 C** **-5 A B 5 C 4**

However, with this option, none of the possibilities regarding the development of the inner content or order of fragments is ever applied.

2) Using a short mukthay: the last option to resolve the sequence onto tala sam, quite surprisingly destroys all the care put into showing the new gati by means of repeating its number as many times as beats are left over; this option is simply to work out a short mukthay to be played after the sequence is finished. In this example, the 14 matras would be divided by three, to give a phrase of 4 matras repeated three times and two gaps of 1 matra each.

SHORT MUKTHAYS CHART

This list is only a compilation of frequently used frames in karnatic music. Two points of relevance should be explained:

-Gaps of 𝅘𝅥𝅯 should be avoided. When this is the case, they simply add a 𝅘𝅥𝅯 to each gap, turning its note value into a 'complete' number, so that the last matra of the last phrase is pushed to fall on tala sam. This implies that the last matra of the phrase should be attacked and always be a 𝅘𝅥𝅯 long. This format of the mukthay, when the last matra of the third phrase falls on tala sam, is written 5 (1) 5 (1) 4+ | 1

---

[7] *For the examples 554 is chosen, but any of the other two options could have been taken.*

-The same frame can be used for entirely different phrases, depending on the musical context. As with the development of jathi bhedam sequences, the thought behind is a numerical one and not phrase-oriented[8].

Chatusra

2 beats (8 matras)	-3 (0)	3 (0)	2+ | 1	-2 (1)	2 (1)	2 | T.S.
4 beats (16 matras)	-5 (1)	5 (1)	4+ | 1	-(1) 5 (0)	5 (0)	5 | T.S.
5 beats (20 matras)	-7 (0)	7 (0)	6+ | 1	-6 (1)	6 (1)	6 | T.S.

Tisra (2nd speed)

2 beats (12 matras)	-4 (0)	4 (0)	4 | T.S	-(1) 3 (1)	3 (1)	3 | T.S.
4 beats (24 matras)	-8 (0)	8 (0)	8 | T.S.	-(1) 7 (1)	7 (1)	7 | T.S.
5 beats (30 matras)	-(1) 9 (1)	9 (1)	9 | T.S.	-8 (3)	8 (3)	8 | T.S.

Khanda

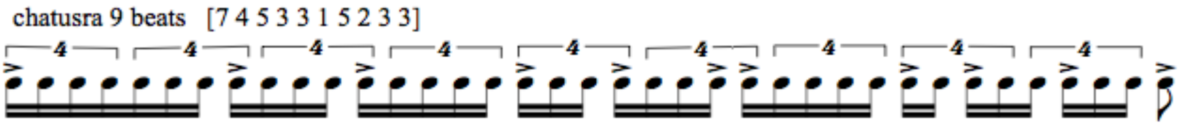
2 beats (10 matras)	-(1) 3 (0)	3 (0)	3 | T.S.	-3 (1)	3 (1)	2+ | 1
4 beats (20 matras)	-7 (0)	7 (0)	6+ | 1	-6 (1)	6 (1)	6 | T.S.
5 beats (25 matras)	-7 (2)	7 (2)	7 | T.S.	-8 (1)	8 (1)	7+ | 1

Misra

2 beats (14 matras)	-5 (0)	5 (0)	4+ | 1	-4 (1)	4 (1)	4 | T.S
4 beats (28 matras)	-9 (1)	9 (1)	8+ | 1	-6 (1)	6 (1)	6 | T.S.
5 beats (35 matras)	-11 (1)	11 (1)	11 | T.S.	-(3) 10 (1)	10 (1)	10 | T.S.

PRACTICE METHOD

1) Prior to trying any phrase, practice the sequence of numbers by singing all the matras of every cell. The performer should try to clearly feel the accents with a 'downbeat' feeling regardless of their position in the beat[9]. Therefore, for the following jathi bhedam phrase it is convenient to do all matras without the phrase.



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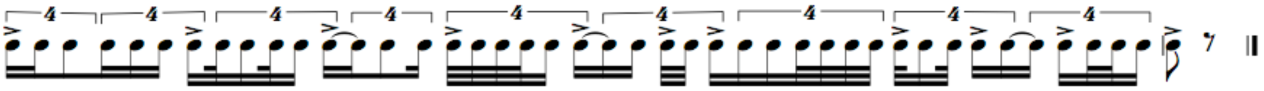
[8] *Number in parenthesis means the number of matras for the gaps, or if they appear before the phrase, signifies the number of matras off the beat before the phrase starts.*

[9] *The main difference with gati bhedam is that in the latter there are only a few accent possibilities and they are always conceived in a regular fashion, whereas in jathi bhedam the number of combinations are almost infinite and accents every 1, 2, 6 and 8 matras are added to the previous set of accents.*



2) Exaggerate the dynamic level and intentionality given to the accent, since each accent has to be performed with a downbeat feeling, as though the metres were changing continuously, and never as dynamic accents or syncopations to a phrase; furthermore, avoid giving any downbeat feeling to any note that is not accented. Obviously, this does not mean that phrases have to sound 'flat' or emotionless. However, there would certainly be a tendency in the westerner to emphasise either notes falling on a beat or longer notes inside a phrase. The musician should be aware at all times of these tendencies, as well as the tendencies of

-Syncopating accents when they are placed in the last matra of a beat
-Not sufficiently emphasising the accents
-Not playing the accent with a downbeat feeling.

3) Once the sequence of numbers and accents is internalised, proceed to play every phrase separately so that the phrase begins to grow as such. Here, two approaches can be used:

-Perform every cell of the phrase within a beat by turning the number of matras of each cell into a gati. For example, if a cell of the phrase is written around a jathi 5, play the phrase in khanda *(see example presented in the gati bhedam chapter, page 50).*

-Perform the cell as if the number of matras of the accent were a metre. If jathi 5 in chatusra, play it as though a 5/16 metre; if tisra, 5/24 and so forth. Eventually, combining the two methods can help to acquire more accuracy and a better feeling for the phrase.

4) Proceed to perform the whole sequence while keeping in mind everything explained.

Chapter 8

SAMA MUKTHAYS

This is the only type of mukthay that has concrete techniques for development throughout a piece, as opposed to most mukthays that tend to be a one-time occurrence.

The principle is essentially the same as in short mukthays: a phrase is repeated three times, usually separated by a gap, that resolves on tala sam.

The main differences are that, while short mukthays are a tool to bridge the end of any technique or phrase and tala sam (but can start anywhere in the tala), sama mukthays must **start** and **finish** on tala sam; further, any karnatic musician, whilst constructing a sama mukthay, will always choose a possibility that will allow every repetition of the phrase to start in a different place within the beat, therefore provoking a displacement of the first phrase, while always making it sound as if it starts on the beat.

Every phrase of a mukthay is called ***pala***, an important term to avoid confusion when talking about the mukthay as a phrase, as opposed to a phrase of the mukthay (the latter called pala).

CONSTRUCTION OF A SAMA MUKTHAY

1) Choose the gati on which the original sama mukthay will be constructed and calculate the number of matras in one or two cycles of the tala[1].

In the example below, the chosen tala is 14 beats, the gati is chatusra and the number of cycles is one. This will result in a mukthay of 56 matras (14x4).

2) Divide the number of matras by three, since these are the number of palas of a sama mukthay. This division will provide the longest possible pala in the tala, and most of the time results in 1 or 2 matras left over that will be used for the gaps.
In this example, 56:3=18 matras per pala, plus 2 matras left over. These 2 matras will be divided by two, since this is the number of gaps, and the length of the gaps must always be the same.

18 (1) 18 (1) 18 I T.S.

3) Make a short list of possible pala and gap lengths so that the most suitable mukthay can be constructed. The first option does not necessarily have to be the one chosen (in fact, this barely happens). To find these different options, subtract one matra per pala that will be added to the left over matras to work out the length of the gaps.

If one matra per pala is subtracted, the length of every pala will be 17 matras. This 'releases' three matras that, together with the 2 left over matras of the first calculation would give 5 matras for the gaps. This number 5 will then be divided by two and will give two gaps of 2+1/2 matras.

---

[1] *The original sama mukthay for a piece does not have to be constructed on chatusra, although the vast majority of them are indeed constructed in this gati.*

17 (2+1/2) 17 (2+1/2) 17 | T.S.

As explained in the section dedicated to short mukthays in the jathi bhedam chapter, these 'fractional matra' gaps (the term used by karnatic musicians) are usually avoided. In order to avoid them, ½ matra is added to every gap and the last matra of the last pala will resolve on tala sam. In order to make this possible, the last matra of the pala needs to be a ♪ and must always be attacked. The previous construction would then look like this:
17 (3) 17 (3) 16 + | 1 (the 1 is the last matra of the third pala and falls on tala sam)

-If two matras per pala are subtracted, the result will be
16 (4) 16 (4) 16 | T.S

-If three matras are subtracted
15 (5+1/2) 15 (5+1/2) 15 | T.S

In this case, the addition of the ½ matra to each gap is necessary and the construction will result in
15 (6) 15 (6) 14 + | 1

One can go as far as one would like to; however, under karnatic 'aesthetics' a sama mukthay with a gap longer than 5 or 6 matras is usually discarded.

4) Once the different options have been constructed, decide which one is the most suitable for the piece. In the decision-taking, factors other than the primary construction are observed: usually the developmental possibilities are taken into account, and whether the number of the pala gives scope for displacement within the beat or not.

These are the four valid constructions to choose from, once the options with 'fractional matra' gaps have been discarded:
-18 (1) 18 (1) 18 | T.S. -17 (3) 17 (3) 16 + | 1 -16 (4) 16 (4) 16 | T.S -15 (6) 15 (6) 14 + | 1

Out of these four options, the second and third possibilities would automatically be discarded because in both cases all the palas will start on the beat, and, as mentioned before, the longest pala is not necessarily the best option. Subsequently, the fourth option will serve the purpose of illustrating this technique and its developmental possibilities.

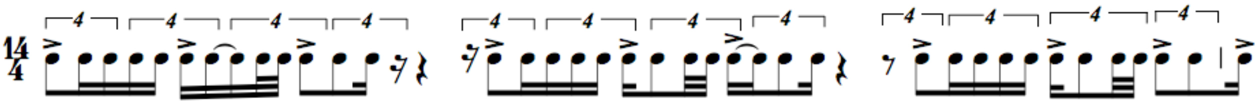
5) Construct a short jathi bhedam sequence on the length of one pala. This sequence tends to have between 2-4 cells (eventually 5) and it always bears a close relationship to the jathi bhedam sequence of the piece.

A choice with 15 matras could be 6 4 5. This sequence will always be repeated in every pala and never permutated because that is the essence of a sama mukthay: the repetition of a phrase three times.

6) Write a phrase on the chosen sequence. As will be seen in the developmental possibilities, the primary phrase, as well as the primary short jathi bhedam sequence worked out for the pala, have an important influence on the development. Therefore, this phrase needs to be thought of quite carefully.

With all the elements seen so far, the example below is a possible phrase, resulting from all previous numerical choices. It can be observed that because the last matra of the third pala falls on tala sam, this has been taken into consideration in writing the phrase.

(track 46)



DEVELOPMENTAL POSSIBILITIES

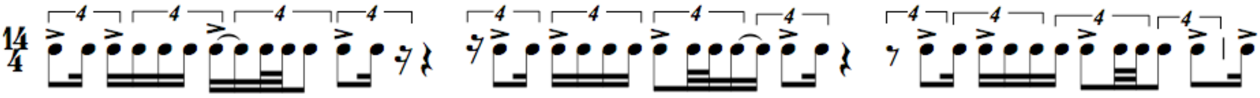
a) Staying in the same gati

Within this context, one of two elements can be used for developing a sama mukthay, each excluding the other: original jathi bhedam sequence on the pala, and original phrase.

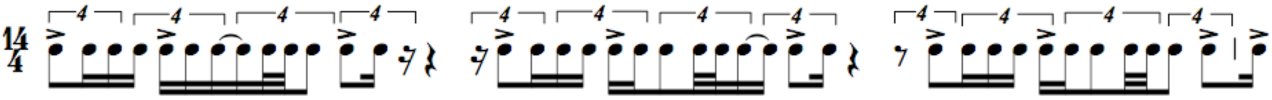
1) If the latter is chosen, the phrase can be re-grouped (therefore creating a different jathi bhedam sequence), provided that all the note values and original order of notes are kept intact. Obviously, every accent has to attack a pre-existing note. Depending on the re-grouping, the new phrase can sometimes sound quite different to the original for the reason given in the gati and jathi bhedam chapters: all accents have to be felt and performed with a down-beat feeling.

Two examples are given using this option[2].

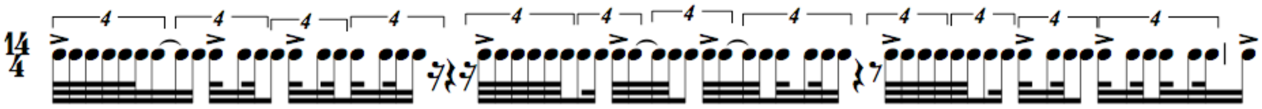
a) The resulting jathi bhedam sequence through this re-grouping is 3 4 5 3 *(track 47)*



b) The resulting jathi bhedam sequence through this re-grouping is 5 7 3 *(track 48)*



2) If the original jathi bhedam sequence is preserved, the number of different phrases that can be created is almost infinite. The phrase will depend on the musical context of the moment. The following two examples are extremely contrasting, in order to demonstrate that the jathi bhedam sequence can produce a variety of phrases with any kind of activity and atmosphere. *(track 49)*



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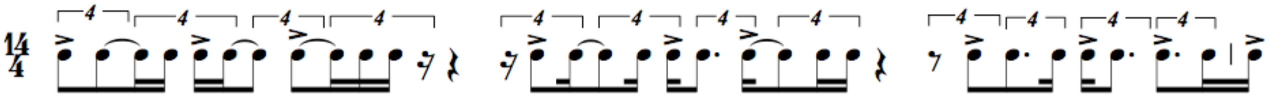
[2] *In both of them can be observed that every note perfectly matches the original phrase in terms of note value and order within the phrase.*

(track 50)



b) Taking the mukthay into another gati (rhythmical sangati)

When this option is chosen, the original phrase, as well as the original jathi bhedam sequence, must remain intact.

Needless to say, when a mukthay is taken into another gati, it will not fit within the tala; it will either be shorter (if a faster gati is chosen), or longer (if a longer gati is chosen) than the original number of beats of the tala. Adjustments to the phrase or gaps are not possible.

In this case it is customary to add a mini-mukthay at the end of the original sama mukthay (a mukthay within the mukthay, a microstructure within the macrostructure). Certain calculations are required:

1) The number of beats and matras of the tala that the new gati will use. In the example below, khanda is chosen for the rhythmical sangati. Considering that the original length of the mukthay is actually 57 matras and not 56, due to the fact that the last matra of the third pala is used to resolve on tala sam, 57 matras should be divided by 5 (number of khanda).

57:5= 11 beats and 2 matras

2) Subtract the number of beats in the tala from the length of the mukthay in the new gati. The resulting number will be used for creating the mini-mukthay[3].

14 beats-11 beats & 2 matras= 2 beats & 3 matras of khanda (or 13 matras of khanda).

The original jathi bhedam sequence was 6 4 5. The number of matras remaining to construct the mini-mukthay with is 13. A choice of

3 (2) 3 (2) 3 I T.S

could seem quite logical. However, the number 3 was not used in the original jathi bhedam sequence, and so should not be contemplated for the mini-mukthay.

The next option is to contemplate number 4, which was included in the original sequence. This will result in

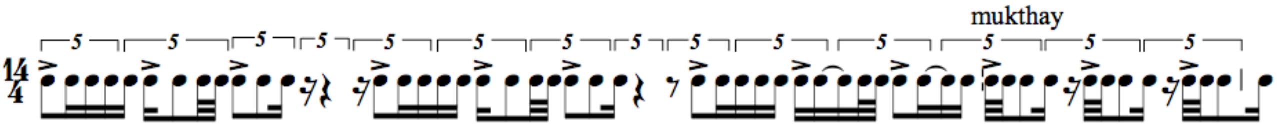
4 (1/2) 4 (1/2) 4 I T.S.

---

[3] *It is important to note the difference between* ***short*** *and* ***mini-mukthays:*** *for the purposes of construction, a short mukthay does not need to take into consideration any of the numerical or even the phrasing/musical context that precedes it; a mini-mukthay is used exclusively to finish a sama mukthay transferred to a different gati, and it must always use one cell, or a combination of two, of the original jathi bhedam sequence as a starting point. In terms of phrasing the mini-muktay has more freedom, as it can be used as a climactic factor, or as a phrase that slows down the potential climax reached with the sama mukthay.*

To avoid the 'fractional matra' gap, ½ matra can be added to every gap and, consequently, the last matra of the third pala of the mini-mukthay will fall on the tala sam:
4 (1) 4 (1) 3 + I 1

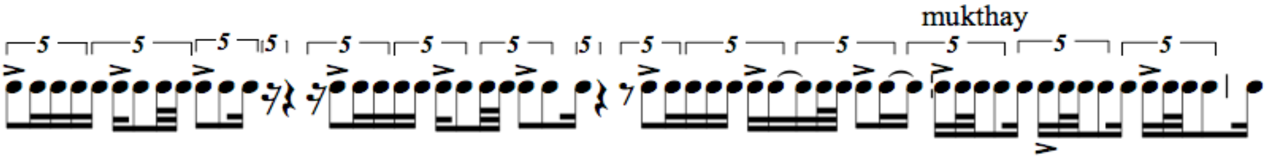
The mukthay would then look as follows: *(track 51)*



-Two alternatives for mini-mukthay construction

In the above example, the mini-mukthay started immediately after the sama mukthay had concluded and stayed in the same gati. Eventually one or even both elements can differ.

A) Overlapping: the last matra of the sama mukthay can simultaneously be the first matra of the mini-mukthay. If this is applied to the example, the number 5 can be employed since the mini-mukthay 'steals' one matra of the sama mukthay, and simultaneously, the last matra of the third pala can fall on tala sam. This would result in the construction 5 (0) 5 (0) 4 + I 1 *(track 52)*



B) Different gati: mini-mukthays can be structured in a different gati than the sama mukthay. This is, however, only possible if the last matra of the sama mukthay finishes on the last matra of the beat or, by combining it with option A), if it finishes on the beat and is taken as the first matra of the mini-mukthay by means of overlapping.

In the case of tala 14, if the choice of pala was 18 (1) 18 (1) 18 I T.S., this would result in 56 matras, the original length used for the first calculations. This number of matras in khanda would result in 11 beats plus 1 matra. If this last matra is overlapped, the remaining 3 beats to complete the tala could take another gati for the mini-mukthay, as long as the rules regarding which cells can be employed for its construction are observed. The choice of gati depends on the desired musical effect.

In any event, there should never exist any separation between the conclusion of the sama mukthay and the beginning of the mini-mukthay, regardless of which option is chosen for the latter.

CONCEPT OF GAP

As mentioned previously, 'gap' is the literal translation of the word *kaarvai*, which does not mean silence. Gap is the term that all karnatic musicians use while speaking in English, but possibly the word 'separation' better conveys the meaning.

A gap can be a silence (as all examples presented in this chapter) or could be attacked, normally producing a note of the same length as the gap itself.

-It will always be a silence when the longest note of the phrase is as long or longer than the gap.

-It can be attacked (optional), when the longest note of the phrase is shorter than the length of the gap.

Chapter 9

ANULOMA-PRATILOMA

(Introduction)

Due to its multiple possibilities, complexity and ramifications, I find it necessary to give an introduction or glimpse at this point (already of great depth in itself) and leave the more substantial part for a later stage of the book.

This technique is possibly one of the most complex in terms of performance, and far-reaching in terms of creative possibilities of the whole constellation of concepts found in karnatic music. It could be said that, rather than a technique, it is an entire theoretical corpus that can be used to organise (both pedagogically and creatively) one of the rhythmical cornerstones of the last eighty years or so in western contemporary music: the use of ‘numbers against numbers’ or ‘numbers against frames’ like 15:16 or 5:6 or 14:12 and so forth.

So far in this text, all techniques have been worked out with what is called the ‘regular’ or ‘neutral’ speed of every gati, (except for tisra that has been seen with triplets as well as sextuplets). Here the possibilities of ‘speeds’ in every gati will be increased by nine. Below, the reader will find the entire chart.

CHART OF ANULOMA-PRATILOMA

ANULOMA

	Tisra	Chatusra	Khanda	Misra
4th speed	12	16	20	28
3rd speed	9	12	15	21
2nd speed	6	8	10	14

NEUTRAL or REGULAR

1st SPEED	3	4	5	7

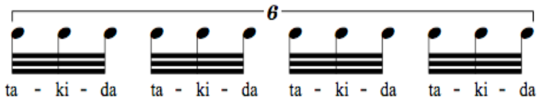
PRATILOMA

2nd speed	3:2	4:2	5:2	7:2
3rd speed	xx	4:3	5:3	7:3
4th speed	3:4	xx	5:4	7:4
5th speed	3:5	4:5	xx	7:5
6th speed	xx	4:6	5:6	7:6
7th speed	3:7	4:7	5:7	xx

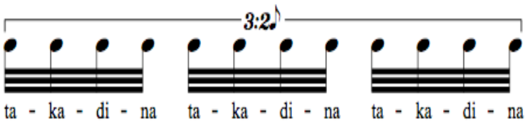
Anuloma could be defined as **when the number of matras in a beat is doubled, tripled or quadrupled.**

This constitutes a new notion when compared to the way western solfege has developed, where every new 'speed' or note value is twice as fast as the previous one. As it can be seen in the chart, the 3rd speed anuloma of every gati is the triple of the regular speed. Therefore, karnatic musicians think of a regular triplet and superimpose the gati on every ♪ of the triplet.

It can also be found that the number (12) is repeated in two different gatis. When it is the 4th speed of tisra, it is felt as four times tisra and when it is the 3rd speed of chatusra, it is felt as three times chatusra. *(track 53)*



versus



For all practical purposes, the 4th speed is exclusively used in the context of **Combinations Anuloma-Pratiloma** that constitutes the aforementioned large corpus of theory[1].

Regarding the 3rd speed, this seems to be used as such solely by percussionists. Other musicians may use it if the tempo is extremely slow. Otherwise, it also pertains to the realm of combinations anuloma-pratiloma.

2nd speed is used quite abundantly (the equivalent of the western 𝅘𝅥𝅯, except for tisra where it would equal the western sextuplet), with the exception of 2nd speed misra, which tends to be used mostly by percussionists.

Pratiloma could be defined as **when the number of matras in a gati is spread throughout 2, 3, 4, 5, 6 or 7 beats.**

The 2nd, 3rd and 4th pratiloma speeds are used quite often, whereas the 5th, 6th and 7th, though practiced and perfected by students and most professionals nowadays (consequently, all are capable of performing them), are seldom performed as such, belonging more to the realm of combinations anuloma-pratiloma.

In order to gain accuracy in a gradual manner as well as to start using this concept creatively with a certain degree of restriction, in this chapter only the following speeds will be utilised. *(track 54, with the two possibilities for 3rd speed pratiloma –see page 65-)*

ANULOMA

	Tisra	Chatusra	Khanda	Misra
2nd speed	6	8	10	xx

NEUTRAL or REGULAR

1st SPEED	3	4	5	7

PRATILOMA

2nd speed	3:2	4:2	5:2	7:2
3rd speed	xx	4:3	5:3	7:3

---

[1] *Combinations Anuloma-Pratiloma will be explained in chapter 23.*

There are a few irregular groupings that have been used quite frequently in western contemporary music as well as jazz, from the 1960s onwards: 5:6𝅘𝅥𝅯, 7:6𝅘𝅥𝅯 and 4:3♪; these can be practiced using a little glimpse of combinations anuloma-pratiloma that can be added to the selected speeds for this chapter.

By introducing the principle of using the 2nd speed anuloma (8, 10 and 14 matras) within a 3rd speed pratiloma (that is, 8:3♩, 10:3♩ and 14:3♩), these three speeds can be added for all purposes of this chapter and the 3rd speed pratiloma will have two different options to work with

3rd speed	xx	4:3	5:3	7:3
3rd speed	xx	8:3	10:3	14:3

NOTATION

Before proceeding any further, it might be convenient to have a completely clear picture of what could be considered the 'proper' notation for these karnatic speeds. Fortunately, this notation is readily available in western music, although in my experience, not so many musicians are entirely clear about it.

The numbers used in the chart respond to karnatic notation, where the first problem is that currently no notation programme can recognise a 14:3♩ as fourteen 𝅘𝅥𝅯 in the time span of three ♩, or even a 5:3♩ for that matter. Besides this 'technical' impediment, the existing western notation can convey these karnatic concepts without any problem.

-Tisra

-There is no discrepancy between the karnatic and western ways of notating the chosen speeds. The same is the case with

-Chatusra

except for 8:3♩, that should be written 4:3♪ (or 8:6𝅘𝅥𝅯) x two times.

-4:2♩ is simply four ♪

-Khanda

-5 and 10 should use the customary bracket of a quintuplet. The sole difference is that when the 2nd speed anuloma is used, the 𝅘𝅥𝅰 tend to be the majority of employed notes and, more importantly, the feeling behind its conception and performance will vary[2].

-5:2♩ = 5:4♪ -5:3♩ = 5:6♪ -10:3♩ = 5:6𝅘𝅥𝅯 x two times

-Misra

-7 and 14 should use the customary bracket of a septuplet.

-7:2♩ = 7:4♪ -7:3♩ = 7:6♪ -14:3♩ = 7:6𝅘𝅥𝅯 x two times [3]

---

[2] *Later on in the chapter, a wider explanation regarding the implications of choosing a speed will be provided.*

DEVELOPMENTAL CONCEPTS

In order to develop ideas with anuloma-pratiloma speeds, it is necessary to fully understand what the concept of speed is, according to the karnatic tradition.

In western music, a phrase written in for instance, 5:4♪, may have 𝅘𝅥𝅯 and even 𝅘𝅥𝅰 in it. Ultimately, the only difference in western music regarding this issue of 'speeds' boils down to a difference between binary and ternary frames (taking into consideration only the possibilities given in this chapter).

In karnatic music, every speed will use **its matra as the fastest note of that speed** so the difference between speeds can be appreciated. Therefore, a 5:4♪ will have an ♪ as its fastest note. Similarly a 5:6♪ will have an ♪ as its fastest note and, finally, 14:3♩ (or 7:6𝅘𝅥𝅯 x two) will have a 𝅘𝅥𝅯 as the fastest possible note[4].

In this manner, besides the difference that binary and ternary frames can provide, the difference between regular, 2nd anuloma and 2nd pratiloma speeds can be established, helping to add another dimension to the perception of tempo change, while actually staying in the same laya.

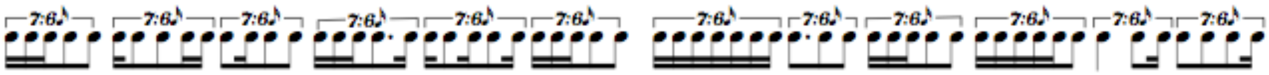
With the whole theoretical corpus of combinations anuloma-pratiloma, there are six developmental techniques, which are reduced to only two with the material explained in this chapter.

1) Choosing one speed

A musician can take any of the speed possibilities presented in the chart and develop phrasing within that particular speed (the only phrasing seen so far was in the regular speed of every gati with some 𝅘𝅥𝅰 added). Now the possibility of phrasing is increased five-fold.

Depending on how long one decides to stay in a particular speed, more or less 'incursions' into faster speeds can be utilised, provided that the feeling of the chosen speed remains clear and constant throughout the whole passage.

The following phrase is written in 14:3♩, using the correct notation of 7:6𝅘𝅥𝅯 x two times. In such a short phrase, according to karnatic musicians, the usage of 𝅘𝅥𝅰 (faster note value than the fastest 'permitted' in a 14:3♩) would blur the feeling of 14:3♩ sought for. *(track 55)*



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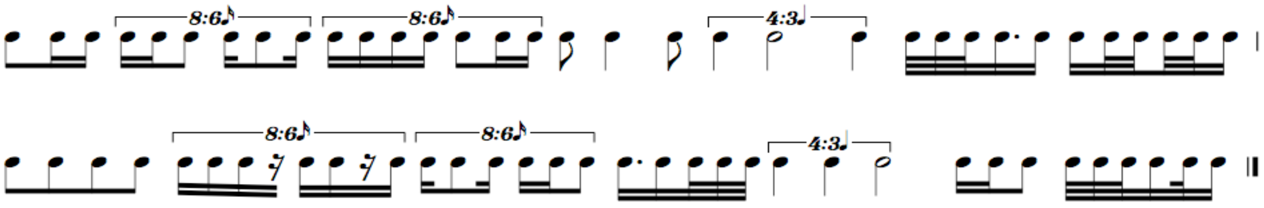
[3] *In order to maintain the karnatic notation and better relate to the chart, the karnatic nomenclature will be used throughout the book. Subsequently, 7:3♩ would be used instead of the correct notation of 7:6♪ for explanation purposes, and the latter when notated musical examples are given.*

[4] *See 'phrases in different speeds' below for a clear understanding of this notion.*

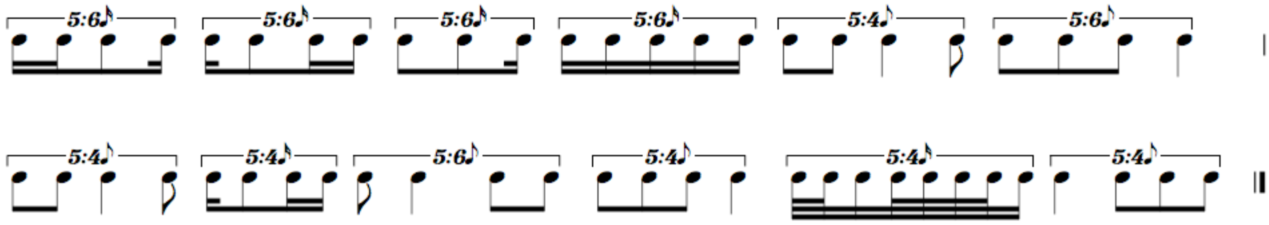
2) **Mixing speeds linearly**

In this concept, a gati is chosen and all speeds pertaining to that gati can be used one after another if so desired. How frequently speed changes occur and/or if all possible speeds are utilised, depend on what the creator wants to achieve. In this technique every speed has to limit itself to its own characteristics and avoid 'incursions' into any other speed.

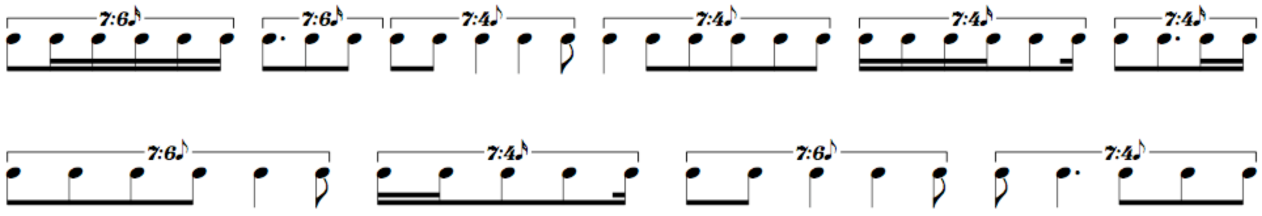
In the examples below, changes occur rather fast and all speeds are used in a very short time-span, although I have heard passages with as many speed changes in a number of concerts[5]. *(track 56)*



(track 57)



(track 58)



-Both techniques must always resolve on a tala sam and last for at least one cycle of the tala.

-Rests can be used in both techniques as seen in the gati chapter. Tie-overs tend to happen much more often in the first than in the second technique, and to an even lesser extent when the tie-over is used between two different speeds.

-Anuloma-Pratiloma speeds belong to the category of 'regular phrasing' in the tree of gati bhedam. This has a double effect on the tree:

-'Regular phrasing' possibilities are increased five-fold.

-The changes between regular phrasing and gati bhedam phrasing can become more sporadic, and the tree can also be used, as indicated in that chapter, as an instrument to map-out changes in a section or a whole composition.

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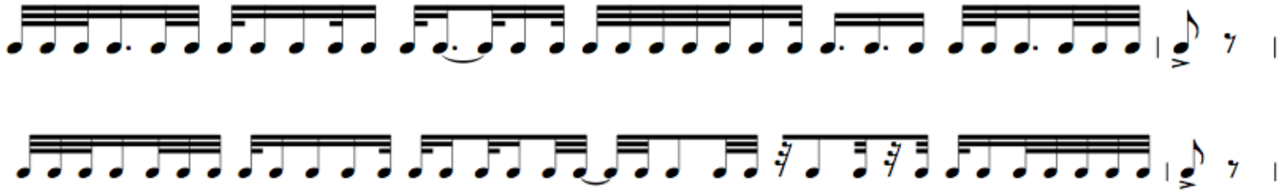
[5] *In the audio files the phrase sequences are preceded by the speed changes performing all the matras.*

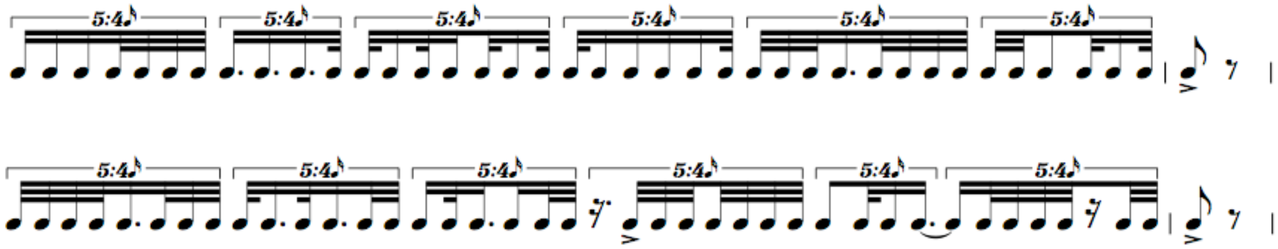
-Gati bhedam, jathi bhedam and rhythmical sangatis can be applied to any speed, as they were used on the regular speed.

Phrasing in 2nd speed Anuloma

Phrasing possibilities with 𝅘𝅥𝅰 in chatusra and khanda go beyond the subdivision of 4+4 or 5+5. A few phrases in which this subdivision is avoided are given below. *(track 59)*

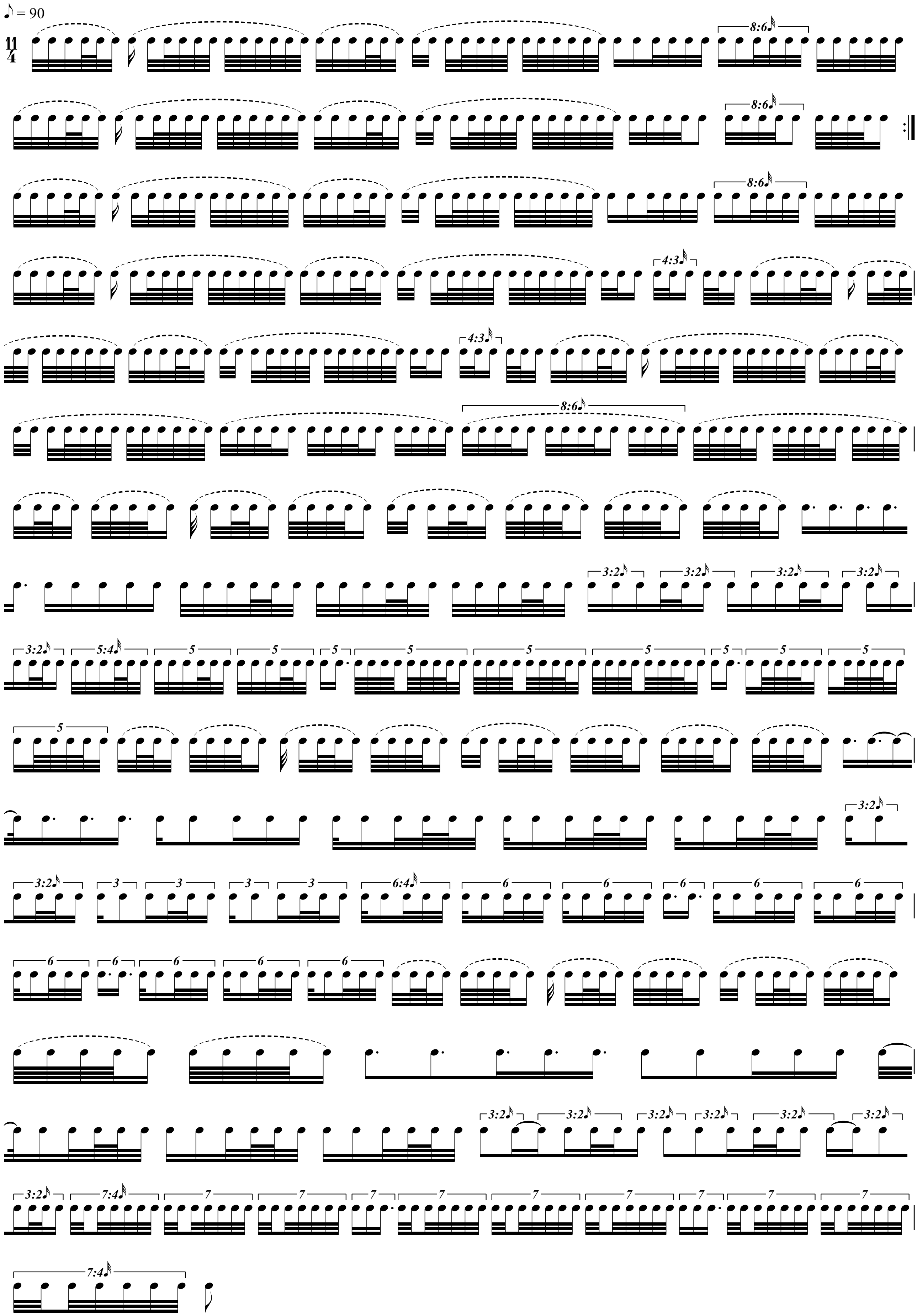


(track 60)



The following example is a transcription of a short solo by B. C. Manjunath, where he explores some of these ideas combined with rhythmical sangatis.

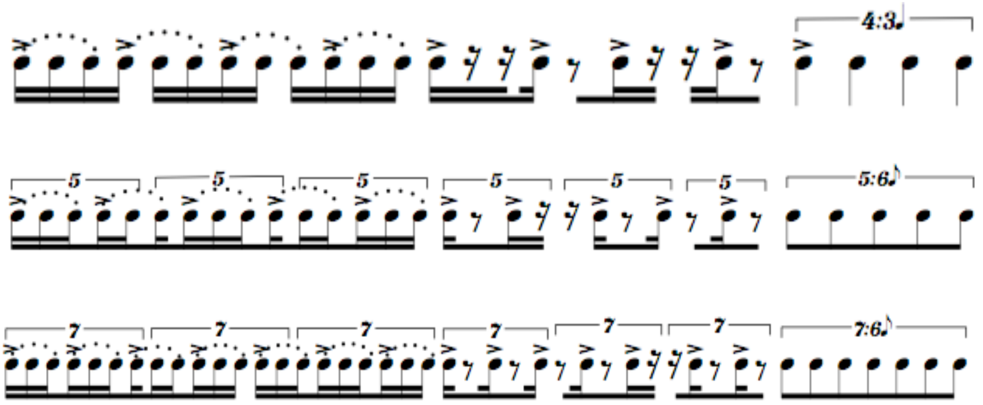
(track 61)



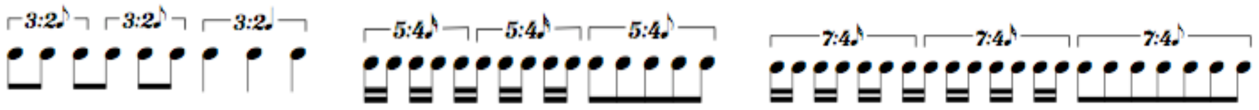
PRACTICE METHOD

1) As far as pratiloma is concerned, the starting point is, as in gati bhedam, to have very clear where the accents of a gati/jathi combination fall in relationship to the beat, and then practice every pratiloma speed separately until the latter is internalised.

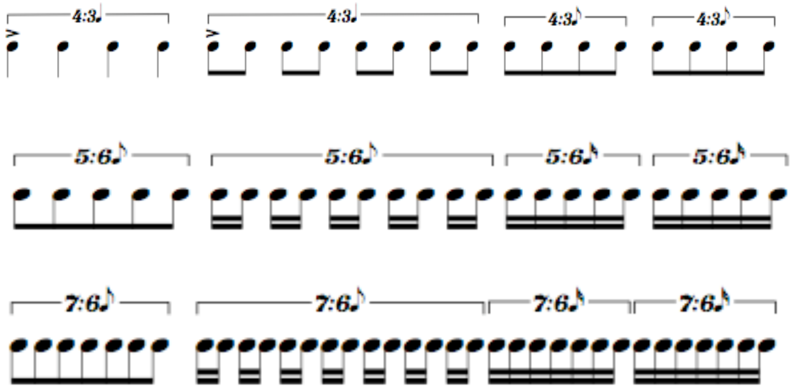
a) In order to practice the 3rd speed pratiloma one should feel jathi 3 and isolate the accents; these accents would provide a 4:3♩, 5:3♩ and 7:3♩[6] *(track 62)*



b) 2nd speed pratiloma has an implicit jathi 2 on tisra, khanda and misra. To practice every gati in the regular speed, taking two beats as frame while using the syllables TA-KI, can help to visualise where every note of a 3:2♩, 5:2♩ and 7:2♩ would fall in relation to the beat. *(track 63)*



c) The approach of the 'jathi 2' can also be used while practicing 8:3♩, 10:3♩ and 14:3♩. The musician should take the original 3rd speed pratiloma and double every accent (that is, to sing two matras for every accent). Once this step is internalised, proceed to make two groups of 4, 5 and 7 respectively. *(track 64)*



d) As for anuloma, since only the speeds of 8 and 10 are newly introduced, the musician should work on doubling the regular speed while doing two groups of four and five 𝅘𝅥𝅯 per beat.

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[6] *Every step of the examples is recorded twice in the audio tracks.*

2) Once every speed is internalised separately, the first obstacle anyone would find is to go between 2nd and 3rd speeds pratiloma with accuracy. Consequently, practicing these speeds in a loop would be relevant.

3) Proceed to practice every gati with the following pattern:

-Regular speed
-2nd anuloma
-Back to regular speed
-2nd pratiloma
-3rd pratiloma
-2nd anuloma within 3rd pratiloma
-Reverse the order

4) Change speeds at random.

5) Practice changes of gatis while keeping the same speed as common denominator. For example, in 2nd speed pratiloma proceed as follows:

-3:2
-4:2
-5:2
-7:2
-Reverse order

Once the feeling for the proportionality between gatis is achieved, one can proceed to change gatis randomly.

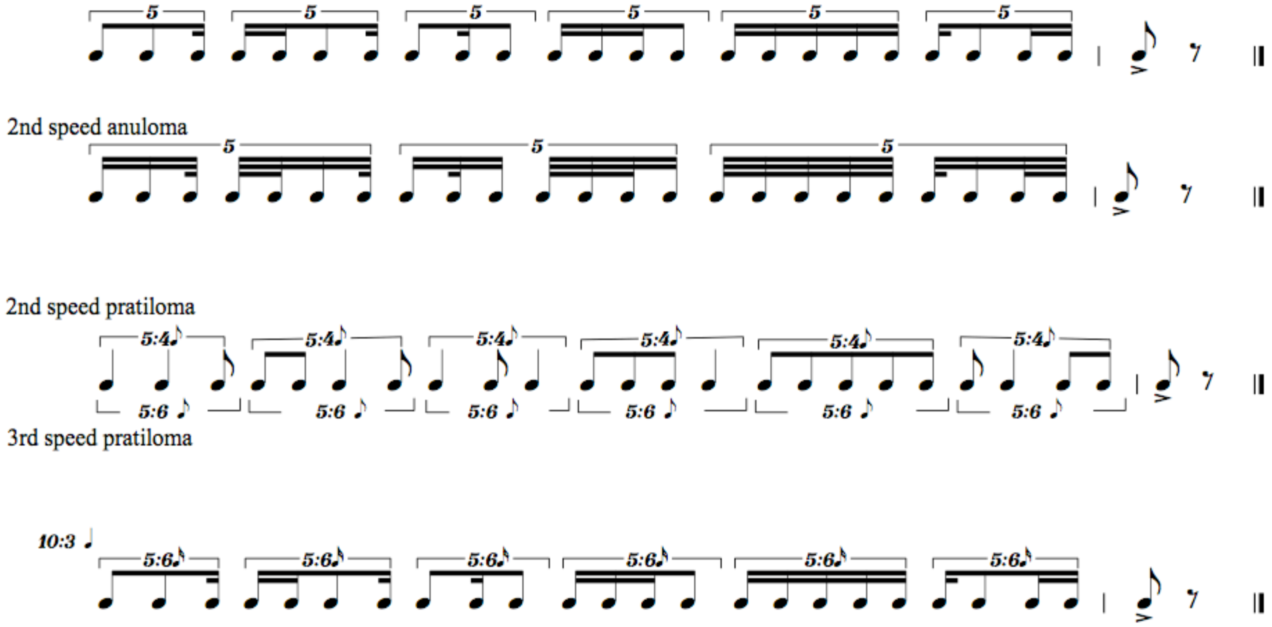
6) Write simple phrases in every gati and perform the same phrase in the different speeds. In this manner, the phrase is felt in the regular speed so playing it in the different speeds becomes less problematic than trying to perform a phrase in a 5:2 or 7:3 in an isolated manner. In fact, when a musician should encounter a phrase in any of the speeds seen so far, it is quite advisable to practice the phrase by taking it to the regular speed, so the feeling for the phrase itself will become easier.

Below there are two examples, one in khanda and another one in misra (in the latter, 2nd speed anuloma is avoided). The correct notation has been employed as well as the karnatic terminology next to it.

It can also be seen that the notation for the phrases in 5:4♪ and 5:6♪ is the same. This is due to the fact that in, for instance, 5:4♪ and 5:6♪, there are five ♪ against 4 and 6 respectively. The time span for these five notes is different, but both use ♪ as their matra unit.

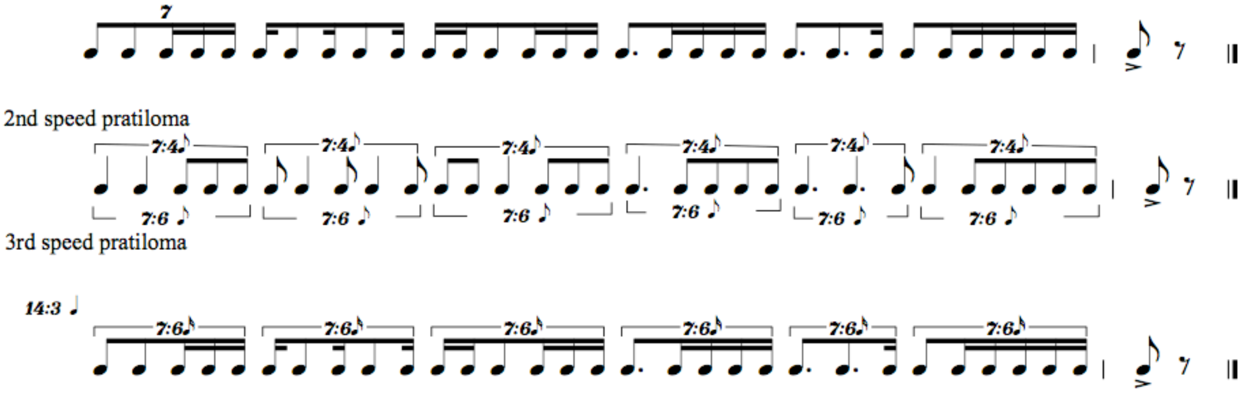
(track 65)

Khanda


5
2nd speed anuloma
5
2nd speed pratiloma
5:4
5:6
3rd speed pratiloma
10:3
5:6

(track 66)

Misra


7
2nd speed pratiloma
7:4
7:6
3rd speed pratiloma
14:3
7:6

7) Write phrases using the two developmental techniques explained previously. As far as the 2^{nd} developmental technique is concerned, one should first practice the speed changes by doing all the matras and, once the speed changes are internalised, proceed to perform the phrases. The phrases presented in the section of developmental techniques can serve as an example for the student to create his own phrases.

B) Exclusively Creative Techniques

Drawing on the foundations, the next eleven chapters are essentially of use to creators: they show the main creative ramifications derived from the concepts presented in the first section.

As a general way to explain their main red-thread while developing ideas, Indian musicians frequently use the image of a 'branch on a branch on a branch': 'every idea can be utilised only once but never only once'. In other words, every musical event is and should be susceptible to further development but never repeated without any sort of alteration.

Beginning with a very strict set of rules, every device adds paths to make techniques gradually more flexible and also shows how all concepts are ultimately interconnected.

Chapter 10

RHYTHMICAL SANGATIS (II)

As seen in the chapters on jathi bhedam and sama mukthay, a phrase following the construction parameters of these techniques can also be taken into another gati. Therefore, besides the three techniques of adaptation explained in the first part of rhythmical sangatis (namely, preserving the original phrase construction, adapting the phrase to the flow of the new gati, and lastly applying a different jathi as well), the phrasing derived from the jathi bhedam concept becomes a fourth possibility of using rhythmical sangatis.

In reality, respecting the original flavour or construction of a phrase, be it gati bhedam or jathi bhedam, is the most common use of rhythmical sangatis. This does not mean that adapting a phrase to the new gati or applying a different jathi are marginally used, but rather that the 'trademark' of rhythmical sangatis is indeed taking a phrase from one gati to another while keeping the phrase as recognisable as possible.

RHYTHMICAL SANGATIS AS POLYRHYTHM

Another way of using rhythmical sangatis, regardless of the construction of the original phrase, is to develop the phrase as a polyrhythm. This implies that the phrase is repeated a number of times, each time starting in a different place of the beat or tala, until it resolves on a tala sam.

In order to use this technique, the phrase has to be of the same length as the number of beats in the tala. This number of beats has, however, no influence at all regarding how many times the phrase should be repeated or how many cycles are needed to resolve this device on tala sam. The calculations required for both elements are as follows:

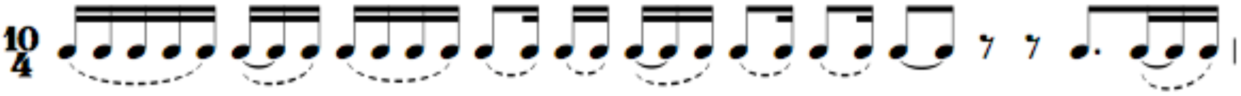
-The number of the gati of the original phrase establishes how many cycles are needed to complete the polyrhythm.

-The number of the new gati (the rhythmical sangati's gati) determines how many times the phrase needs to be repeated to resolve on tala sam.

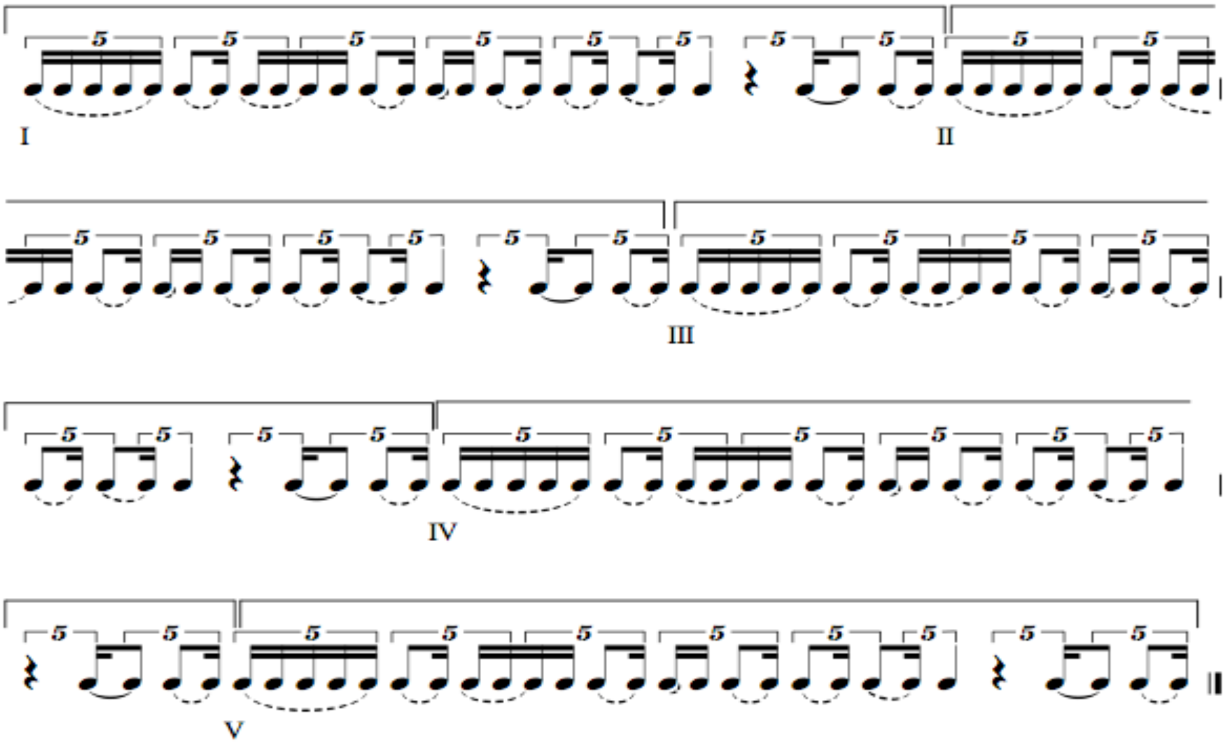
Therefore, if the original phrase is in chatusra, the number of cycles needed for the rhythmical sangati to resolve using this polyrhythmic fashion will be four.

If the gati of the rhythmical sangati is khanda, the phrase has to be repeated five times.

Theme *(track 67)*



The phrase in khanda will look like this *(track 68)*



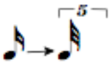
Consequently, if the rhythmical sangati is performed using misra, the phrase should be repeated 7 times and would require 4 cycles to resolve on tala sam; if tisra, 6 times the phrase in again 4 cycles.

However, this seldom happens in karnatic music.

The profound aversion that karnatic musicians have towards long passages of repetition has been mentioned in previous chapters. All calculations and theory just explained are very useful as a starting point to develop this polyrhythmic notion, but in reality karnatic musicians have created methods to use this technique in a less repetitious fashion.

1) Same number of phrase repetitions in half the number of cycles

In order to achieve this, the rhythmical sangati phrase must be performed at a faster speed than the original phrase.

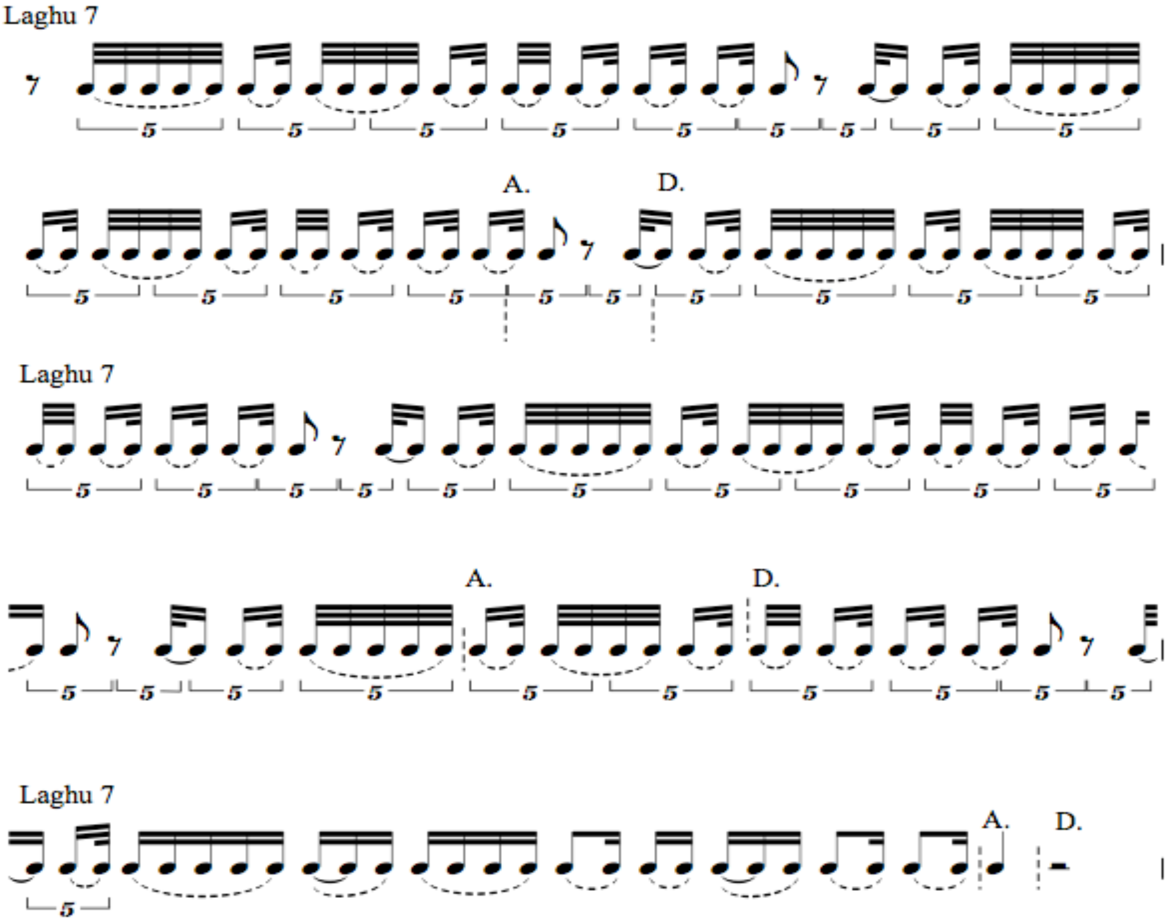
In the example below, the equivalence is  or in karnatic terms, the matra of chatusra is set in regular speed, and the matra in khanda is set in 2nd speed anuloma. Therefore, the original phrase, besides being taken into a different gati, is subjected to a diminution as well.

In this fashion, the phrase will be performed five times, but because of this diminution of the note values in the khanda version, it will only require two cycles to resolve on tala sam[1].

---

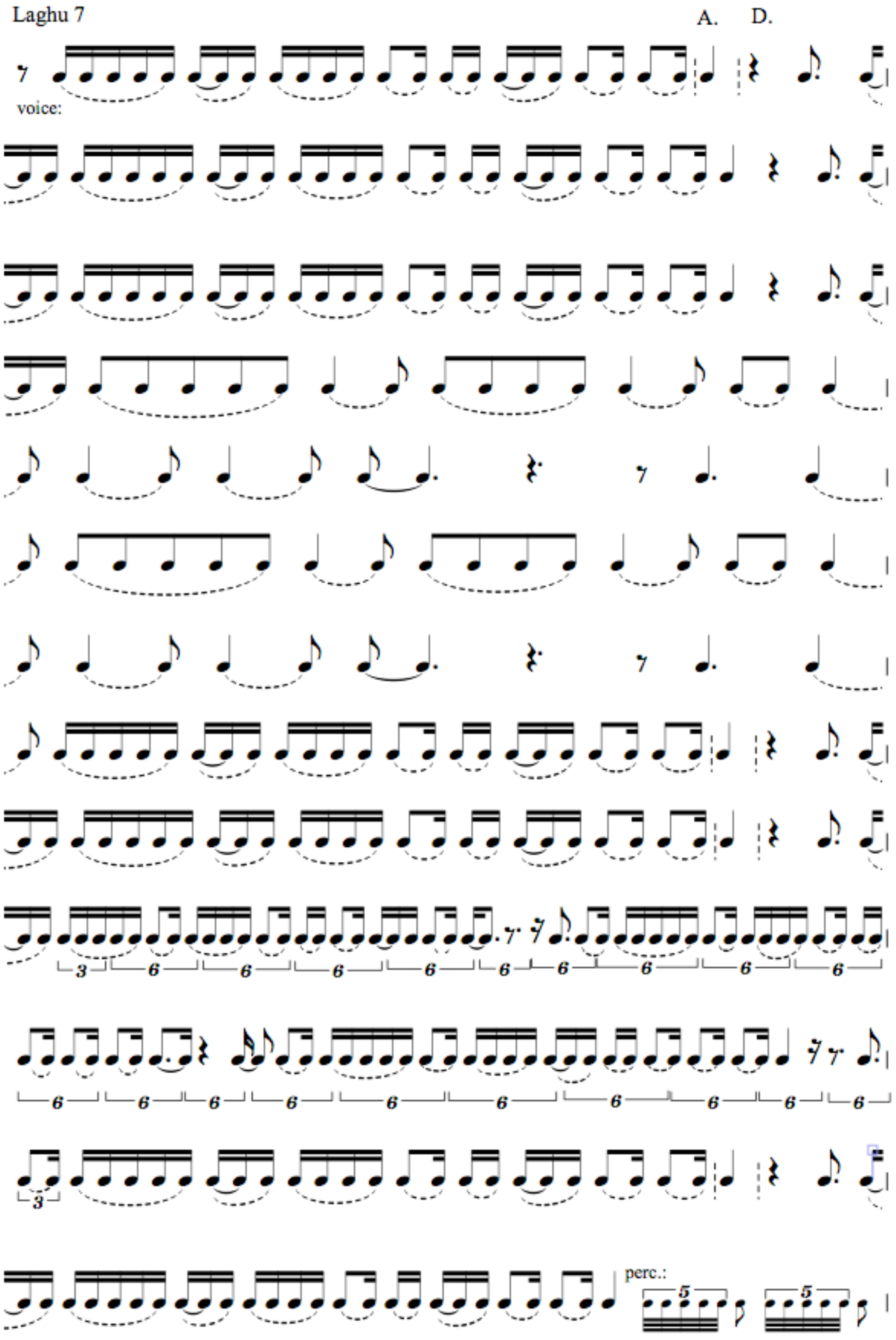
[1] *In reality, the theme in this composition starts two matras after tala sam and not on tala sam as shown in the example above. This implies that the rhythmical sangati has to commence and resolve in the same place as the theme.*

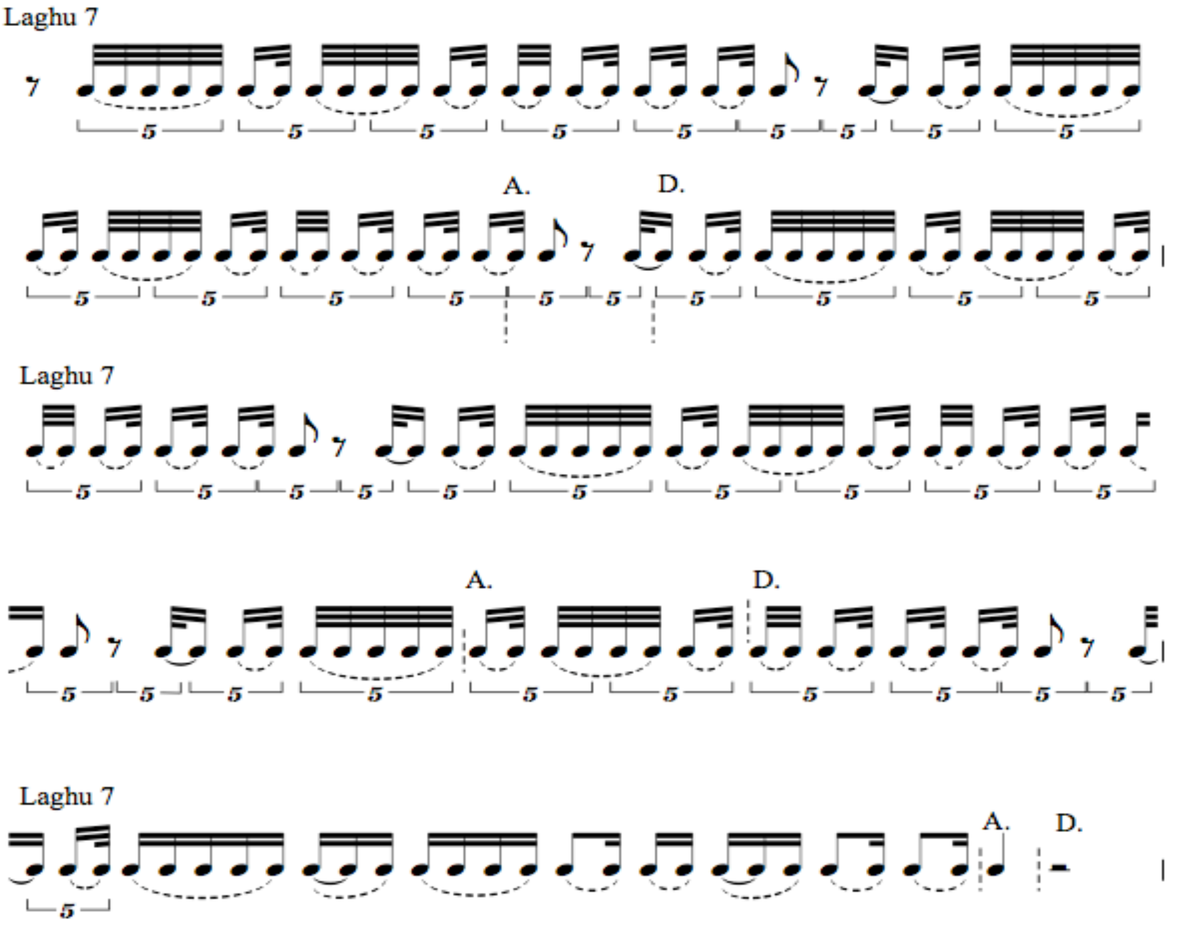
The inner construction of the tala is L7 A D. The starting point of every repetition is easy to observe: every phrase starts with a group of five 𝅘𝅥𝅰 whilst every bracket of khanda embraces five 𝅘𝅥𝅰 of this gati. It can be observed that the fifth repetition of the phrase ends on the second half of the beat and is followed by the original version of the phrase in chatusra. *(track 69)*



The example below is the transcription of the opening passage of a piece by Jahnavi Jayaprakash in a form named *pallavi,* in which the theme is subjected to augmentation, a rhythmical sangati in tisra (that follows the same principle as the one in khanda, consequently the phrase is done 3 times within two cycles), and in khanda (the example shown above).

(track 70)


Laghu 7
A.
D.
voice:
perc.:



2) Fewer repetitions of the phrase in the original number of talas

Eventually, the number of cycles required according to the initial explanation might be desired by a musician, but not the number of times the phrase has to be repeated. By using pratiloma speeds the number of repetitions can be reduced.

For instance, by choosing the 2nd speed pratiloma of khanda (which requires twice the length of a phrase in the original speed), two repetitions of the phrase in regular speed can be turned into one, as the example below shows. In this example, the phrase is performed four times: the first one in 5:4♪ and the other three times in regular khanda[2].

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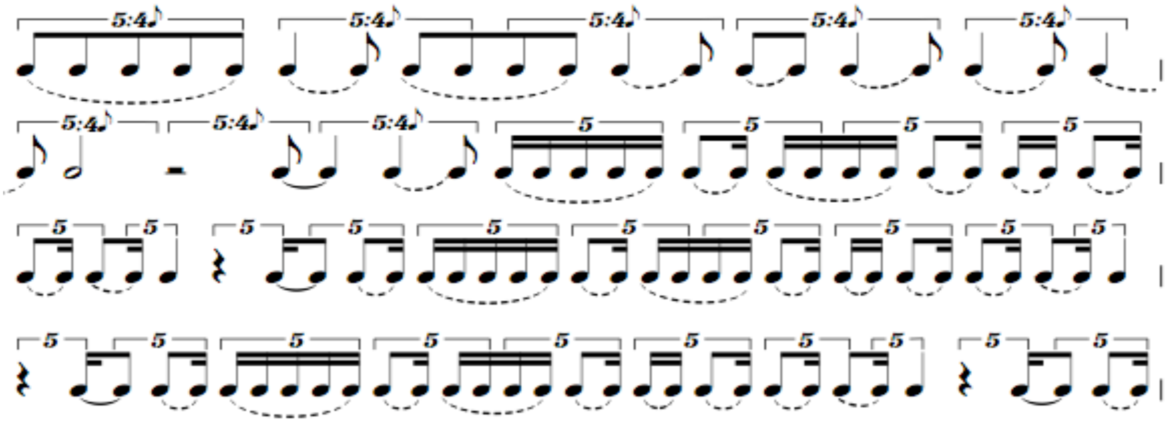
[2] *The phrase in 5:4♪ does not need to be performed first. The passage could start with the phrase in regular khanda performed once, twice or even thrice, and the augmented version of 5:4♪ could either be inserted in between repetitions of the phrase in the regular speed or be played as the last phrase.*

(track 71)



If the musician would rather play the phrase only 3 times, he could choose one of the following options:

a) Twice 5:4♪. and once in regular khanda (in any order)

b) Once in 5:6♪. (3rd speed pratiloma) and twice in regular khanda (in any order)

If the musician would rather play the phrase only twice, he could choose one of the following options:

a) Once in 5:6♪. and once in 5:4♪. (in any order)

b) Once in 5:4♩. and once in regular khanda (in any order)

The use of the phrase in 2nd speed anuloma has not been contemplated in any of the previous possibilities. If chosen, however, this option increases the number of possibilities of mixing different speeds in khanda whilst keeping the framework of four cycles.

The calculations are quite self-explanatory at this point: the time-span needed for one phrase in regular speed would require that the version in 2nd speed anuloma is repeated twice. If this option is chosen, the order of the speeds could vary, and depending on the position within the beat or tala, the whole passage can become more or less complex.

The example below is relatively easy due to the fact that the number of beats in the tala (10 beats) is a multiple of the chosen gati (khanda). As a result the phrase is only displaced within the tala but not within the beat, which is a more recurring event.

The phrase uses a 5:4♪., two repetitions in 2nd speed anuloma (1st & 5th phrases), plus two repetitions in regular speed (2nd & 4th phrases)[3].

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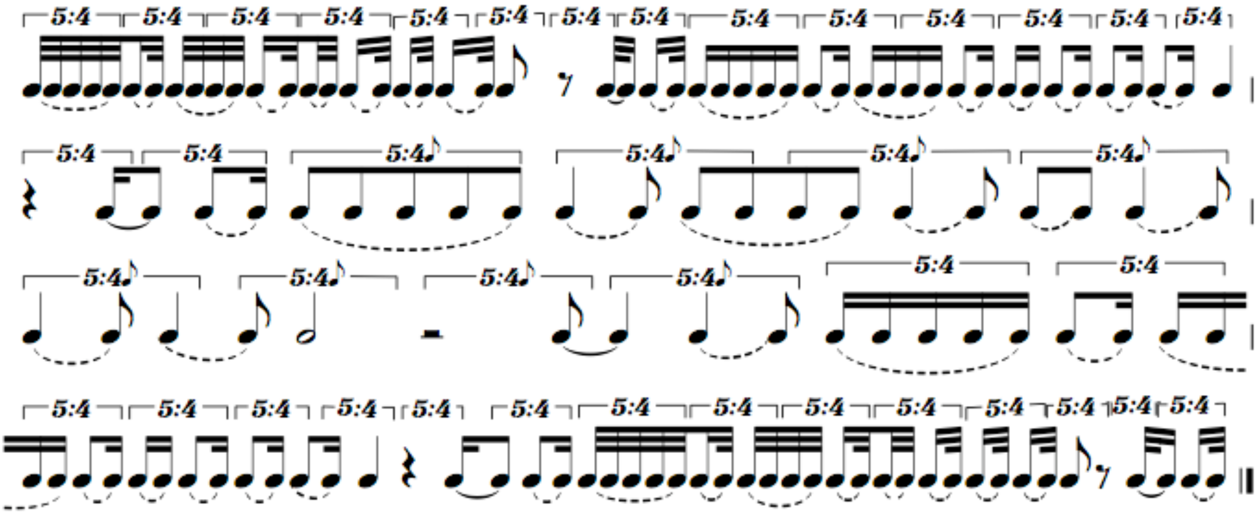
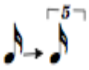
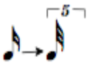
[3] *To simplify the example, the passage begins and finishes on tala sam.*

(track 72)

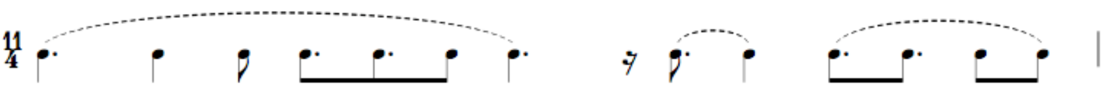


3) Fewer phrase repetitions in half the number of cycles

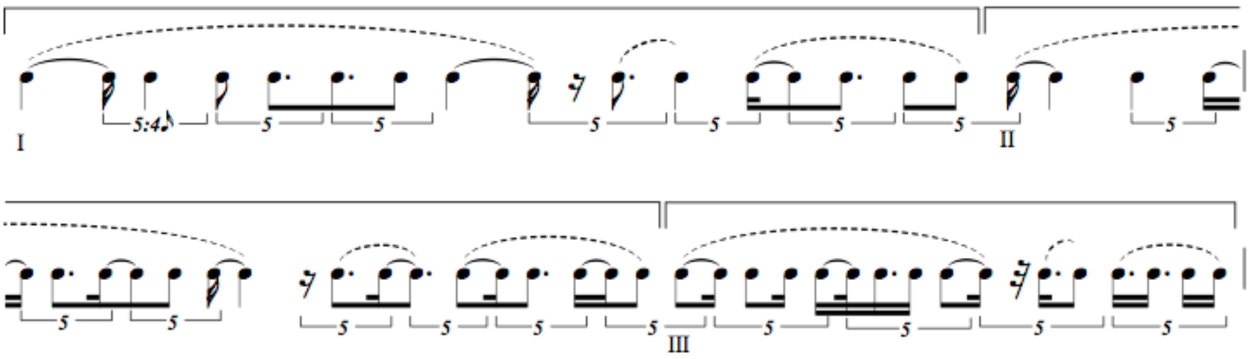
This option is the one that karnatic musicians use most abundantly. The concept of mixing speeds explained previously to complete four cycles, is applied here in the same way, but with the goal of performing the whole passage in half the number of cycles. Normally the aim is to perform only three, or even two repetitions of the phrase.

The example below belongs to another composition by Jahnavi Jayaprakash in tala 11 (L3 D L3 L3). The original phrase in chatusra is performed, by means of rhythmical sangatis, thrice in khanda; twice in the regular speed (therefore, the equivalence is ), and another time in 2nd speed anuloma, with the equivalence . Every repetition of the theme starts in a different matra of the beat.

Original theme *(track 73)*

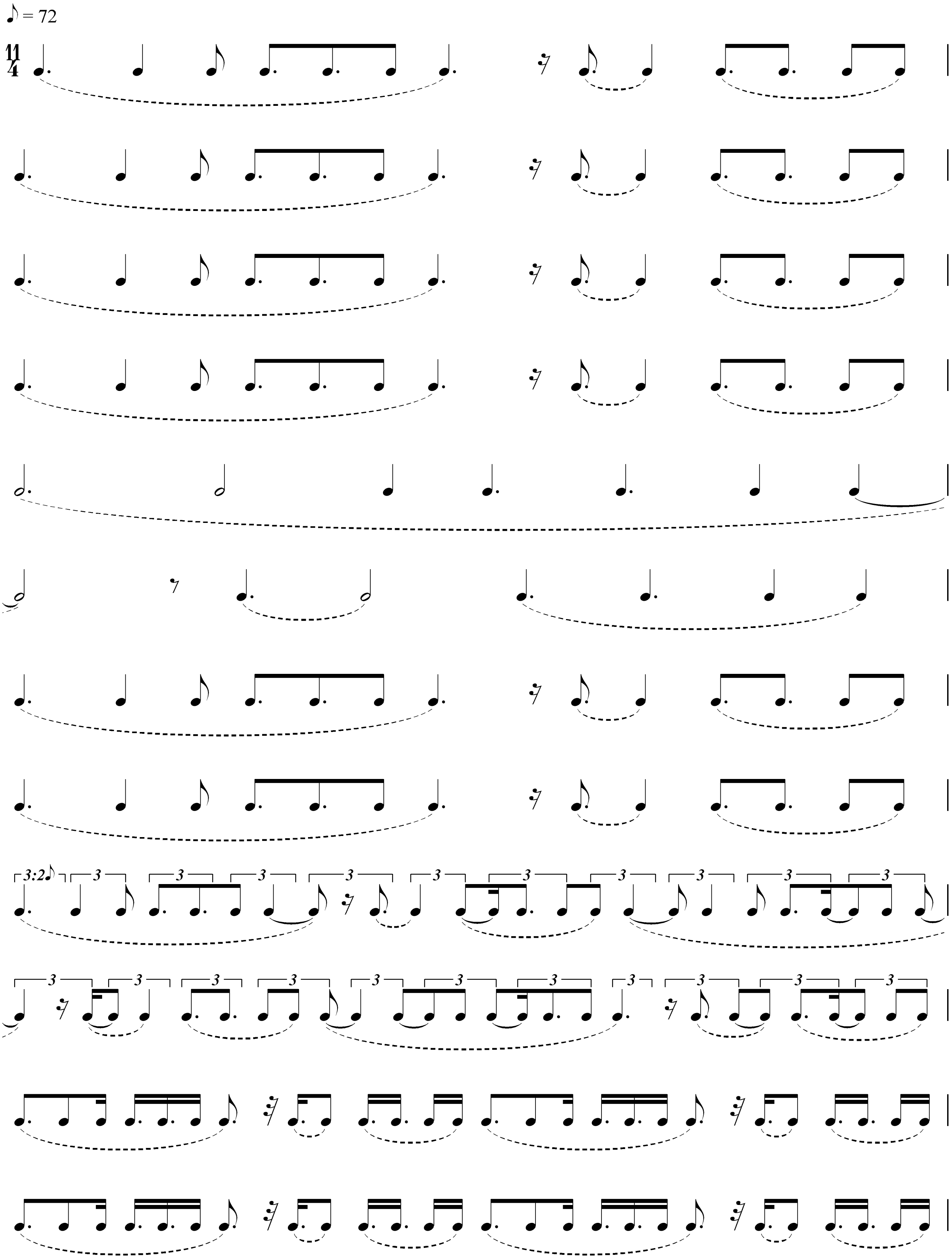


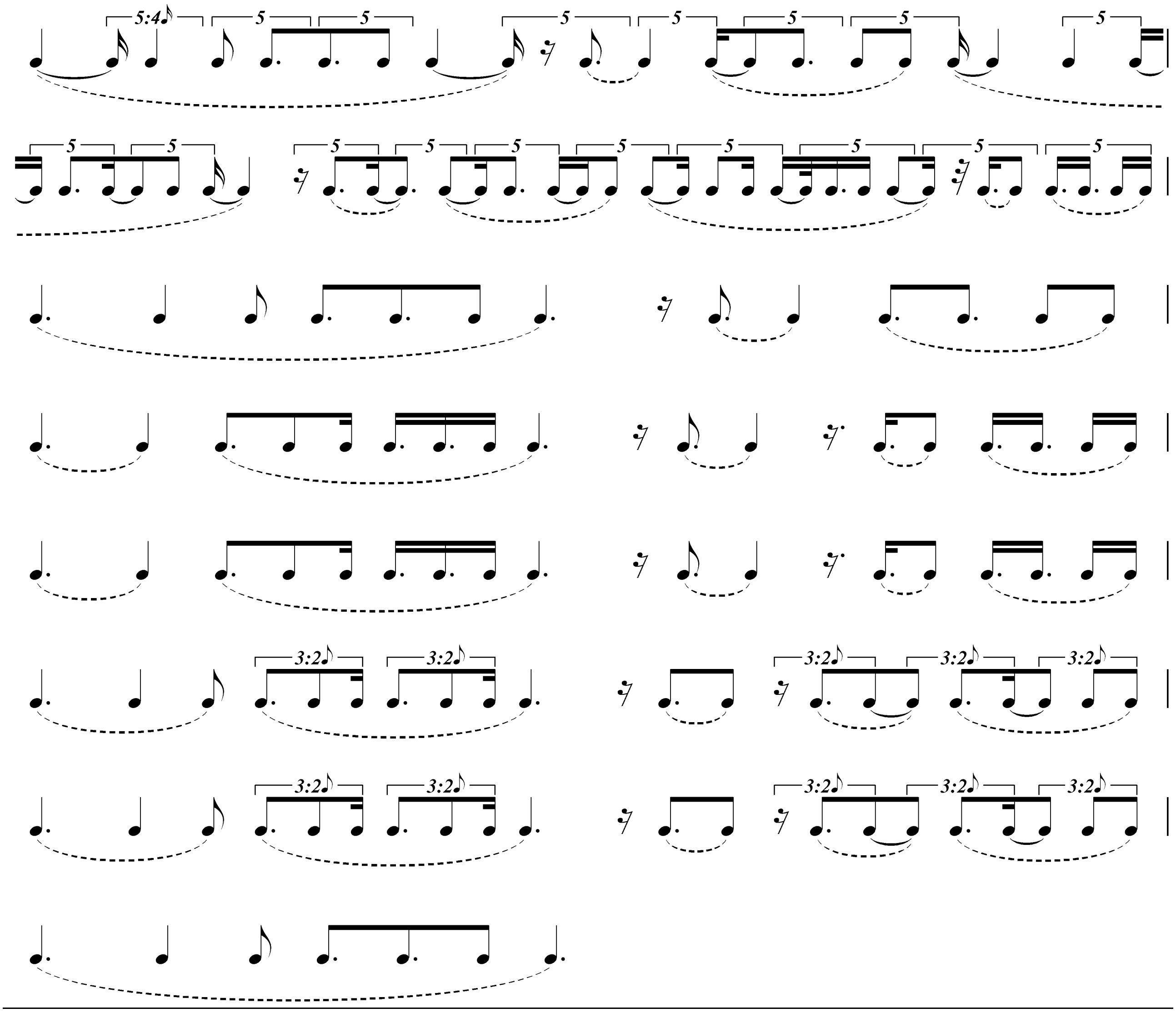
Rhythmical sangati *(track 74)*



The theme of this composition is subjected to augmentation and diminution in chatusra, rhythmical sangatis in tisra (3 repetitions of the phrase in 2 cycles) as well as the example in khanda shown above. In the last few cycles the theme is subjected to another form of rhythmical sangati that will be explained at the end of this chapter. *(track 75)*

Pallavi in Subhapantuvaraly, Tala 11 (L3 D L3 L3) (Theme, Rhythmical sangatis and Fragmentation)





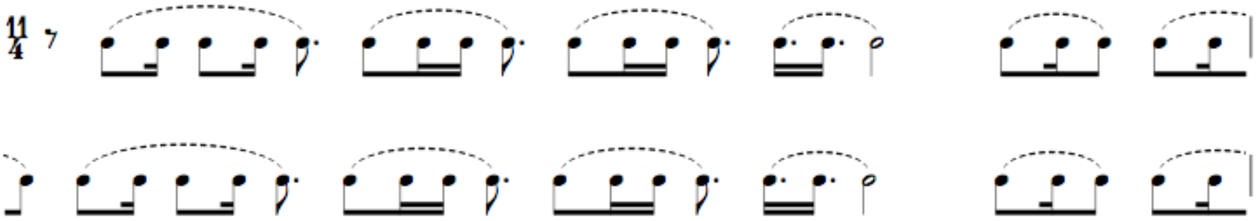
A third transcription is presented below. It also uses tala 11, but with the inner division L7 D D.

In all previous examples, it could be heard that the theme was always divided into two parts, with a silence or long note separating them. The 'resolution' of the first part of the theme fell always on an anga sam, and the 'resolution' of the second part fell on the matra with which the theme starts (be it on tala sam or off tala sam).

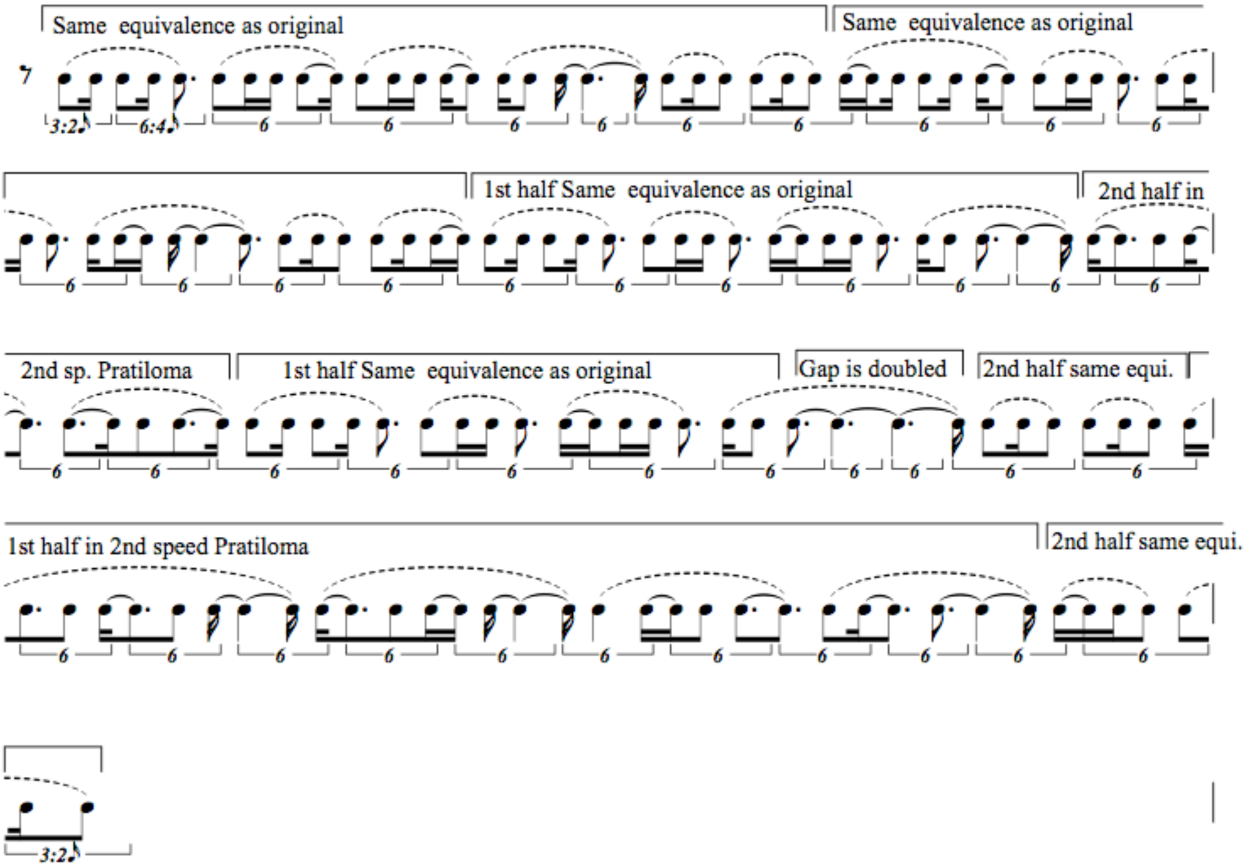
The rhythmical sangati section of the passage below is performed exclusively in tisra. It uses the second method explained above: mixing speeds whilst keeping the original number of cycles - in this case 2nd speed anuloma and regular speed in four cycles. However, instead of performing the whole theme as a unit, **the two parts of the theme are subjected to different speeds**, creating complex displacements of the phrase. The beginning and finishing points are the second half of the beat.

The original phrase is 11 beats long, starting a ♪ off tala sam and finishing at the same place.

(track 76)



Rhythmical sangati applying different speeds to the two fragments of the theme and the gap *(track 77)*

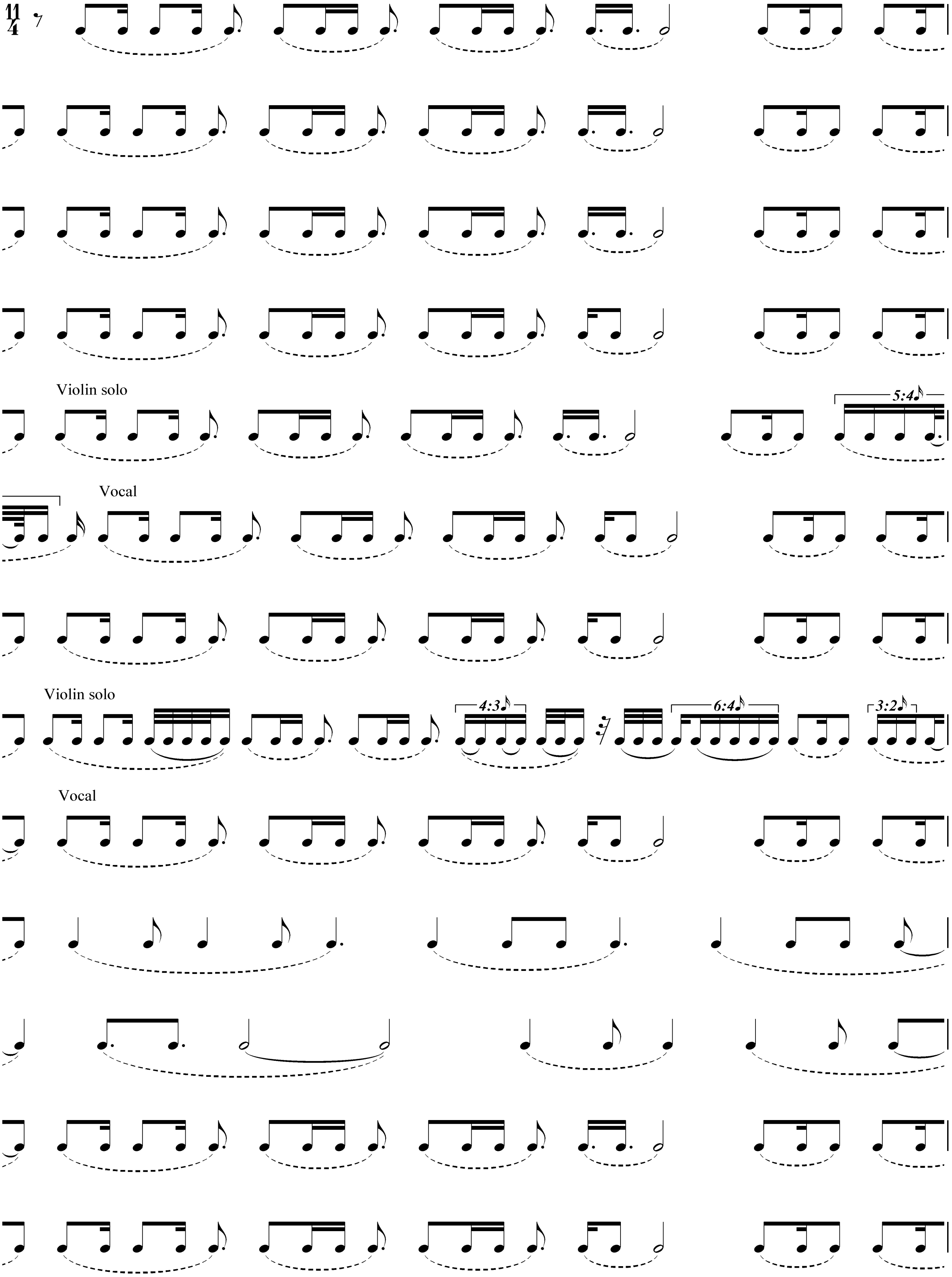

Same equivalence as original
Same equivalence as original
3:2
6:4
6
1st half Same equivalence as original
2nd half in
2nd sp. Pratiloma
1st half Same equivalence as original
Gap is doubled
2nd half same equi.
1st half in 2nd speed Pratiloma
2nd half same equi.
3:2

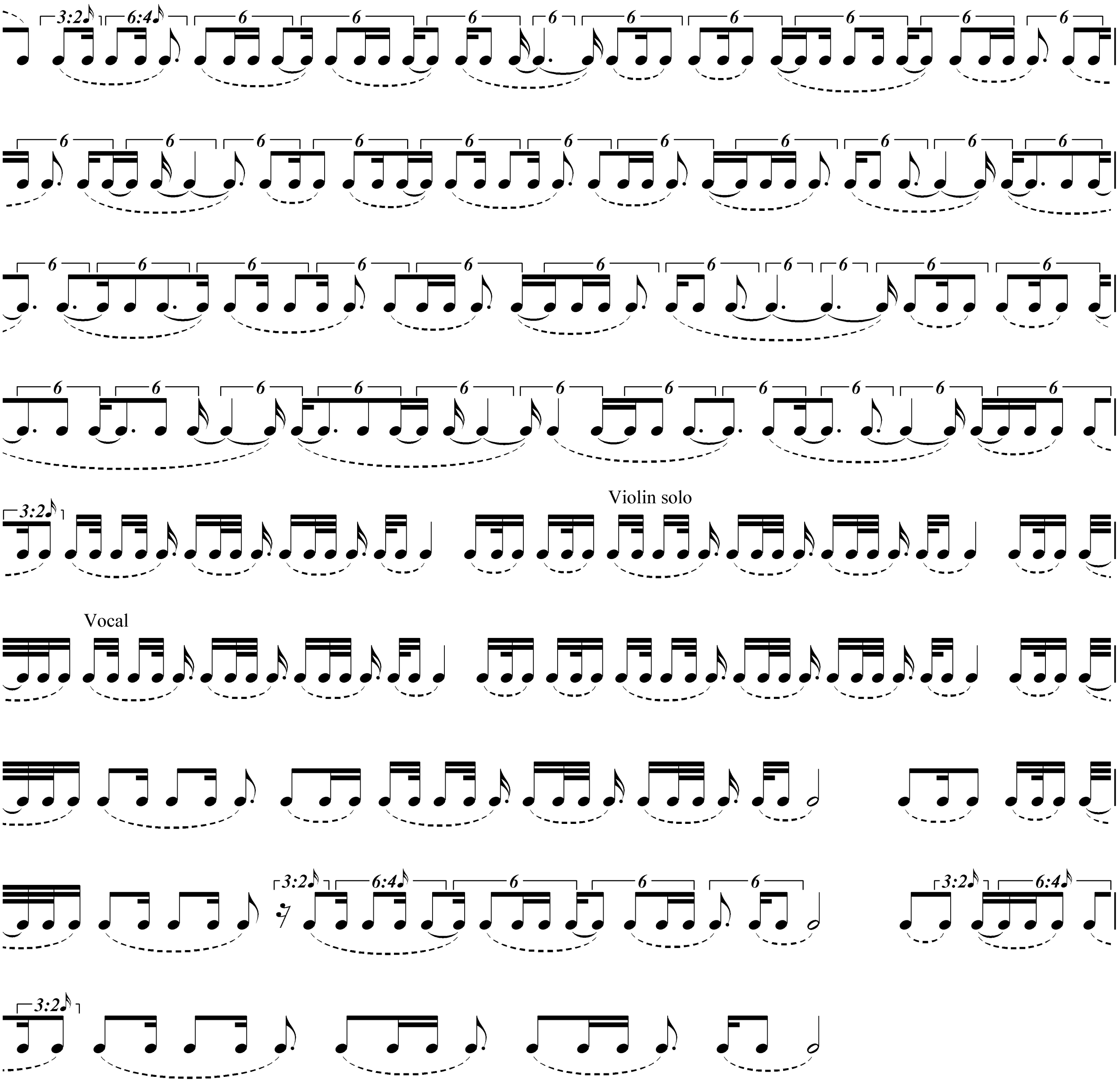
Below there is a transcription of the whole opening section of another pallavi to which the previous passage belongs, with rhythmical sangatis and other melodic techniques.

(track 78)

Pallavi in 3 ragas, Tala 11 (L7 D D) (Theme, Rhythmical sangatis and Fragmentation)

♪ = 72


11
4
Violin solo
5:4♪
Vocal
Violin solo
4:3♪
6:4♪
3:2♪
Vocal



From these transcriptions (and from many other pieces I have heard while in India or on CDs), it can easily be concluded that this 'polyrhythmic manner' of using rhythmical sangatis is not such, but a theoretical skeleton that ultimately serves the purpose of creating more unpredictable developmental options than the repetition of phrases in a lengthy number of cycles could provide.

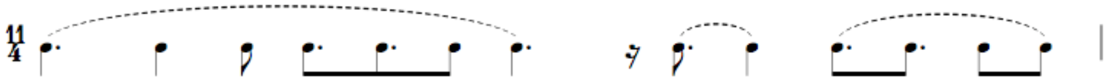
RHYTHMICAL SANGATIS through TWO GATIS or SPEEDS

Karnatic musicians call this technique, 'fragmentation of themes in gatis' or 'in speeds' - to my mind a rather obscure and technically incorrect Indian-English translation of a concept that seems to have no name and is primarily used as part of the rhythmical development of a theme in the form called pallavi.

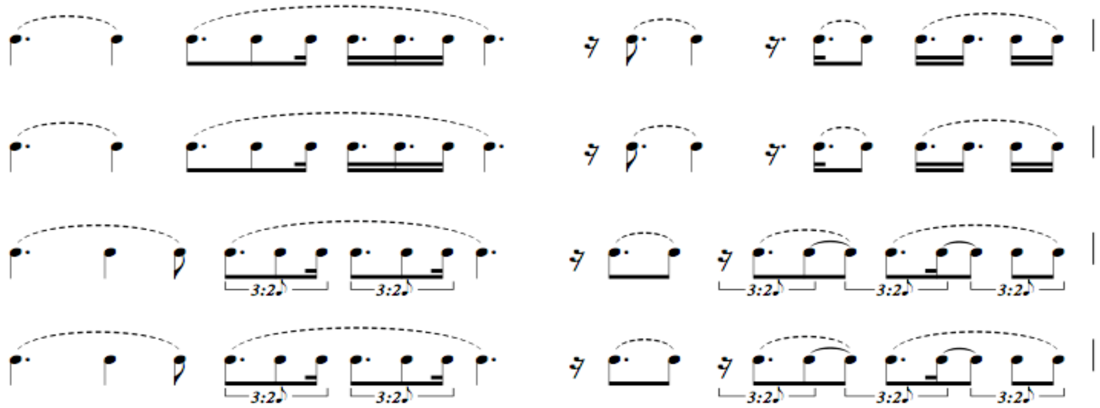
In this technique, the theme is always fragmented into two parts, as seen previously, and every segment is independently subjected to this form of rhythmical sangati.

So far, the length of the original phrase was ignored for any developmental purposes when taking it into another gati. In this concept, the original length of the phrase is preserved and its duration is occupied by two versions of the phrase, either in two different gatis or two speeds of the same gati. The example below will be analysed.

Theme *(track 79)*

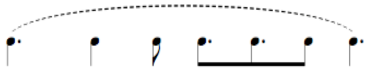


Section to be analysed *(track 80)*

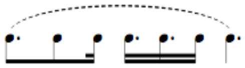
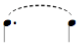


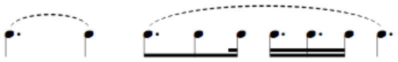
In order to present how this concept of rhythmical sangatis works, an explanation of the first line will suffice.

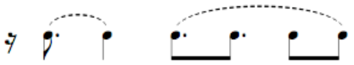
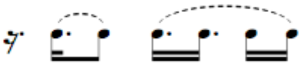
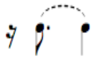
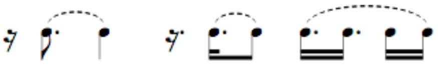
1) The first step is to calculate how may beats and possible extra matras this phrase (without counting the gap) would produce in another gati or speed (always faster than the original phrase).

The first fragment before the gap is 

5 beats become 2+ ½ in chatusra 2nd speed anuloma (the last note is taken as a gap in the rhythmical sangati version)

 Therefore, it has to be preceded by a number of notes in the original speed that would complete the other 2+ ½ beats or 10 matras,  and the whole phrase becomes



2) The second fragment of 18 matras  becomes 9 matras in 2nd speed anuloma . The ♪ rest is used to divide the first part in regular speed from the diminished version. Consequently, in order to make the phrase as long as the original, 8 more matras are needed, which are taken from the first two notes of the theme, preceded by the original rest . The whole phrase becomes thus 

Summarising: a phrase of x number of beats or matras is subjected to a transformation to another gati or speed (always faster than the original). This transformed version of the phrase is always placed off the beat so that it always resolves on a beat. The remaining number of beats or matras to complete the original duration of the phrase are filled by x number of notes of the original phrase preceding the rhythmical sangati version. The choice regarding how many notes need to be used depends on the extent to which they can arrive at the rhythmical sangati version in a way that is musically acceptable.

Sometimes the last note of the original phrase can be shortened to make it fit into the required length, or alternatively, a rest can be inserted to separate both phrases.

Chapter 11

THREE-FOLD MUKTHAYS

The two types of mukthays explained previously took the concept of jathi bhedam as a starting point for phrasing purposes. The 3-fold mukthays take regular phrasing and gati bhedam as a source for construction and phrasing.

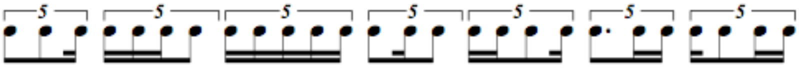
In the chapter on sama mukthays, it was mentioned that this category of mukthays are the only ones with a clear set of rules enabling the creator to develop an initial idea. The remaining mukthays are usually a one-time occurrence. They tend to ignore any possible development anywhere in the piece, and are subjected only to the context and how close to or contrasting with this context the creator would like the mukthay to be: 3-fold mukthays are a clear representative of this notion.

CONSTRUCTION METHOD

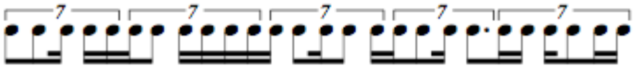
Depending on a few variables, there are three construction methods for this category of mukthays. Firstly, the steps common to all of them will be explained.

1) A number of matras common to two gatis in any of their speeds must be chosen, with complete independence from the tala. Usually, the numbers taken for every gati are 3, 6, 4, 8, 5, 10 and 7. Therefore, the number to be chosen will be the result of multiplying any given speed of two different gatis[1]. In the first example below, the number of matras is 35, the result of multiplying 5 (regular khanda) by 7 (regular misra).

2) One of the gatis is chosen as the main pala and a phrase is constructed that always attacks the beat. In the example below, the chosen gati is khanda. Since the length is 35 matras, it will result in a phrase of 7 beats.



3) The other chosen gati (misra) performs the same phrase applying the gati bhedam concept: consequently, if the original phrase is constructed in khanda, the other gati will use a jathi 5.



4) Since the essence of mukthays is that a phrase, in one way or another, is repeated three times, the choice of features for the remaining pala is what will determine the type of 3-fold mukthay. The choice of the third pala and its influence in the order of the sequence of gatis within the tala will be further explained later in this chapter.

5) Once the three palas have been chosen and their order determined, the 3-fold mukthay is organised within the tala. Unlike the sama mukthays, 3-fold mukthays do not need to start on tala sam; consequently, the first pala could start anywhere in the tala, as long as the last pala of the mukthay resolves on tala sam.

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[1] *3x6, 4x8 or 5x10 will be never be used as they are two speeds of the same gati.*

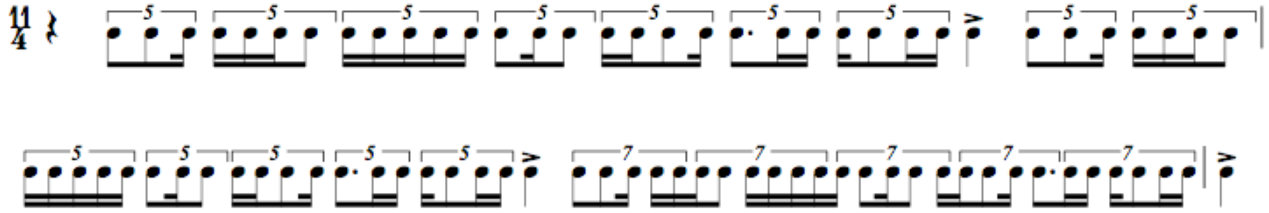
Due to the nature of this category of mukthays in which at least two different gatis are used, if gaps are chosen they will always be expressed in number of beats rather than number of matras, as is always the case in short and sama mukthays.

Type A

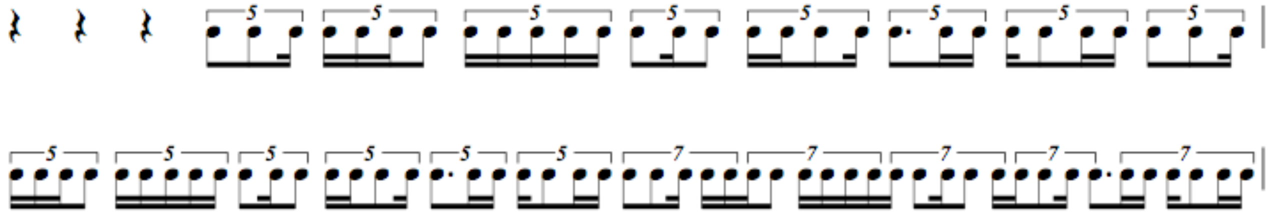
In this type, the gati on which the original phrase is constructed is repeated twice followed by the other chosen gati.

In the example below, the tala is of 11 beats. The phrase in khanda is 7 beats long, therefore when played twice will result in 14 beats. The misra jathi 5 pala is 5 beats long. Adding up, the length of the three palas is 19 beats. Obviously, at least 2 cycles of the tala 11 will be needed to perform the 3-fold mukthay. 22 beats of the tala minus 19 beats of the 3-fold mukthay leave 3 beats to work out length of gaps and starting point of the mukthay in the tala. In the first example, the choice made is of one beat per gap and to start the mukthay one beat off tala sam. It is customary in this sort of mukthay to always attack the gap for its entire duration (because the length of the gap will most likely be longer than the longest note of the phrase). *(track 81)*

Type A



In the second example, the first tala starts on the fourth beat and is followed by the three palas without any gap in between.

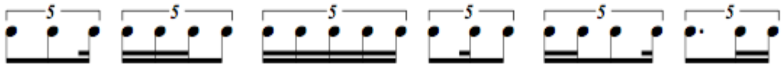


Whether in the first or second example, the gap at the beginning of the tala does not imply that it has to be a silence, as in the examples. It simply means that the mukthay commences at that precise spot but it can be preceded by any other technique or regular phrasing.

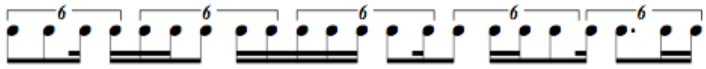
Type B

In this second type, the third pala to complete the mukthay is the 2nd speed anuloma version of the gati on which the phrase was constructed.

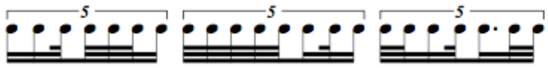
In the following example, the number of matras chosen is 30, which is the result of multiplying 5 (regular khanda) by 6 (tisra 2nd speed anuloma). The main phrase is constructed on khanda.



The other gati will thus use jathi 5. The second pala will be set in tisra 2nd speed anuloma jathi 5.



The third pala will be performed in khanda 2nd speed anuloma.

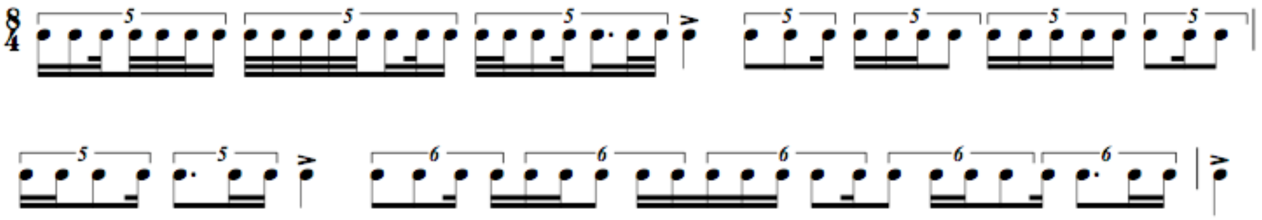


The order of the gatis is chosen freely.

As opposed to Type A, in which the order is regulated by the formula of repeating the main phrase twice followed by the second gati, in Type B the order of the gatis is left completely up to the musician. In reality, the first type works as though a sama mukthay is being played, followed by a kind of 'twist' or surprise at the end resulting from the gati change.

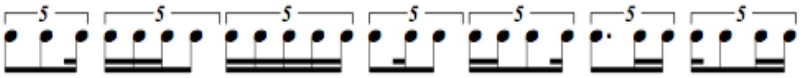
The order chosen within a tala of 8 beats is the khanda 2nd speed anuloma version of the phrase, followed by the original phrase and finishing with the tisra jathi 5 as third pala. The gaps are of one beat each. *(track 82)*

Type B

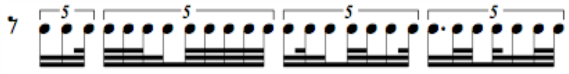


There is, though, an exception to what just has been explained: if the number of beats of the main phrase is an uneven number, this will automatically produce a 2nd speed anuloma version with an x number of beats plus ½ beat.

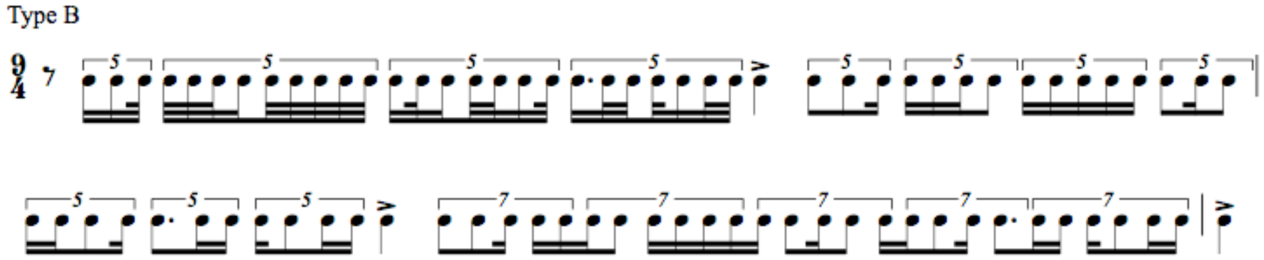
For instance, if the same phrase as in Type A is taken,



the seven beats of the original phrase in khanda, when taken into its 2nd speed anuloma, will produce a phrase of 3 + ½ beats.



It has previously been explained that the duration of gaps between palas must always be the same. If a phrase of 3 + ½ beats is used as a second or third pala, this will inevitably produce a gap longer than the other one. In order to avoid this, the 2nd speed anuloma phrase needs to be the first pala of the mukthay and the musician can then choose the order of the other two palas. The version in 2nd speed anuloma will start on the second half of the beat so that the phrase does not finish in the middle of the beat. The silence preceding the commencing of the phrase could be a rest or the end of a previous device or phrasing. *(track 83)*

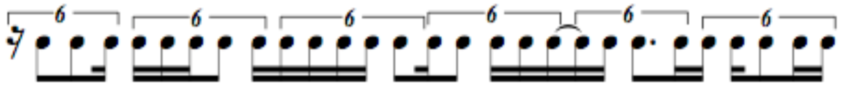


Type C

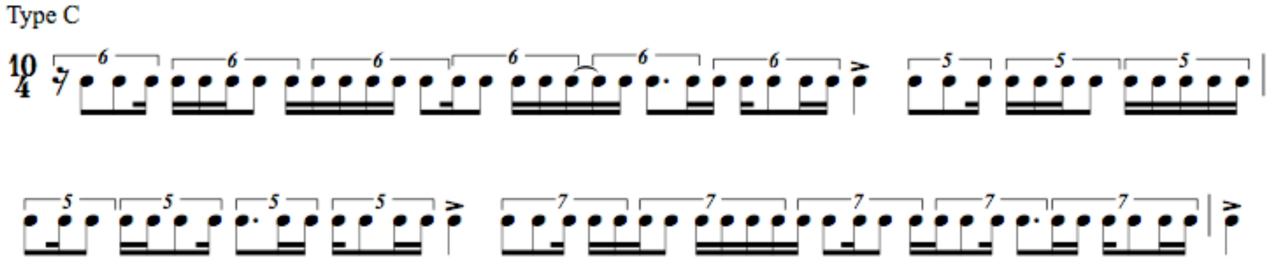
This is the type used most frequently by karnatic musicians. It involves using a third gati that inevitably will produce a phrase in which one beat will be incomplete.

If the first example is taken (35 matras, with a pala in khanda, and another one in misra jathi 5), chatusra or tisra can be chosen. If chatusra, it will produce a phrase of 8 beats and 3 matras, if tisra 2nd speed anuloma, the resulting phrase will be 5 beats and 5 matras long. In either case, this third gati has to use jathi 5, because the original phrase was constructed in khanda, and it will always be the first pala of the mukthay in order to avoid one gap being longer than the other.

In the example below the choice of tisra 2nd speed anuloma jathi 5 is taken



and the gap is of one beat each. The order of the second and third palas is again left to the musician to decide. *(track 84)*



Chapter 12

YATI PHRASES

The general accepted 'definition' of yati phrases is that they are phrases that use some form of 'geometric' shape to develop. For the purposes of this text, this definition will be avoided, since in reality, one should rather talk of a sequence of phrases in which the first phrase (or, better said, *pala)*, forms the nucleus of the sequence, every subsequent pala taking the previous one as starting point with a systematic increase or decrease to its number of matras.

This is the essence of yati phrases. However, due to the fact that there are 6 different types, each one with its own set of rules and features, it seems more appropriate to explain the characteristics of each of them individually.

1) Samayati

A phrase repeated at least three times (usually no less than four times, to distinguish it from sama mukthays). They are usually short phrases that are repeated always with a different melody (unlike the sama mukthays, where the melody tends to be the same or very similar in its three palas). Samayatis can start anywhere in the tala, may or may not have gaps in between repetitions, and generally resolve on tala sam.

Due to the proliferation and diversity of mukthays, samayatis are seldom used. However, when used, displacement within the beat is the main priority. The tendency is to utilise them in the context of '*yati prastara*', to be explained in a separate chapter.

2) Srotovahayati

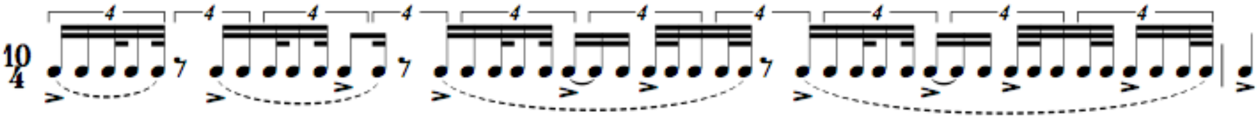
Srotovahayati is a sequence of at least three palas in which the initial one is the shortest. Every ulterior pala is an increased version of the previous one, this increase being calculated systematically by adding the same number of matras to every pala. Consequently, if the first pala is 4 matras long and the second pala is 7 matras long, it implies that the third pala has also to be increased by three matras and its length would be 10 matras. A fourth pala would be of 13 matras, a fifth one 16 matras etc.

The phrases can be increased by adding matras in three different places: once the position is chosen, every added cell has to respond to the chosen pattern.

a) Adding at the end of the phrase

This yati sequence is constructed in the following manner[1]*:*

4 (2) 7 (2) 10 (2) 13 I T.S. *(track 85)*



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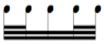
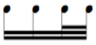
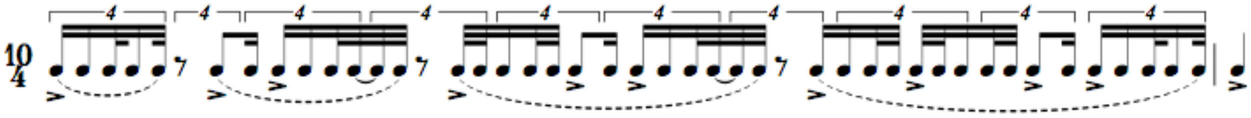
[1] *All the gaps, as was the case for mukthays, must always be of the same length.*

The pala of 7 matras uses the cell after the initial phrase has been repeated. The pala of 10 matras adds the cell  at the end of the repetition of the 7 matras, whereas the pala of 13 matras utilises the cell  at the very end of the cycle. Once the option of adding at the end of the phrase has been taken, this option must be applied to the whole sequence.

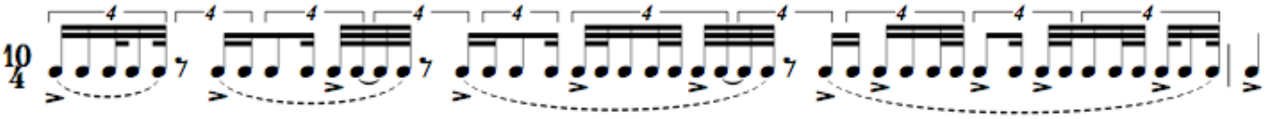
b) Adding from the beginning of the phrase

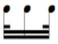
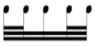
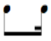
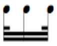
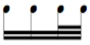
In this option, every new cell has to precede the repetition of the previous pala, again, in a systematic fashion. Consequently, the initial pala is heard as the last cell of every new phrase and the new cell precedes the repetition of the previous one. *(track 86)*



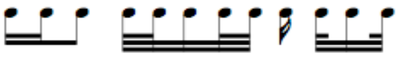
c) Adding in the middle of the phrase

In this option the only rule that has to be followed, is that the first note(s) of the original pala must always be the first note(s) of every pala and the same applies to the last note or recognisable fragment. The order of the added cells can be organised in any way that the performer finds suitable. *(track 87)*



In the example above, the first 4 matras motif is split between and  in the pala of 7 matras, by inserting the cell in between. In the pala of 10 matras, the cell  is again inserted between the new phrase created by combining and  , and the last fragment of the original phrase . In the very last pala of 13 matras, the cell  separates the cell that initiated palas 2 and 3.

This example is almost ‘conservative’, since it keeps intact every cell that has previously been played. Many karnatic musicians prefer a more ‘sophisticated’ development, achieved by inserting a new cell in a position that would break any of the previous cells. For instance, in the 10 matras phrase, the cell could have been split into a ‘sub-cell’ of an ♪ and another ‘sub-cell’ of a 𝅘𝅥𝅯, and the phrase could have resulted in



In short, it can be said that when the option of adding in the middle is chosen, except for the split cells of the original phrase that need to remain as first and last cells of all palas, any new cell can be inserted anywhere in the phrase, including breaking existing cells into two sub-cells.

Srotovahayatis can start and finish on tala sam (as is the case in all previous examples). They can also finish anywhere in the tala, if followed without any break by a short mukthay. Also, as sometimes happens because of difficulties with the calculations or because the musician so desires, they can start off tala sam provided that the ‘gap’ before the start of the yati sequence is always shorter than a beat[2]. Also, as was the case in sama and short mukthays, the last matra of the last phrase can fall on tala sam.

Below is a chart of characteristic calculations in chatusra, khanda and tisra in three different talas. One very important feature for karnatic musicians is that the very first phrase should have a clearly recognisable character, almost ‘catchy’ in nature. However, complete clarity in the development of phrases (so that any listener could eventually predict the development of the yati sequence) is not something that is sought after. Rather, as long as the calculations follow a systematic increase, karnatic musicians often prefer to create more ‘unpredictable’ phrases.

Tala 7

Chatusra	(1) 3 (1) 5 (1) 7 (1) 9 | TS	1 (2) 4 (2) 7 (2) 10 | TS
Tisra	4 (3) 7 (3) 10 (3) 12+ | 1	4 (1) 8 (1) 12 (1) 15+ | 1
Khanda	5 (1) 7 (1) 9 (1) 11 | TS	(1) 4 7 10 13 | TS

Tala 10

Chatusra	5 (3) 7 (3) 9 (3) 10+ | 1	4 (2) 7 (2) 10 (2) 13 | TS
Tisra	(2) 4 (2) 7 (2) 10 (2) 13 (2) 16 | TS	6 (4) 10 (4) 14 (4) 18 | TS
Khanda	(1) 7 (3) 9 (3) 11 (3) 13 | TS	6 (3) 9 (3) 12 (3) 14+ | 1

Tala 12 (followed by short mukthays)

Chatusra	7 (2) 10 (2) 13// 5 5 4+ | 1	3 7 11 15// 3 (2) 3 (2) 2+ | 1
Tisra	5 (4) 8 (4) 11 (4) 14// 7 (1) 7 (1) 6+ | 1	3 (3) 8 (3) 13 (3) 18// 5 (3) 5 (3) 5 | TS
Khanda	4 (3) 8 (3) 12 (3) 16// 3 (1) 3 (1) 3 | TS	7 (2) 9 (2) 11 (2) 13// 4 (1) 4 (1) 4 | TS

3) Gopuchayati

Gopuchayati is exact reverse of a srotovahayati, with the first phrase being the longest. Every ulterior pala is a decreased version, omitting always the same number of matras. The three options regarding where to omit notes, are the same as explained in the srotovahayati: omit from the end, from the beginning or the middle of the phrase. Since these three options have already been explained above, one example should suffice to illustrate gopuchayatis: the option that omits from the end.

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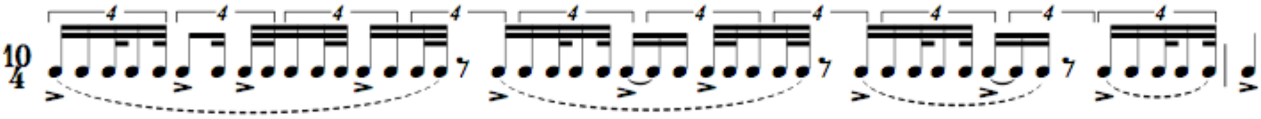
[2] *The length of the gap before the beginning of the sequence does not have to correspond with the length of the gap used between the palas.*

(track 88)



The above chart with a srotovahayati construction can equally be used for gopuchayatis; all is needed is to reverse the numbers.

When the last matra of the yati sequence resolves on tala sam, the procedure should be quite self-evident. If the following example appears as a srotovahayati construction
5 (3) 7 (3) 9 (3) 10+ I 1

all that needs to be done is to reverse the order and the last matra of the first pala of the srotovahayati falls on tala sam in the gopuchayati.
11 (3) 9 (3) 7 (3) 4+ I 1

4) Mridangamyati

In its simplest possible definition, mridangamyati is a srotovahayati followed by a gopuchayati. However, there are many elements to take into consideration that can, in many cases, turn this simple notion into a more elaborate technique. These elements are:

a) Placement of added and omitted matras: since there are three possible ways to add or omit notes, every segment can choose a completely different way; for instance, the srotovahayati fragment (first part) of a mridangamyati could add notes at the end of the phrase whilst the gopuchayati (second part) could omit from either the beginning or the middle.

b) Use of different gatis: every fragment can be performed in different gatis, regardless where the gati change takes place within the tala.

c) Gaps: each fragment can have a different number of matras in its gaps, as long as every fragment keeps the same number of matras for all its gaps.

d) Short mukthays: the length of every fragment does not have to equal to an exact number of cycles, regardless of whether performed in the same gati or not. A mridangamyati can be followed, without any break, by a short mukthay.

All these elements can also be combined while constructing a mridangamyati. In addition to these, there are two structural methods of developing the whole sequence.

A) First structural method: viloma

Viloma means 'retrograde'. There are several ways of retrograding a melody and a rhythm (and their combinations) in karnatic music. What it is quite interesting is how karnatic music makes use of the retrograde concept in a 'structural' way, not only retrograding the rhythm or the melody but also steps of a sequence or various other parameters. To avoid confusion with the western term (which basically refers to the retrograde of pitch content or of a particular rhythm), I prefer to use the karnatic term of viloma.

When viloma is applied to the construction of a mridangamyati, it means that the numbers used for the length of palas for the first segment are applied to the second segment in reverse order. How palas omit matras, and whether the second fragment uses a different gati or different number of matras in its gap is an ulterior consideration.

If the srotovahayati sequence exposed above is taken once again
4 (2) 7 (2) 10 (2) 13

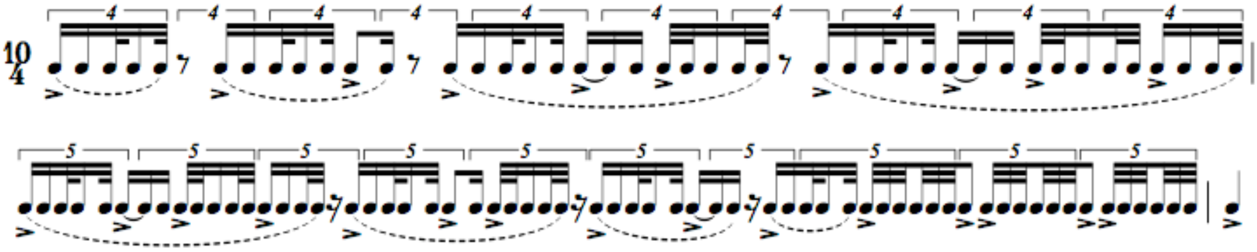
the viloma version will be[3]
13 (x) 10 (x) 7 (x) 4

Needless to say that when the longest phrase is performed twice in a row, there is no possibility of creating any change to that phrase (phrases are not to be changed or ornamented arbitrarily in a mridangamyati, or any yati for that matter). Although the development of the second fragment could give as a result an entirely different phrase than the first fragment, the fact remains that the pala of 13 matras is repeated twice in a row. Often this can be done in the same gati, but it is customary that, in order to give some 'spice' to this repetition, the second fragment is performed in a different gati. This provides room for the possibility of using a different number of matras for the gap and/or the use of a short mukthay at the end of the second fragment.

In the example below, the chatusra version is 4 (2) 7 (2) 10 (2) 13, and it is followed immediately by the reversed version exposed above, but in khanda. Counting only the number of matras that the four palas of the srotovahayati sequence provide, there are 34 matras. A whole cycle of tala 10 in khanda is 50 matras long: therefore, the sequence is short by 16 matras to resolve on tala sam. In the following example, the gap has been varied (only 1 matra gap in between phrases of the gopuchayati) and a short mukthay has been added.

The calculations for the gopuchayati segment are
13 (1) 10 (1) 7 (1) 4

which gives 37 matras: therefore the sequence is still 13 matras short to resolve on tala sam. The short mukthay that follows the second fragment is 3 (2) 3 (2) 3 I T.S. *(track 89)*



In this specific mridangamyati, the increased and decreased palas have followed the same pattern (adding and omitting from the end). But, as indicated previously, the second fragment, besides the change of gati and number of matras in the gap, could have omitted from the beginning or the middle.

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[3] *X refers to the fact that the gap could be of different length that the one used for the first fragment.*

B) Second structural method: palindrome

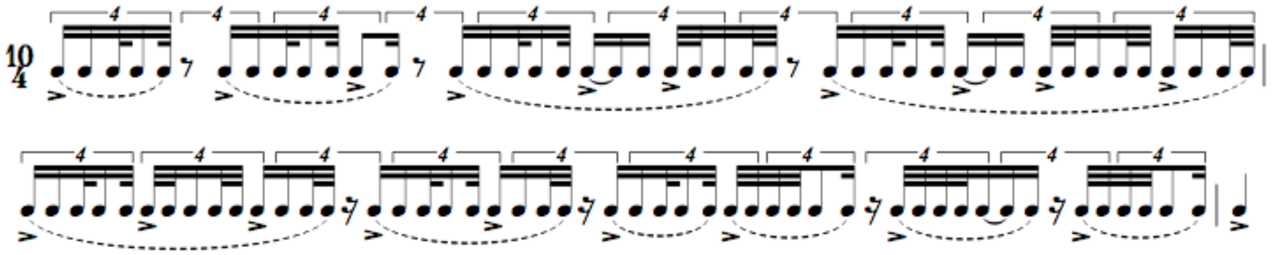
The concept of palindrome is, as with viloma, used abundantly to develop melodies and rhythms in karnatic music. But, as in the case of viloma, can also be utilised for structural purposes. The main difference between the two concepts is that, in a retrograded version of a musical object, the whole object is reversed, whereas in the palindrome version the very last element (be it a pitch, a note of a rhythm, a step etc), is never repeated, creating a sort of 'axis' point.

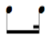
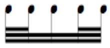
When applied to a mridangamyati, this implies that the longest phrase is not repeated in the second fragment. Consequently, the phrase sequence would be as follows (without gaps):
4 7 10 13 -- 10 7 4

Again, this second segment could omit matras from a different place in the phrase, go to another gati, use a different gap than the first segment and be followed by a short mukthay. In the example below, except for the gati change, all other possibilities are present.

The calculations are:

4 (2) 7 (2) 10 (2) 13---10 (1) 7 (1) 4, followed by the short mukthay 5 (1) 5 (1) 5 | T.S. *(track 90)*



The first fragment adds matras at the end of the pala, whilst the second fragment omits matras from the middle. The very first pala of the second fragment (10 matras long) removes the cell , which was the second cell of the srotovahayati sequence. Similarly, the second pala of the gopuchayati (7 matras long) removes the cell  that was the third cell of the original phrase.

In fact, the palindrome option is utilised more often that the viloma option because it avoids the repetition of the longest pala which matches the aversion to potential 'repetitiousness' that most karnatic musicians tend to have, as already mentioned a few times.

5) Damaruyati

This technique is the opposite of a mridangamyati: it is a gopuchayati followed by a srotovahayati.

All the elements used in the mridangamyati to add variation or modify the second segment, are used here as well. Similarly, the viloma and palindrome structural options are also used, although in the case of a damaruyati, the viloma option is used more often than in the mridangamyati, due to the fact that the last pala of the first fragment is the shortest pala of the whole sequence. Consequently there is, a priori, no risk of 'repetitiousness'.

Furthermore, the fact that the last phrase of the sequence is the shortest one, results in the addition of another technique to the viloma and palindrome options.

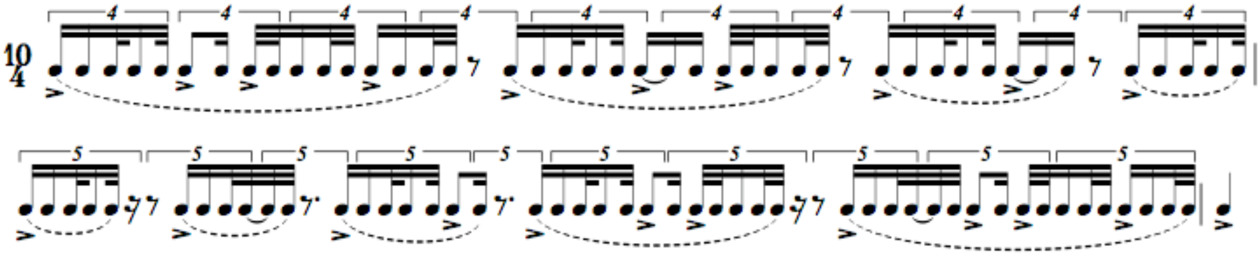
Corresponding to the 'taste' of karnatic musicians to use number three in any possible way (derived from cultural and religious elements), the last phrase of the first fragment could be repeated three times to then be followed by the reversed version of the rest of the srotovahayati.

The sequence below is structured as follows (without gaps): 13 10 7 4 4 4 7 10 13

In this option, a gati change should take place in the second fragment (this is not given as a fixed rule, but is common practice in karnatic music). This gati change can be applied to the second or third time the shortest pala is repeated, depending on calculations or musical purposes.

In this case, the gati change takes place the second time the shortest pala is performed. The first fragment has a gap of 2 matras, whilst the second fragment uses a 3 matras gap. The placement for adding and omitting matras is the same (from the end). This placement for omitting matras in the second fragment could also have been constructed differently. Further, the whole sequence could have finished anywhere in the tala and be followed by a short mukthay.

This option of repeating the shortest phrase three times, surprisingly enough, does not have a name in karnatic music. The most common answer I have heard from teachers and musicians is that 'is like a mukthay'. Therefore, I have coined this possibility the **'mukthay-like'** option, for lack of a better or more 'sophisticated' term. *(track 91)*



6) Visamayati

This type of yati is the least clear of all yatis. The general definition found in various books is that it 'does not follow any order', or descriptions along this line. Asking musicians what characterises a visamayati results in enormously varying explanations.

For some, a visamayati is the same as a sequence of jathi bhedam, because there is no regularity or pattern of any kind in the chosen numbers.

For other musicians, a visama yati is the permutation of the numbers of a previous yati phrase but with the following rules:

-Every pala has to be repeated twice or thrice

-There should be two different gaps: one for all the gaps in between repetition of palas, and a different one to be used between the fragments that any repeated palas create.

A possibility based on the example used in this chapter (4 7 10 13) could be:
(1) 7 (2) 7 (2) 7 --(3)-- 13 (2) 13 (2) 13 --(3)-- 4 (2) 4 --(3)-- 10 (2) 10 (2) 10 | T.S.

The gap of 2 matras is used in between repetitions of every pala, and the 3 matras gap in between the blocks.

This sequence would be performed in 3 cycles of tala 10, starting one matra off the tala sam. Calculations required for visamayatis are much more laborious than for any other technique used in karnatic music.

The vagueness of its definition, together with the rather arduous manner to find the way to make the sequence fit into a concrete number of cycles (without mentioning the fact that many musicians believe that it is the same as jathi bhedam), turns this technique into a theoretical concept that is barely, if ever, utilised by karnatic musicians.

Chapter 13

YATI MUKTHAYS

This form of mukthays is the first to depart from the generic idea that a mukthay is a phrase repeated three times. The number three is undoubtedly present, but not in the transparent manner encountered so far. Instead, the number three is intertwined with the yati concept of systematic increase or decrease of a musical parameter, and in addition to the increase or decrease of matras in phrases, this concept is also applied to other parameters.

Yati mukthays are divided into three different types.

1) TYPE A

The format of this type follows the pattern **AAA** (gap) **BBB** (gap) **CCC**

'A' is a shortened or elongated version of 'B', and 'C' will be shortened if 'A' is elongated (and vice versa), by the same number of matras. This in itself would not be different from a regular sequence of yati phrases. In order to turn it into a mukthay, every pala is repeated three times and is structured into a specific pattern (unlike a yati sequence that could have any number of palas).

Calculations

This type, for developmental reasons explained later, exclusively starts and finishes on tala sam (therefore, the option of using the last matra of the last pala falling on the tala sam is discarded). These are the steps to construct a yati mukthay of type A:

1) Decide on which gati the mukthay will be constructed. In the example below, the tala is 14 beats and the gati is chatusra. If the mukthay is constructed on one cycle of the tala, the number of matras will be 56.

2) Divide 56 matras by 9 (because this is the number of palas in the mukthay). This division will result in every pala being of 6 matras with 2 matras left over that will be used for the gaps.

3) The resulting number of 6 matras will actually be applied to the 'B' phrases of the mukthay. 'A' phrases will add or omit an x number of matras and, whether the 'A' phrases are increased or decreased, the 'C' phrases will omit or add the same number of matras. Here there are some possibilities.

555 666 777 444 666 888 999 666 333

4) The number of left over matras will be used for the gaps. Since there are 2 matras left over and both gaps must have the same length, every gap will be 1 matra long. Therefore, if the first example above is taken, the mukthay will be 555 (1) 666 (1) 777

As opposed to sama mukthays, where a list of potential pala durations for the mukthay constituted the initial step, in type A yati mukthays this step is discarded. If the longest possible pala of the example is 6 matras, and one matra is subtracted from every pala (as it was the case in sama mukthays), not only will the gap be rather long (something that could be quite effective but is usually avoided by karnatic musicians), but it will invariably give fractional matras. Consequently, unless a long gap and/or a 𝅘𝅥𝅯 displacement of the phrase is sought for, the result of the first division will always give the number of matras for the 'B' phrases and the left over number will be used for the gaps.

Phrase construction

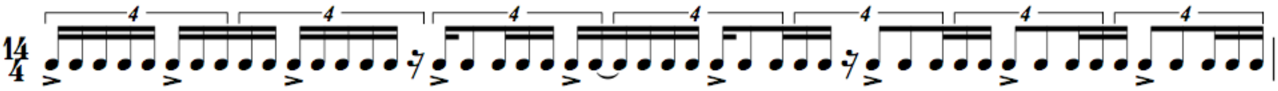
Besides the fact that, unlike yati phrases, all types of yati mukthays follow a specific pattern, a major difference between yati phrases and yati mukthays lies in the manner the phrases are increased or decreased. Whereas in a yati phrase sequence the palas are increased or decreased by adding or omitting notes, in **yati mukthays the palas are increased or decreased by shortening or elongating note values while the number of notes of the first pala remains the same.**

However, this shortening or elongation of note values is never random and must follow some form of protocol, a logic and coherence which can sometimes be very clear (and almost predictable) while at other times it may be more intricate and difficult to follow[1]. There are two main principles that rule the increase of note values:

-Increase on already increased notes

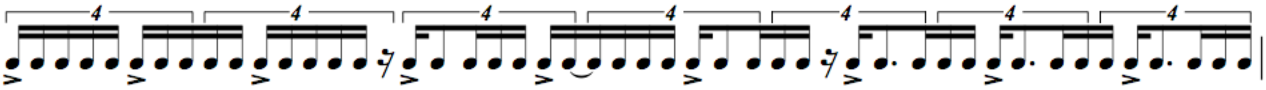
-Increase on new notes, usually those that follow or precede already increased notes.

(track 92)

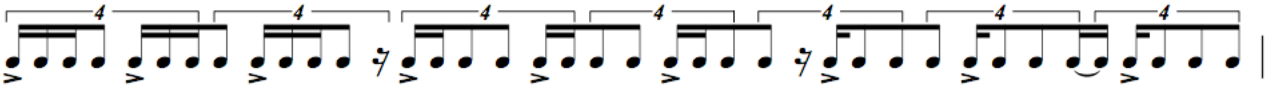


The first phrase ('A') is 5 matras long and uses 5 notes. Therefore 'B' and 'C' should keep 5 notes and increase the value of one or two notes. The example above is a standard phrase that can be heard quite frequently in diverse contexts. The 'logic' behind is that the second note becomes an ♪ in the 'B' phrase and the same happens with the first note of the 'C' phrase.

The example below would follow a more transparent logic, by which the note that has been increased by one matra in the 'B' phrases, is again increased by another matra in the 'C' phrases. *(track 93)*



Another possibility with the same calculations would be to have a 4-note phrase in 'A', in which the last note is an ♪, and turn successively every previous 𝅘𝅥𝅯 in the 'B' and 'C' phrases into an ♪, leaving only the very first note intact in all three phrases. *(track 94)*



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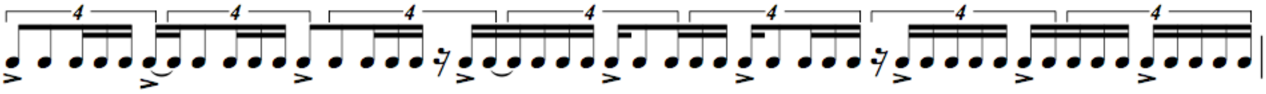
[1] *As long as the creator finds some form of logic or coherence as to which notes can be increased or decreased and the musical result does not sound like a random or obscure choice of increased or decreased notes, the developmental possibilities are quite rich.*

Development of yati mukthay Type A

It was seen that the sama mukthays have a large corpus of developmental possibilities, whereas the three-fold mukthays were a one-time occurrence. Type A yati mukthays are developed in a very specific manner:

The exposition of the pattern **AAA** (gap) **BBB** (gap) **CCC** is called *krama* (in reality, any exposition of any material is named krama, which means 'in order'). This is followed in the next cycle by the viloma form of the groups, but the rhythm is never retrograded. Therefore, the phrase would follow the pattern
CCC (gap) **BBB** (gap) **AAA**

If the first example is taken, the viloma version would look like this



Finally, the groups are 'de-constructed' and every A, B or C phrase can be mingled without following a specific pattern. This is called *vakra*, or, as karnatic musicians would translate into English, a 'zigzag' phrase.

The only requisite is that every group must be constructed with 3 palas and be separated by the gap. Although this may seem to open the door to 'chaos', the actual mathematical possibilities to make the 9 phrases fit into one cycle of the tala are ultimately only two:

- **a)** Every A, B and C is played 3 times, in any order
- **b)** A and C phrases are performed twice whilst B is done five times, also in any order.

Here there are just a few options covering the two possibilities

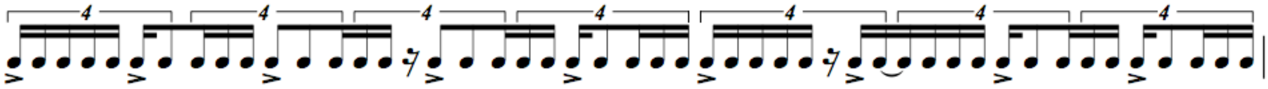
CCB (gap) **BBC** (gap) **AAA**

CAC (gap) **BAB** (gap) **BBB**

ABC (gap) **BBB** (gap) **CBA**

ABC (gap) **CBA** (gap) **BBB**

If the last option is chosen, the vakra version of the yati mukthay would be[2]



Consequently, this mukthay would be performed in 3 cycles of tala 14. The fact, mentioned previously, that this type of mukthays should be enclosed within the cycle and never have the last matra of the last pala attacking tala sam derives from this developmental notion - otherwise, the viloma version would start on the 2nd matra, the vakra on the 3rd matra and the final matra on the 4th matra of the beat.

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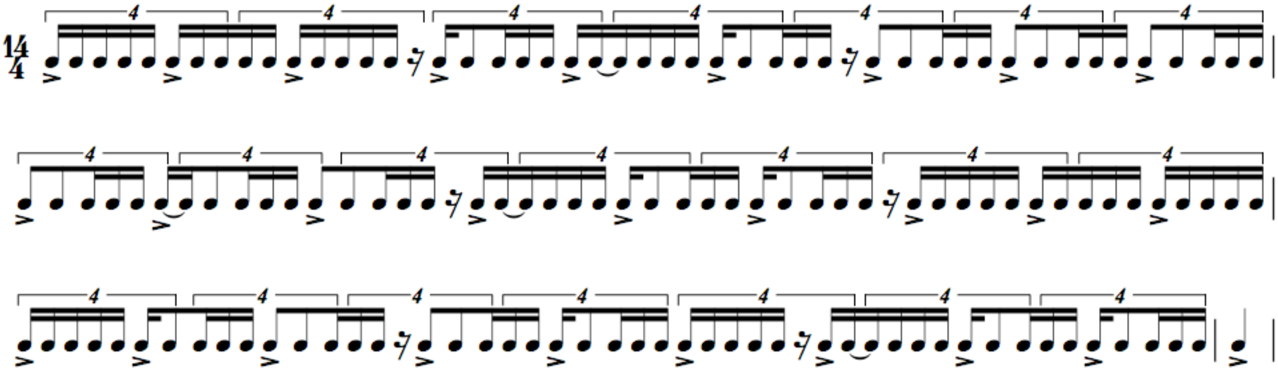
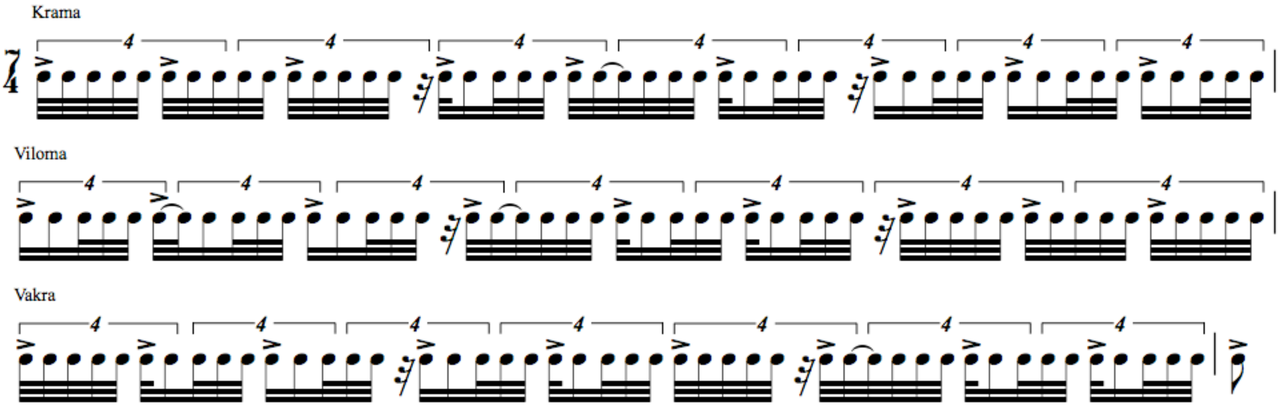
[2] *This option is the most 'conservative', because it maintains 18 matras per group. But this does not necessarily mean that is the one preferred or most abundantly performed.*



In reality, the entire previous explanation in tala 14, using 𝅘𝅥𝅯 and ♪, is a simplification of a mukthay by Jahnavi Jayaprakash performed in a tala of 7 beats with 𝅘𝅥𝅰 and 𝅘𝅥𝅯, with a gap of ½ matra.

(track 95)

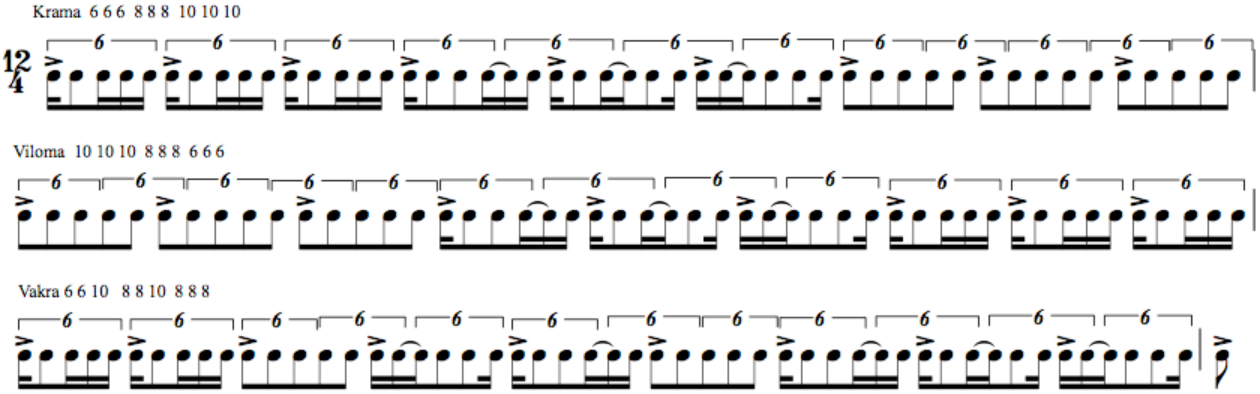


The melody impedes any feeling of repetitiousness or predictability; on the contrary, it becomes rather difficult to follow the rhythmical pattern with the same ease as when the rhythm is heard only with solkattu.

Below, another yati mukthay in tisra in tala 12 is presented. The number of matras in one cycle is 72; when divided by 9, this gives 8 as a result and 0 for the left over. This implies that the 'B' phrases will be 8 matras long and the mukthay will have no gaps.

The 'A' phrases are 6 matras long, but they contain only 5 notes. This number of notes must be kept in the 'B' and 'C' phrases. 'B' phrases are 8 matras long and, in order to keep the same number of notes as 'A', the third and fourth notes are elongated from a 𝅘𝅥𝅯 to an ♪; 'C' phrases are 10 matras long and the musician decided to elongate the first and fifth notes into an ♪ as well. It can be observed that the vakra version takes the pattern **AAC** (gap) **BBC** (gap) **BBB.**

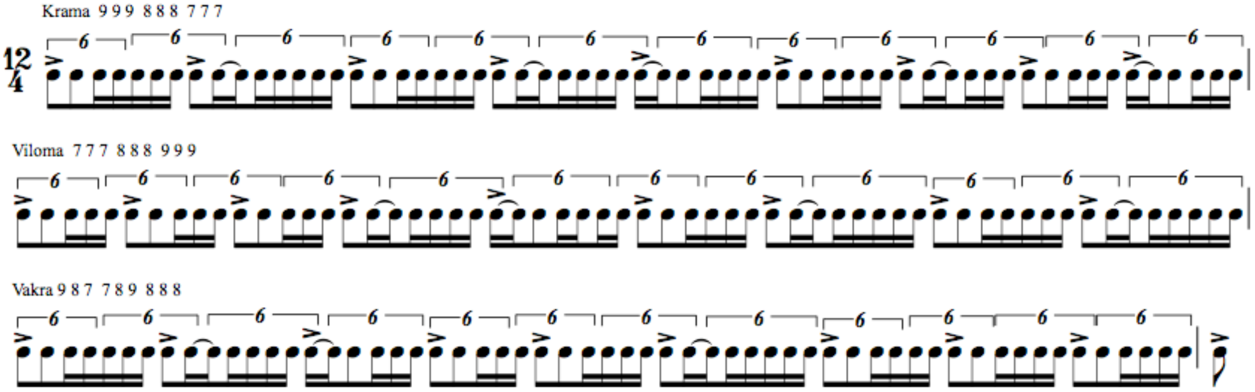
(track 96)


Krama 6 6 6 8 8 8 10 10 10
Viloma 10 10 10 8 8 8 6 6 6
Vakra 6 6 10 8 8 10 8 8 8
12
4

This krama-viloma-vakra concept, besides being used in the manner just explained (essentially as a block or sequence), can also be separated within a piece of music with the viloma and vakra versions appearing at different places in the music. Generally, when this is done, it follows certain patterns of specific sections of karnatic forms, or is used as a way to develop mixing techniques (explained later).

Use in different contexts

This type of yati mukthays can also appear in different contexts, namely Double or Triple mukthays, Mukthay Combinations or *Poruttam* A. When this is the case, the rule of increasing or decreasing the note values can be replaced by the manner of increasing and decreasing characteristic of the yati phrases, as long as the pattern **AAA** (gap) **BBB** (gap) **CCC** is preserved, as well as all the structural rules for viloma and vakra. In the example below, the 'B' phrases omit the last 𝅘𝅥𝅯 of 'A', and the 'C' phrases omit in exactly the same fashion. *(track 97)*



2) TYPE B

This type of yati mukthay would follow one of the following patterns

A (gap) **AB** (gap) **ABC**

ABC (gap) **AB** (gap) **A**

In both cases, the phrases can increase or decrease, but as opposed to Type A, there are different available combinations of mixing adding/omitting notes with increasing/decreasing note values.

Calculations for increasing the length of palas

As can be deduced from the patterns, there are 6 palas in this type of yati mukthays: 'A' is performed 3 times, 'B' is played twice and 'C' only once. The number of matras of the 'A' phrase is increased by an x number of matras in the 'B' phrase, and the 'C' phrase is increased by the same number of matras in relationship to the 'B' phrase.

There are specific formulas for this type B. The decision as to which of the patterns shown above should be taken does not affect the calculations.

The formula used for increasing the palas is

T=(6xP)+(4xI)+(2xG)

-T is the number of matras of the whole mukthay. This number of matras is the result of multiplying the chosen gati by the number of beats of the tala, eventually multiplied by more than one cycle. This number has to equal

-6xP (which means that the core number of matras, the one of phrase 'A', is to be performed 6 times) plus

-4xI (this is the number of matras to increase the core phrase multiplied by 4 times) plus

-2xG (number of matras in the gap multiplied by two)

In the example below, the tala is of 12 beats and the gati is tisra, which gives as a result 72 matras. This is the **T** of the formula that has to match the following calculations:

The core phrase ('A') is 9 matras long, but these 9 matras are also the first building block of the other two phrases. Therefore these 9 matras are to be performed six times and result in 54 matras.

The increase applied to 'B' is of 3 matras. Since 'B' is played twice, there are 6 more matras to match **T**. The 'C' phrase is increased by 3 matras over the 'B' phrase, and so is consequently 6 matras longer than the 'A' phrase. The increase of 3 matras multiplied by four gives 12 matras, which added to 54 equals 66 matras. This number is still 6 matras short of completing the number of matras required by **T**. These 6 matras will be distributed equally between the two gaps and then the two parts of the equation will finally match.

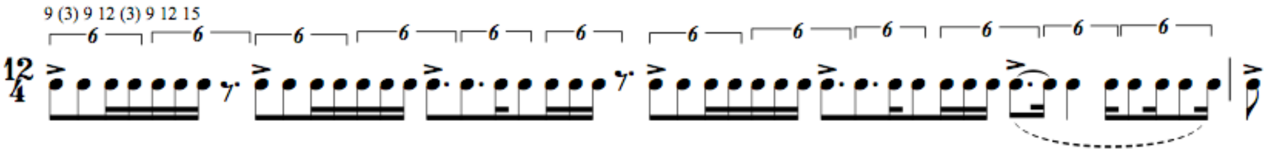
T (72 matras)=6xP (54 matras) + 4xI (12 matras) + 2xG (6 matras)

So, with the pattern **A** (gap) **AB** (gap) **ABC** becomes 9 (3) 9 12 (3) 9 12 15

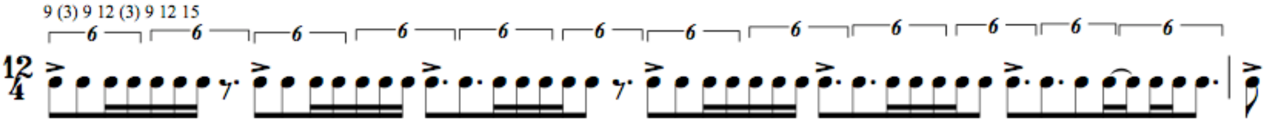
As with type A, the phrases are increased by elongating certain notes while maintaining the same number of notes of the 'A' phrase. The 3 matras for the increase applied to the 'B' phrase are distributed by adding one matra to every ♪ and turning the second 𝅘𝅥𝅯 into an ♪; in this way, the original seven notes are preserved.

The 'C' phrase is similarly increased by 3 matras. These are used in a similar fashion as with the 'B' phrase: the first two notes are increased by one matra, becoming ♩, and the fourth 𝅘𝅥𝅯 of the original phrase is turned into an ♪

(track 98)



In the second example, based on the same calculations and 'A' phrase, the development is similar in the 'B' phrase (adding one matra to every ♪ and turning this time the last 𝅘𝅥𝅯 into an ♪). However, the manner in which the 'C' phrase is increased differs more drastically than in the first example; the first two notes remain the same, the first and second 𝅘𝅥𝅯 are turned into ♪ whilst the very last note, already increased by one matra in the 'B' phrase, is once more increased by one matra. *(track 99)*



The first example represents a more 'transparent' and almost straightforward notion of increasing logically, whereas the second example juggles more with the two main principles that rule the increase of note values:

-Increase on already increased notes

-Increase on new notes, usually those that follow or precede already increased notes.

Both notions can be mixed, which most of the time produces a more varied musical result. In the 'C' phrase of the second example, the notion of increasing on increased notes is applied to the last note. The new notes that are increased are the first and second 𝅘𝅥𝅯 (following the karnatic logic of transforming notes next to the ones that were already increased). In this context, since the last 𝅘𝅥𝅯 was increased in the 'B' phrase, the third and fourth 𝅘𝅥𝅯 could have been increased as well, because they are next to the last note. However, increasing the first and third, or second and fourth 𝅘𝅥𝅯 would be considered illogical.

Calculations for decreasing the length of palas

The formula for a decreased version of the patterns **A** (gap) **AB** (gap) **ABC** or **ABC** (gap) **AB** (gap) **A** is as follows:

T=(6xP)-(4xD)+(2xG)

In this context, the **4xD** signifies the four times that the core phrase is decreased. The resulting number is to be subtracted from the multiplication of the number of matras in the core phrase by six. Therefore, the latter must always be larger than the number of matras in the tala **(T).**

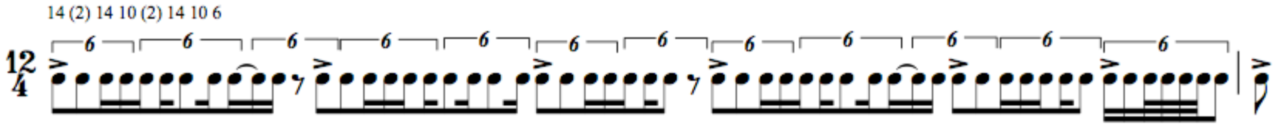
In the next example, the tala and gati are the same (72 matras long). Since the 'A' phrase is 14 matras long, this number multiplied by six times results in 84 matras, a number sufficiently bigger than **T** so that there would be more room to use a variety of choices for the decreased 'B' and 'C' phrases.

The 'B' phrase is 10 matras long and the 'C' phrase is, necessarily, 6 matras. This implies that **4xD** is 4 matras multiplied by four times, resulting in 16 matras.

Subtracting the number of matras in the **6xP** (84 matras) from **4xD** (16 matras) gives 68 matras, four matras short of **T**. Therefore, every gap has to be 2 matras long.

T (72 matras)= 6xP (84 matras) – 4xD (16 matras) + 2xG (4 matras)

So the pattern **A** (gap) **AB** (gap) **ABC** becomes 14 (2) 14 10 (2) 14 10 6 *(track 100)*

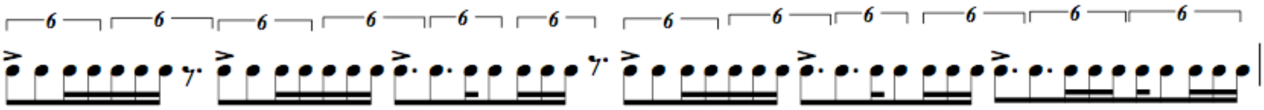


Phrase development

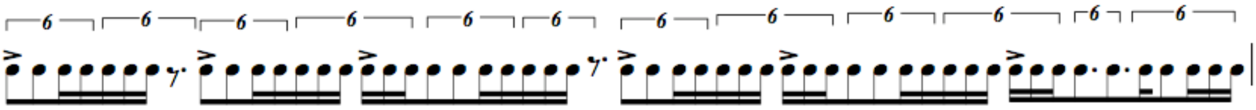
One of the possible variations regarding phrasing in the Type B can be observed in this mukthay: unlike the Type A that rigorously follows the notion of exclusively increasing or decreasing note values, in Type B a combination of adding/omitting notes with increasing or decreasing note values is not an unusual occurrence. There exist four possibilities:

a) Increasing length of phrases:

-The ‘B’ phrase increases the note value of some notes while the ‘C’ phrase adds notes in any manner seen in the yati phrases chapter. In the example below, the three added matras in the ‘C’ phrase split the ‘B’ phrase into two parts, and three 𝅘𝅥𝅯 become inserted in between. *(track 101)*



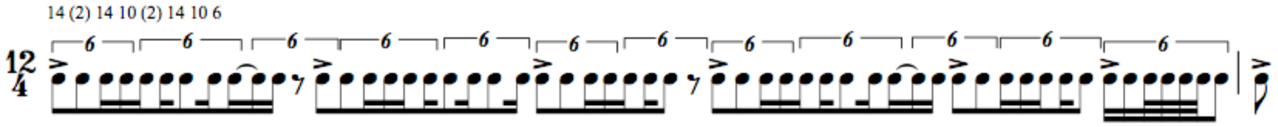
-The ‘B’ phrase increases by adding notes: in this case, the ‘C’ phrase has to increase the note values of some of its notes. In the example below, three 𝅘𝅥𝅯 have been added at the beginning of the ‘B’ phrase, which produces a 10-note phrase. Therefore, the ‘C’ phrase has to increase, maintaining ten notes instead of seven. The two ♪ increase by one matra each, whereas the second 𝅘𝅥𝅯 of the group of five 𝅘𝅥𝅯 is increased by one matra. *(track 102)*



b) Decreasing length of phrases:

-Omitting notes in the ‘B’ phrase is the most common framework where one finds a deviation from the concept of keeping the same number of notes in all phrases while increasing or decreasing note values, possibly in order for the ‘C’ phrase to be more playable. The same two options and rules explained above are applicable here.

In the example shown for the explanation of the calculations of the decreased Type B, it can be observed that the ‘B’ phrase is shortened by omitting its last four matras. This produces a phrase of seven notes. Consequently the ‘C’ phrase has to keep this number of notes while reducing the note value of every note by half, except for the very last ♪ that is kept intact.



-The option of omitting notes of the 'C' phrase, although theoretically possible, is considered rather 'sloppy' and never used by karnatic musicians. The previous option is essentially the only one utilised.

Consequently, it can be concluded that only one phrase ('B' or 'C') can be increased or decreased by adding or omitting notes and never the two of them. If 'B' is increased or decreased, 'C' must use the same number of notes as 'B' and increase or decrease note values.

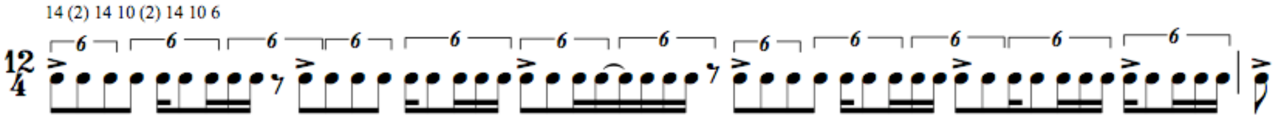
Ornamentation

Although a not uncommon occurrence in sama mukthays and yati phrases, this element is quite present in type B of yati mukthays. However, unlike ornamentation in other techniques, a concise explanation is needed since this sort of mukthays base their shortening or elongation of phrases on the number of notes of a previous phrase.

If, for instance, the second time that an 'A' phrase is played the performer decides to ornament the phrase, the 'B' phrase will be constructed exclusively on the number of notes of the first 'A' and **never** on the ornamented version performed the second time. The same holds true with the 'C' phrase in relation to 'B'.

Use in different contexts

As with Type A, yati mukthays can be used in the context of double, triple and mukthay combinations as well as poruttam A. When this is the case, the rules of increasing or decreasing note values become more flexible as long as the pattern **A** (gap) **AB** (gap) **ABC** or **ABC** (gap) **AB** (gap) **A** is kept untouched. In the following example, the 'B' phrase is shortened by omitting its first two ♪ and the 'C' phrase repeats the same idea of omitting 4 matras from the beginning. *(track 103)*



3) TYPE C

This type follows the pattern

A (gap) **AA** (gap) **AAA**

Unlike types A and B that needed to start on tala sam, type C can start anywhere in the tala. In fact, this mukthay is used also as a 'short mukthay'. Less commonly used than the short mukthay in its sama version (repetition of a phrase three times), this type can be used as a short mukthay with any technique that could call for it, like jathi bhedam sequences or yati phrases. Usually the phrase is quite concise.

Calculations

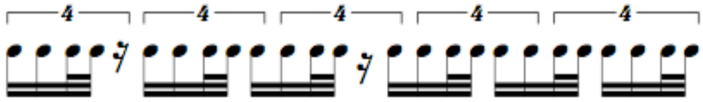
Simply divide the remaining number of matras before tala sam by six instead of three; the left over will be used for the gaps. If there are 20 matras before tala sam, divide 20 by 6 and every ’A’ phrase will be 3 matras long; the 2 matras left over will be distributed between the two gaps.

Phrase construction

Since all the phrases share the same length, there is a variety of options.

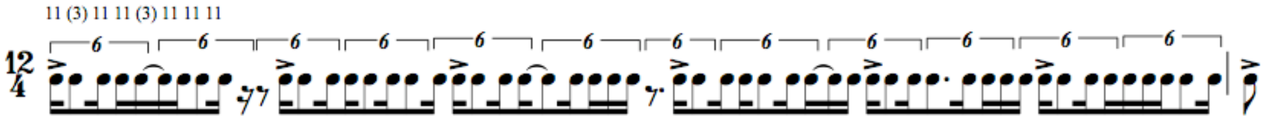
a) Repetition of the same phrase:

This is generally realised only when the phrase is quite short (between 3 and 5 matras). The example below follows the above calculations. *(track 104)*



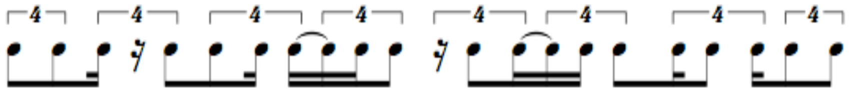
b) Variation on the initial phrase:

These are simple ornamentations, one or two notes shortened or elongated, or a note added, but without following any pattern or specific rules. *(track 105)*



c) Permutation of note values within the same sort of cell:

The example below is a typical yati mukthay using this notion. The ♪ is placed differently amongst the two ♪ *(track 106)*



Chapter 14

TIRMANAS

Tirmanas are rhythmical structures made up of the following elements:

1) A phrase of 3, 4, 5, 6 or 7 notes in which each note is separated from another by the same number of matras.

2) A section called *purvanga* in which the phrase is performed at least two more times, although the separation between the notes is decreased systematically.

3) This section ends when the last phrase has reached a separation between notes of 2 matras, eventually 3 matras, depending on the system applied to decrease the separation between notes.

4) A section called *uttaranga*; in this section the only requisite is that every repetition of the phrase is constructed in a shorter time-span than the previous step. As a result of this flexible concept, several uttarangas can be structured for one purvanga.

Tirmanas start and resolve on tala sam. They can be constructed in any number of cycles and have two unique features:

a) Unlike any other technique seen thus far, they are exclusively constructed in chatusra,

b) Once the sequence has reached the uttaranga, the number of notes chosen gives the possibility of going to another gati, and the change can occur anywhere in the tala. If, for instance, a phrase of 5 notes is chosen, in the uttaranga these 5 notes can be used as khanda against any frame (amongst other possibilities).

CONSTRUCTION OF THE SEQUENCE

The first step is to choose the number of cycles for the whole tirmana, and how many notes will be used for the phrase. There are no formulas or short cuts to construct tirmanas. Karnatic musicians have learnt many tirmanas for all talas, but when faced with a different situation I have observed that they need to make calculations and a sort of trial and error process ensues.

In the example below, two cycles of tala 9 have been chosen along with a 5-note phrase. Therefore, the tirmana has to be set to 72 matras. All notes in the first phrase are separated by 6 matras, resulting in

-5 notes x 6 matras of separation= 30 matras

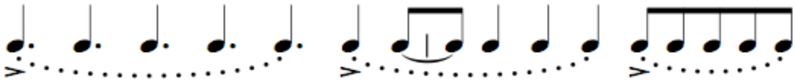
In the second step the separation between notes has been reduced to 4 matras. Therefore,

-5 notes x 4 matras of separation= 20 matras

In the third step, every note has to necessarily be separated by 2 matras, to continue with the systematic decrease among notes by 2 matras. This will imply

-5 notes x 2 matras of separation= 10 matras

These three steps will constitute the purvanga, since the third step has reached the 'threshold' of 2 matras of separation. Adding up the three steps leads to 60 matras, 12 matras short of 72 matras. *(track 107)*



The remaining 12 matras need to be completed by the uttaranga.

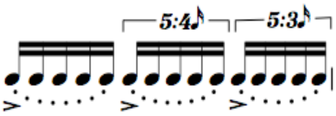
-A first option could be

-5 notes x 1 matra of separation =5 matras

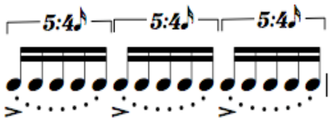
-5:4♪ =4 matras

-5:3♪ =3 matras

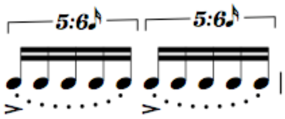
which will result in the 12 matras sought for. It can be observed that when the phrase goes into khanda, it is the number of matras of the frame that counts for the calculations and **never** the number of matras of the gati. *(track 108 with the four uttaranga options)*



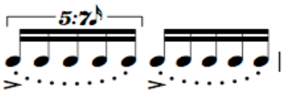
-A second option for the uttaranga could be to use one of the construction rules for the uttaranga section: **the very last step in a tirmana can be repeated twice or thrice**. If a 5:4♪ is repeated three times, the necessary 12 matras are obtained.



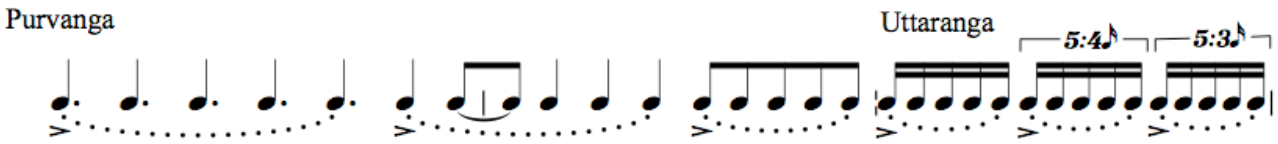
-If 5:6♪ is repeated twice, the frame of 6♪ twice would again give the 12 matras needed.



-A fourth possibility could be to use a 5:7♪ followed by five ♪

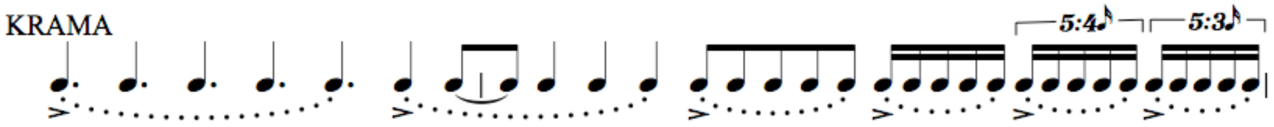


If the first uttaranga option is chosen, the whole tirmana will look as follows *(track 109)*

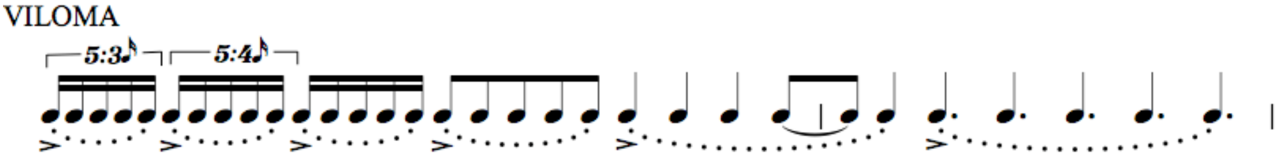


DEVELOPMENT OF TIRMANAS

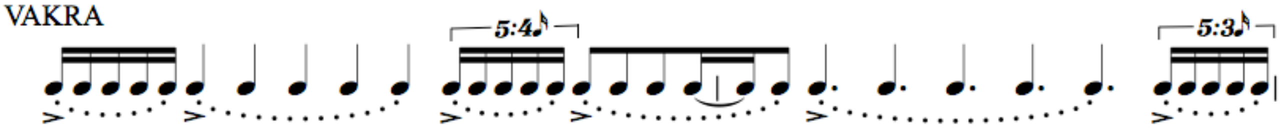
A tirmana can be performed a number of times, merely changing the uttaranga each time, or be developed in a similar fashion to type A yati mukthays utilising the concept of krama, viloma and vakra. The concept can be applied to constructing a long sequence of tirmana with krama-viloma-vakra or the viloma and vakra segments can be used in different parts of the piece.



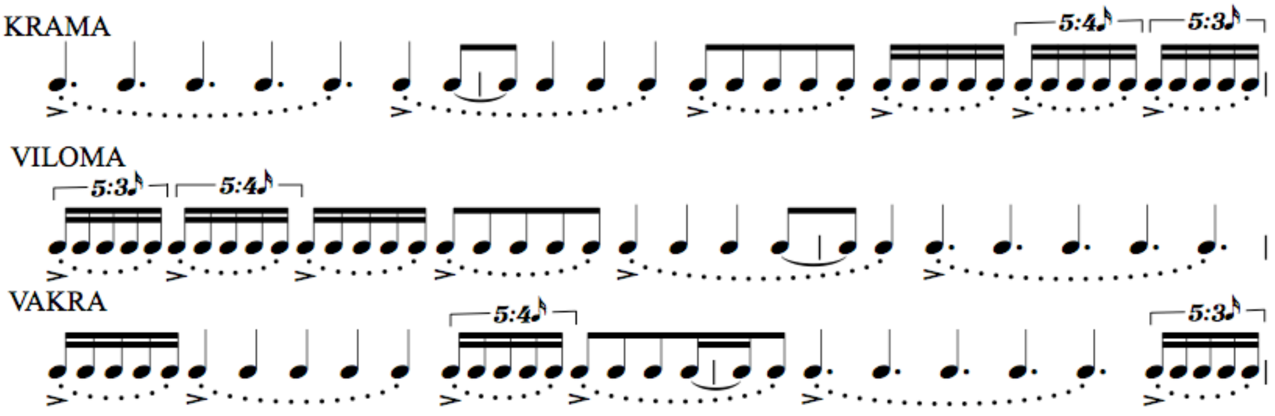
Once more, the concept of viloma is applied exclusively to the order of the steps and not to the rhythm.



In the vakra segment, the steps are permutated at the creator’s will. As with many other techniques, one of the goals is to produce some form of displacement of steps without creating any feeling of syncopation; all phrases should sound as in the krama version, regardless of their position in the beat. The example below is just one possibility.



If the three segments are to be performed as a sequence, the result will be *(track 110)*



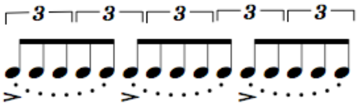
Different gatis in the uttaranga

The number of notes chosen for the tirmana in most cases determines which gati can be used for the uttaranga. If 3 notes are chosen, tisra will be the gati, if 5 notes, khanda etc.

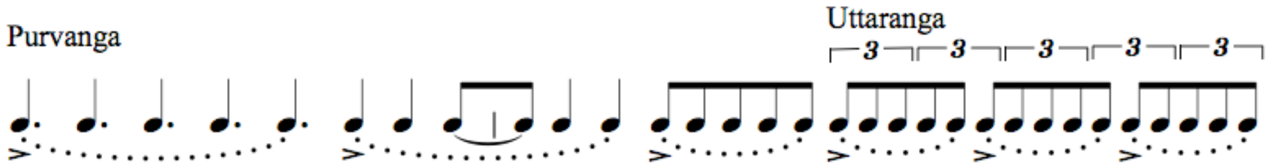
However, sometimes, another gati is used. A standard example occurs with a 5-note phrase that is taken into a tisra 1st speed with jathi 5.

Because of the phrase of five notes, the gati change can take place, although here it goes a step further and the 5-note phrase becomes the jathi of a different gati. Since in tisra jathi 5 there are three accents in 5 beats, this responds to the possibility of repeating the very last step twice or thrice.

The example below is in tala 10 (80 matras). The purvanga is the same as in the previous examples (60 matras). Consequently, there are 20 matras left to complete the tirmana. As seen before, all calculations, regardless of the gati used, are based on the frame or number of matras in chatusra. Twenty matras are five beats in chatusra. Any gati with jathi 5 will always be 5 beats long. If tisra 1st speed jathi 5 is chosen, there will be a 5-note phrase repeated 3 times in five beats.



The whole tirmana will then be *(track 111)*

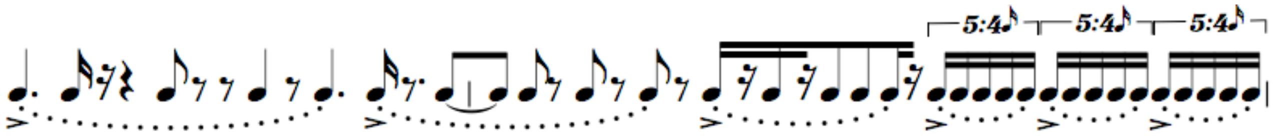


Duration of notes

All examples thus far have been written with the full duration of the notes, a fact that may lead the reader to ask why tirmanas are explained as a ‘separation’ between notes rather than a phrase of 3, 4, 5, 6 or 7 notes with specific lengths that are systematically shortened.

The reason is that every note is like a ‘space’ of a determined length, but the note itself does not have to last for the whole duration that separates it from the next note. As long as each note is attacked in its proper place, the duration of the note could be as short as a 𝅘𝅥𝅯, followed by a silence that would complete the number of matras that separates it from the next note.

In the example below, many notes have been shortened to simply give an impression of the concept of duration of notes in the tirmana. The dotted line should help to see the original phrase. Obviously, this concept is more applicable to the purvanga than the uttaranga sections.



TIRMANA-MUKTHAYS

Although in some parts of South India the term tirmana is a synonym of mukthay (which makes the terminology rather confusing), or the entire explanation and rules regarding tirmanas may be considered as yet another type of mukthay by some musicians, the reality is that tirmanas, as elucidated so far, constitute an entirely different concept to any other type of mukthay. The number three is completely absent (except for the krama-viloma-vakra development), which is the essence of any sort of mukthay.

Furthermore, a tirmana can be turned into a mukthay when the krama-viloma-vakra development is calculated as a whole within a number of cycles of the tala, and the viloma and vakra will be separated from the previous fragment by a gap. In a regular tirmana, the calculations are thought of for the krama, and the viloma and vakra will always start on tala sam and will never be separated by a gap.

However, a tirmana with the development krama-viloma-vakra is frequently conceived as a mukthay when the total number of matras provided by the chosen number of cycles of the tala is divided by three and the calculations for the tirmana construction as explained above are realised on one ‘pala’. Each fragment resulted of this division will take the krama, viloma and vakra versions. Moreover, a tirmana-mukthay will never be constructed on three cycles of the tala (or any multiple of three), to ensure that every pala is displaced within the tala.

In the following example, the tirmana-mukthay is constructed on four cycles of tala 11 in chatusra[1].

11 beats x 4 cycles x 4 matras per beat=176 matras

These 176 matras are divided by three as it was the case in sama mukthays. The division brings forth 58 matras per pala with two matras left over to be used in the gaps.

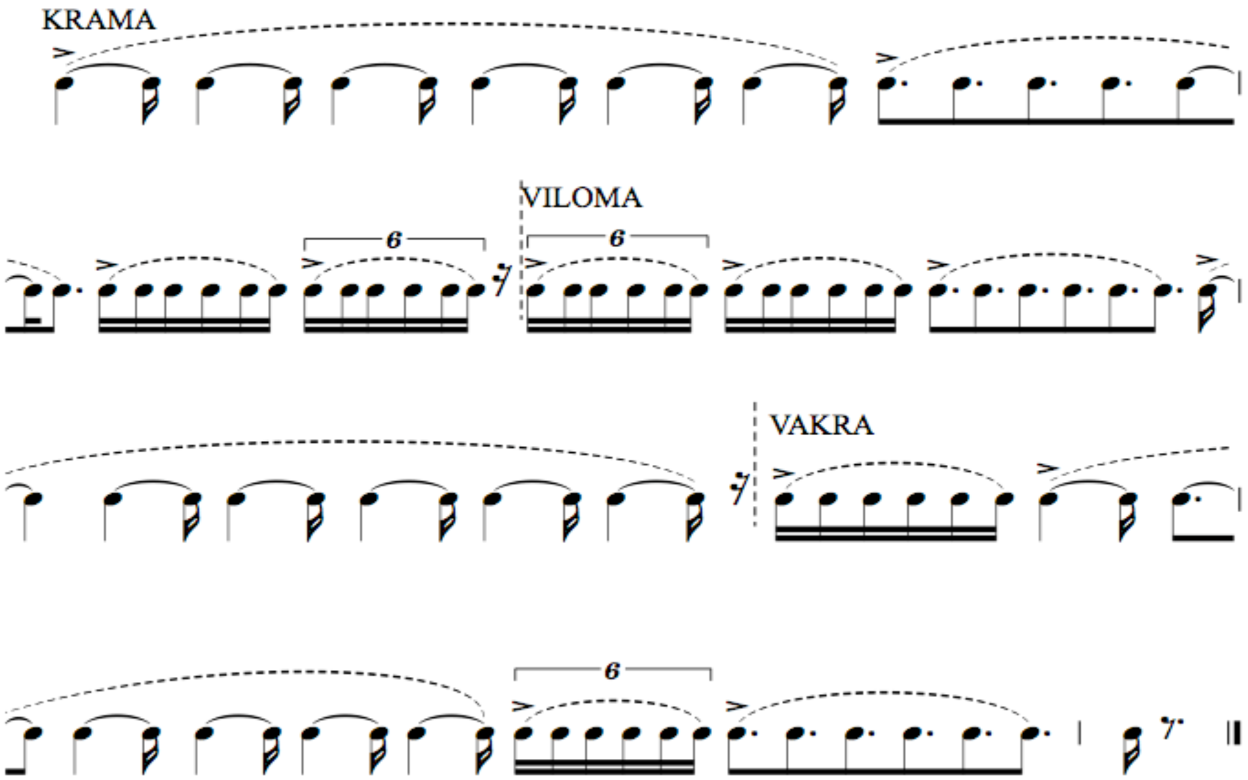
The phrase is of 6 notes and the calculations are
6 notes x 5 matras of separation = 30 matras
6 notes x 3 matras of separation = 18 matras
6 notes x 1 matra of separation = 6 matras
6:4𝅘𝅥𝅯 = 4 matras

The total is 58 matras per pala, with one matra per gap. It can be observed, for instance, that the 6:4𝅘𝅥𝅯 after the first gap will start on the fourth matra of the beat.

---

[1] *Since the idea of purvanga and uttaranga remains untouched in the tirmana-mukthays, the notion that a tirmana is exclusively constructed in chatusra to enable the uttaranga to go into other gatis also remains.*

(track 112)



In the next example, constructed on 4 cycles of tala 9 (144 matras), the number of matras per pala after dividing 144 by 3 is 48 with no left over, therefore every pala would start on a beat. When this occurs, a karnatic musician would make calculations so that the number of matras of all the steps together will always be shorter than the length provided by the division in order to create gaps and displacement of palas within the beat.

The number of notes in the phrase is five and the calculations give 46 matras instead of 48.

5 notes x 5 matras of separation = 25 matras

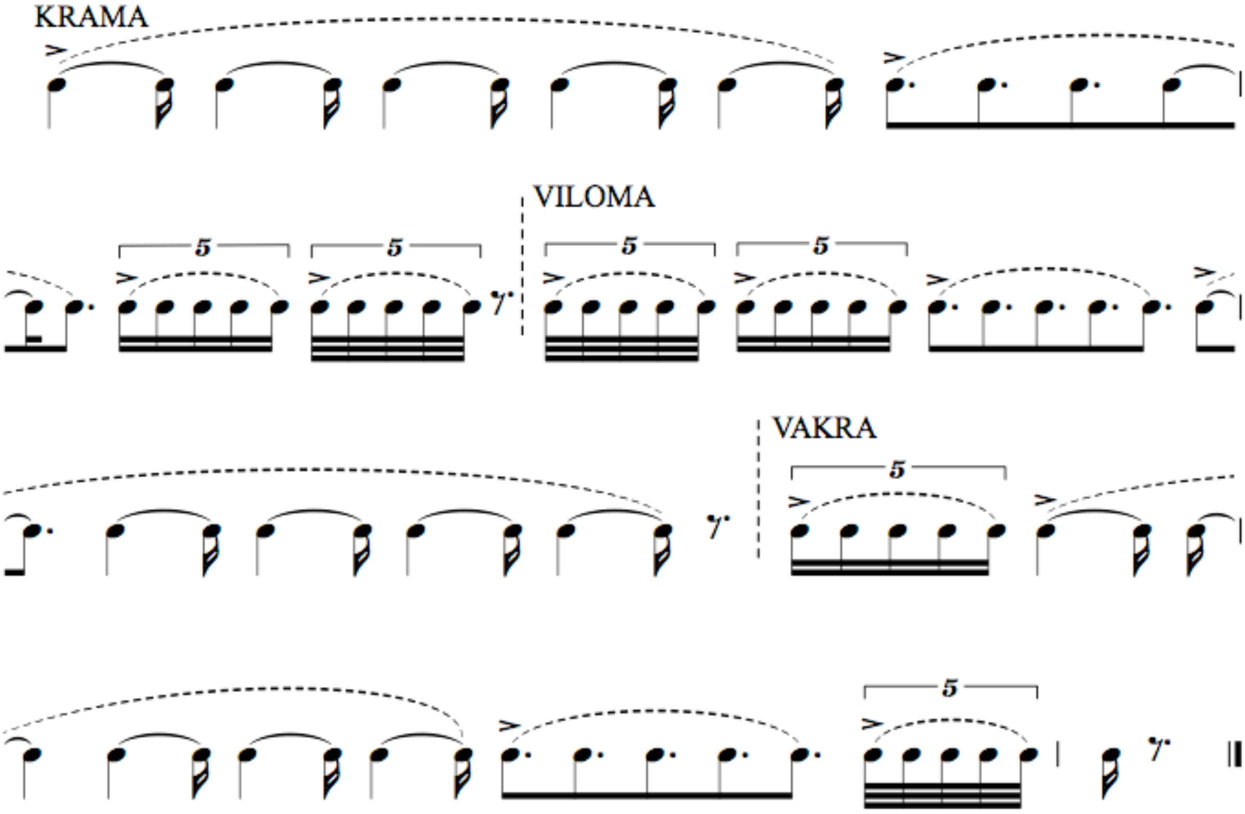
5 notes x 3 matras of separation = 15 matras

5:4𝅘𝅥𝅯 = 4 matras

5:4𝅘𝅥𝅰 = 2 matras

These two matras of difference between the original division and the actual length of the four steps of the tirmana multiplied by three palas give 6 matras. Distributed between the two gaps, each one of them will be of 3 matras, which provokes displacement of the original pala. For instance, the 5:4𝅘𝅥𝅰 will start on the second matra of the beat in the second pala, whereas the 5:4𝅘𝅥𝅯 should start on the fourth matra of the beat in the third pala.

(track 113)


KRAMA
VILOMA
VAKRA
5

Chapter 15

COMPOUND MUKTHAYS

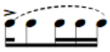
Compound mukthays are the most 'ready-made' of the whole constellation of karnatic rhythmical techniques. Due to their characteristics, the musician has very little margin for creation, except for choosing different combinations of note values for the phrase, always within the number of matras that is a direct result of the number of beats in the tala.

A compound mukthay is constructed around the following elements:

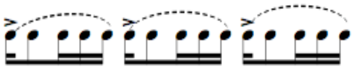
a) The number of matras for the *beeja sangati* (meaning literally 'seed phrase', the original phrase from which the other phrases sprout out in order to construct the compound mukthay) will always be the same, half or double than the number of beats in the tala. Consequently if the tala is 6 beats long, the number of matras in the 'seed' phrase could be 6, 3 or 12. If the number of matras is 6, it will produce a mukthay of 2 cycles, if half the number of matras it will be 1 cycle long, and if double it will be 4 cycles.

b) The seed phrase will be developed or modified in different ways so that all the resulting phrases will fit into the number of cycles aforementioned. The elements utilised to construct a compound mukthay are

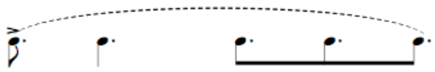
- Repetition of the seed phrase three times.
- Multiplication of every note value of the seed phrase by three matras.
- Rhythmical sangati of the seed phrase that will be taken into tisra 1st speed and tisra 2nd speed.

If a tala of 6 beats and a seed phrase of 6 matras are chosen, the mukthay will be two cycles long. If the seed phrase is , the developed version of the phrase will be

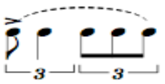
1) Seed phrase repeated three times



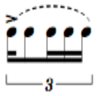
2) Every note value of the seed phrase is multiplied by three matras



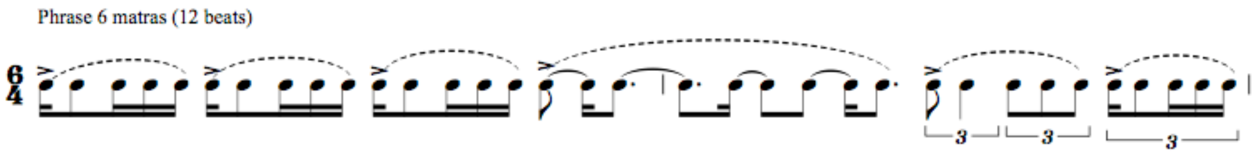
3) The seed phrase taken into tisra 1st speed



4) The seed phrase taken into tisra 2nd speed



The entire phrase will then be (*track 114*)

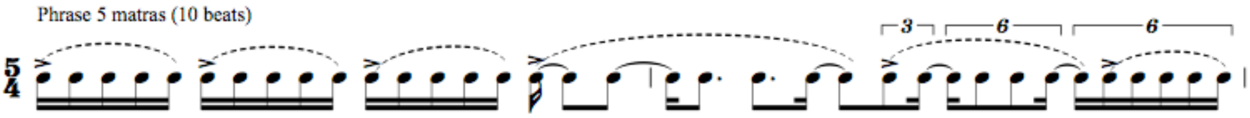


There is no other manner of constructing a compound mukthay. No other gatis would provide the result that this construction delivers. It is a very clear pattern and the choice of the musician lies solely in determining what the seed phrase can be within the number of matras chosen. Afterwards, one must adhere to the steps described. Although any permutation of these elements would theoretically be possible, this permutation is never used in karnatic music.

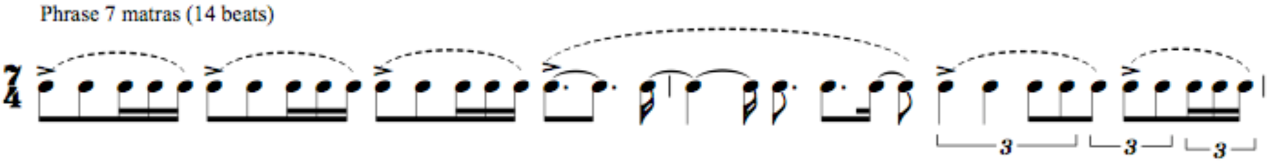
A compound mukthay is relatively easy to perform when created on even number talas. It becomes slightly more difficult when performed in odd number talas, since the tisra 1st speed version will invariably start on the second half of the beat, although the phrase should be performed with a feeling of down-beat and never with a feeling of syncopation.

Notation

In terms of notation for the tisra phrases, the following notation conveys to the musician the placement of every note within the beat, although it does not convey the phrase with the down-beat feeling as performed by karnatic musicians. Visually, it gives a clear sense of syncopation *(track 115)*



In the following example in tala 7, the triplet over an ♪ is written at the end to provide a clearer sense of the phrase. In order to enhance the clarity of the phrase, the first triplet is against two beats, the second against one beat, and against an ♪ at the end. However, in this way the problem the performer would encounter is that he would not know where the notes fall within the beat, since the tisra phrase starts on the second half of the beat. *(track 116)*

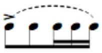


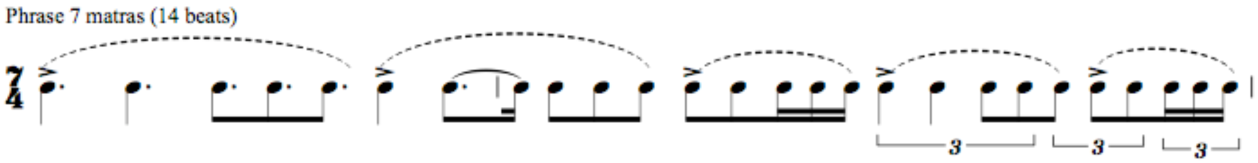
The only possible re-writing of the previous phrase will look like the mukthay in tala 5, so the notational problem remains - unless the notation of the mukthay in 7 beats is considered as the most beneficial for phrasing purposes and the one in 5 beats is written as an *ossia,* so that information as to where every note falls within the beat is provided.

Variation on the structure

Another set of elements exists to create a compound mukthay, which quite closely resembles the concept of tirmana (in fact, both concepts co-exist creating various mukthays that will be explained later on in this chapter).

-Every note of the seed phrase multiplied by three matras
-Every note of the seed phrase multiplied by two matras
-The seed phrase, only once
-The seed phrase taken into tisra 1st speed and tisra 2nd speed

If the seed phrase  in tala 7 is taken, the compound mukthay will result in *(track 117)*

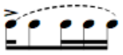


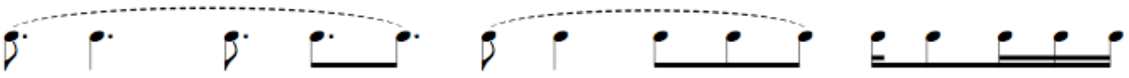
TIRMANA-COMPOUND MUKTHAYS

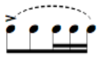
As mentioned above, both concepts intertwine, so other types of mukthays that could not be ascribed to one or the other type are born. None of these seem to have any specific name, so I have coined the term 'Tirmana-compound mukthays' for mukthays that somehow fall between the definitions of both concepts. There are two basic types.

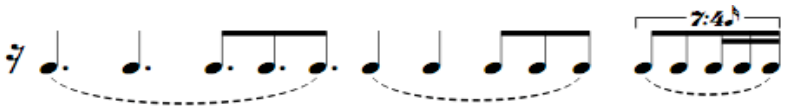
1) In the first option, the tirmana-compound mukthay is similar to the variation on the compound structure explained previously; it basically involves taking any regular tirmana or tirmana-mukthay, and instead of having a phrase that is constantly separated by the same number of matras, uses the concept of multiplying every note value by the same number of matras as in a compound mukthay.

The example below could actually be the first three steps of a compound mukthay of the second type. But, as opposed to tirmanas, where any number of steps would be possible, in these mukthays there would only be three steps. The way to construct it would always be by thinking of a seed phrase and multiplying every note value by x number of matras. The systematic reduction seen in tirmanas remains, but the 'threshold line' is reached when every note value is multiplied by 1 or 2 matras.

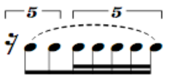
The seed phrase is . The first step, or, within this context, better said **pala**, multiplies every note value by 3 matras, the second pala multiplies it by 2 matras and the last pala is the original seed phrase. The mukthay fits in a cycle of tala 9. *(track 118)*



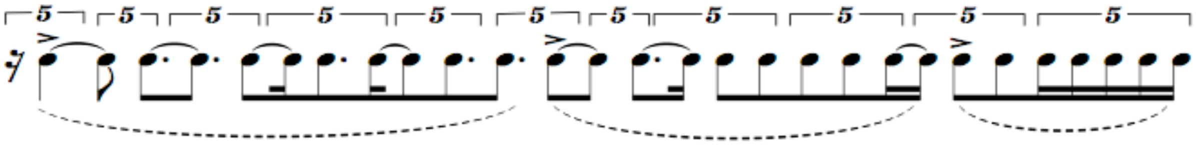
A variation on the first type occurs when the seed phrase is not played but, instead, the number of matras used for the seed phrase becomes a gati. In the following example, in one cycle of tala 10, the seed phrase is . This phrase serves as starting point to create the mukthay, but does not appear in it. In the first pala every note value is multiplied by 3 matras, in the second pala by 2 matras, but in the third pala the phrase of 7 matras goes into misra. *(track 119)*



As opposed to tirmanas, this sort of tirmana-compound mukthay can be created in any gati.

The following example is in khanda, in one cycle of tala 11. The seed phrase is 

The first pala is multiplied by 3 matras, the second pala by 2 matras and the third one is the seed phrase *(track 120)*

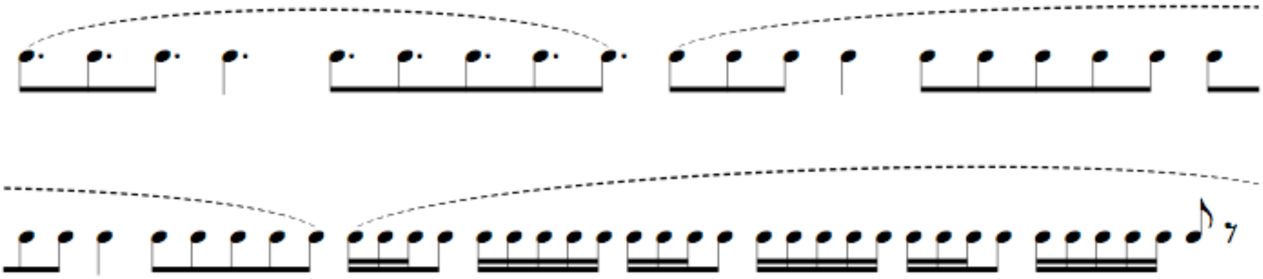


2) In this second possibility, the notion of multiplying every note value by x number of matras and systematically reducing it while creating 3 palas, intertwines with the yati mukthay pattern of A, AA, AAA, but without gaps. The pattern of this sort of mukthays is as follows:

-First pala, multiplied by the largest number of matras, performed once

-Second pala, multiplied by a shorter number of matras, performed twice

-Third pala, whether the seed phrase as such or in another gati, performed three times *(track 121)*



The other two options elucidated for the previous mukthay apply similarly in this possibility:

-The seed phrase would not appear in the mukthay and the last pala would go into another gati.

-The mukthay can be created in any gati.

OTHER MUKTHAYS

There is a myriad of other mukthay constructions: formudaisi, 'magic number', palindromic, sub-mukthays, to mention just a few by name; augmenting these is yet a large variety with unknown designated names. I have explained thus far the most important and most frequently occurring types of mukthays which share the common denominator that all of them can be combined, mixed, modified and altered within the context of double and triple mukthays, or serve as starting point for the highly creative and imaginative concept of mukthay combinations (all of these will be explained in different chapters). The concept of mukthay could indeed become another thesis in its own right.

As opposed to the mukthays that I have explained in the text, the very many not included are really a one-time occurrence in the strictest sense, and they seldom or never mix or combine with any other type of mukthays. Therefore, I feel compelled to end the explanation of mukthays at this point, with one exception: sub-mukthays.

Sub-mukthays

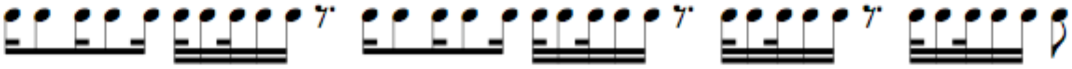
This sort of mukthays have a double use: as a third option for short mukthays[1] as well as being utilised within the context of double, triple and mukthay combinations.

A sub-mukthay is a phrase that is fragmented into two cells and follows the specific pattern of

AB (gap) **AB** (gap**)** **B** (gap) **B | T.S.**

If the pattern is analysed, it can be observed that from the second **B** onwards, the phrase could be interpreted as a short mukthay of the sama type. But it is simultaneously part of a phrase that has previously been played, therefore it is not yet another sama mukthay. Again, it falls somehow in between definitions since the whole phrase is performed only twice (therefore, it does not qualify as a mukthay), but the second cell is performed four times altogether. In addition, there are three gaps in the mukthay, something that occurs exclusively in this kind of mukthays.

In the example below, the '**A' phrase** is 7 matras, the **'B 'phrase** is 4 matras and the **gap** is of 3 matras. The whole mukthay is 39 matras long and it can be placed in any tala and used in any gati. *(track 122)*



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[1] *Wherever in the text it is said that a short mukthay could follow a specific technique to complete the tala, a sub-mukthay could be utilised.*

Chapter 16

YATIS PRASTARA

Yatis Prastara is a technique whereby two different yati phrases intermingle. Each pala of one yati phrase alternates with another pala of a different yati phrase. The sequence can eventually commence off tala sam, (provided that the rest is always shorter than one beat), but it ought to resolve on tala sam. One of the yati phrases can use one more pala than the other one.

An important difference with yati phrases is that there are no gaps between palas. Calculations are always made so that the total sum of matras of both yati phrases would complete a chosen number of cycles of the tala. A simple short cut would be to calculate two different yati phrases of the same length and proceed to mix the palas. However, this is never done in karnatic music. The aim is always to ensure that the duration of every yati phrase is different.

For the purposes of yatis prastara solely the sama, gopuchayati and srotovahayati yatis are considered. The possible combinations are:

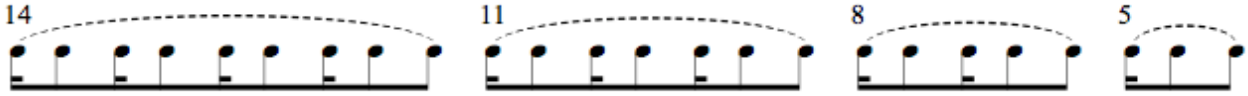
-Sama-sama
-Sama-gopucha
-Gopucha-gopucha
-Sama-srotovaha
-Srotovaha-srotovaha
-Gopucha-srotovaha[1]

One important feature in yatis prastara is that the two different manners of increasing or decreasing explained for yati phrases and yati mukthays are used together in this context. In some cases, a phrase can even be elongated or shortened by simultaneously applying the two techniques.

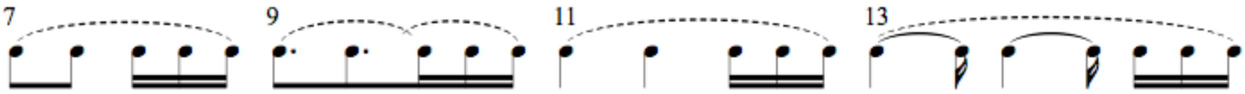
Analysis of examples

1) The first example to be analysed is a **gopuchayati** intermingled with a **srotovahayati**.

The gopuchayati decreases by leaving out the first 3 matras of the previous pala



whereas the srotovahayati increases by adding one matra to the first two notes in every pala, keeping the last three ♪ intact as a recognisable feature of the development



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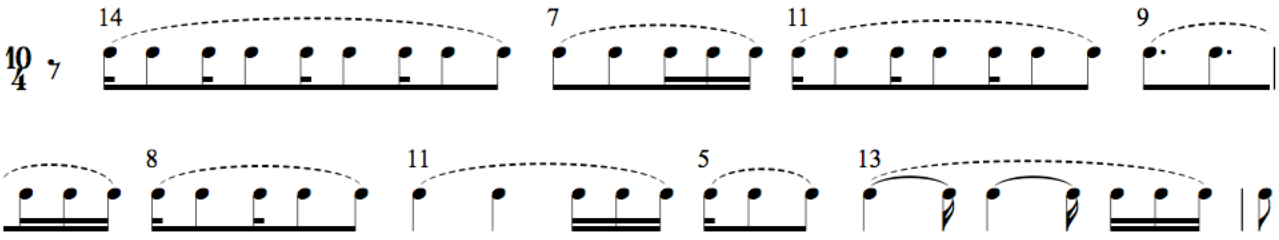
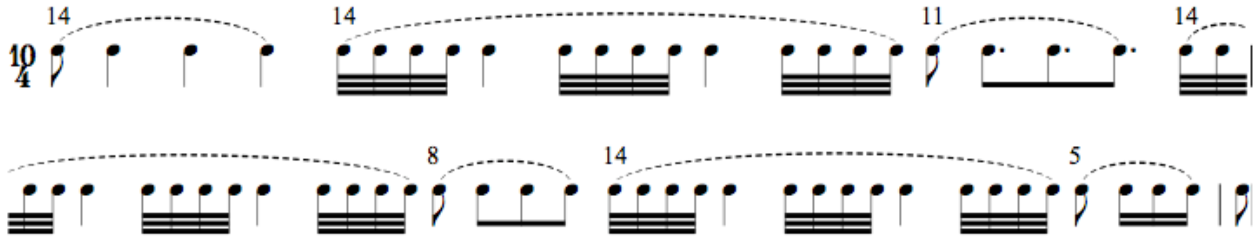
[1] *In the last three options the order can be reversed.*

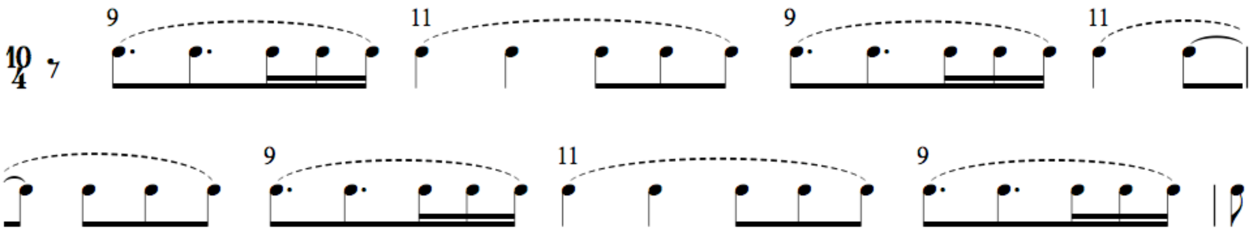
The two intermingled phrases fit in two cycles of tala 10, starting two matras off tala sam. *(track 123)*



2) The second example features a **gopuchayati** (14 11 8 5**)** intermingled with a **samayati** (14 14 14). The manner of decreasing in this gopuchayati is by shortening the second, third and fourth notes by one matra at a time whilst keeping the first ♪ intact throughout. Samayatis do not have any variation but it is interesting to observe the sort of sama mukthay thinking behind its construction. *(track 124)*



3) In this third example two **samayatis** are intermingled. Possibly this sort of yatis prastara is the most predictable or repetitive of all the options. I have chosen it because I find it quite interesting, that although of different length, both sama yatis use the same number of notes and somehow create a feeling of continuous tempo change. *(track 125)*



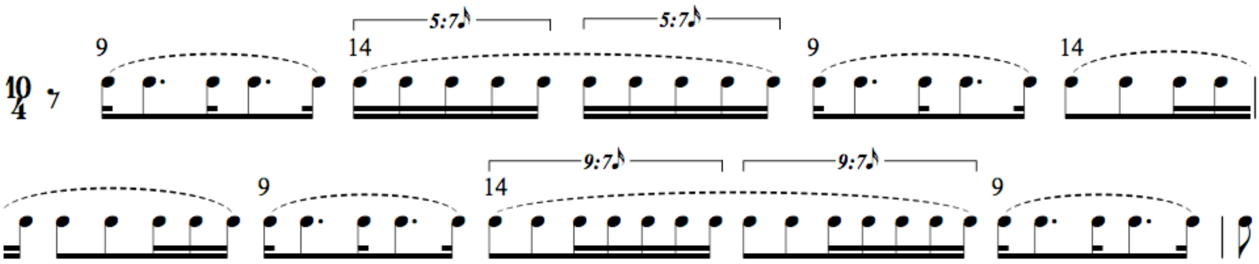
Usage of superimposed gatis on samayatis frames

Whenever a yati prastara containing a samayati has previously been played and is repeated elsewhere in a piece, the number of matras of the samayati can be used as a frame over which different gatis can be superimposed. However, this superimposition does not occur randomly: it also follows the notion of logical increase or decrease of a musical element. In this context the superimposed gatis follow a pattern regarding the number of matras by which every new gati increases or decreases.

In the example below, the musician has chosen to use the length of 14 matras as the frame for superimposing gatis. Since there are three palas of 14 matras, three different gatis need to be used. The 14 matras are divided into two equal frames of seven 𝅘𝅥𝅯 and the gatis are increased by two matras giving the following outcome.

-5:7♪ twice -7:7♪ twice -9:7♪ twice

One could argue that a 7:7♪is not a superimposed gati, but rather chatusra jathi 7: this would be completely correct. But, as will be further explained in the chapter of *Mixed Jathi Nadai Bhedam*, this is essentially due to the fact that misra, or any gati with jathi 7, are simply different ways to work with the number 7. *(track 126)*



Development of yatis prastara

In a similar fashion to tirmanas or type A yati mukthays (among others), a yatis prastara sequence can be developed by using the possibility of repeating it three times in one of the two following options:

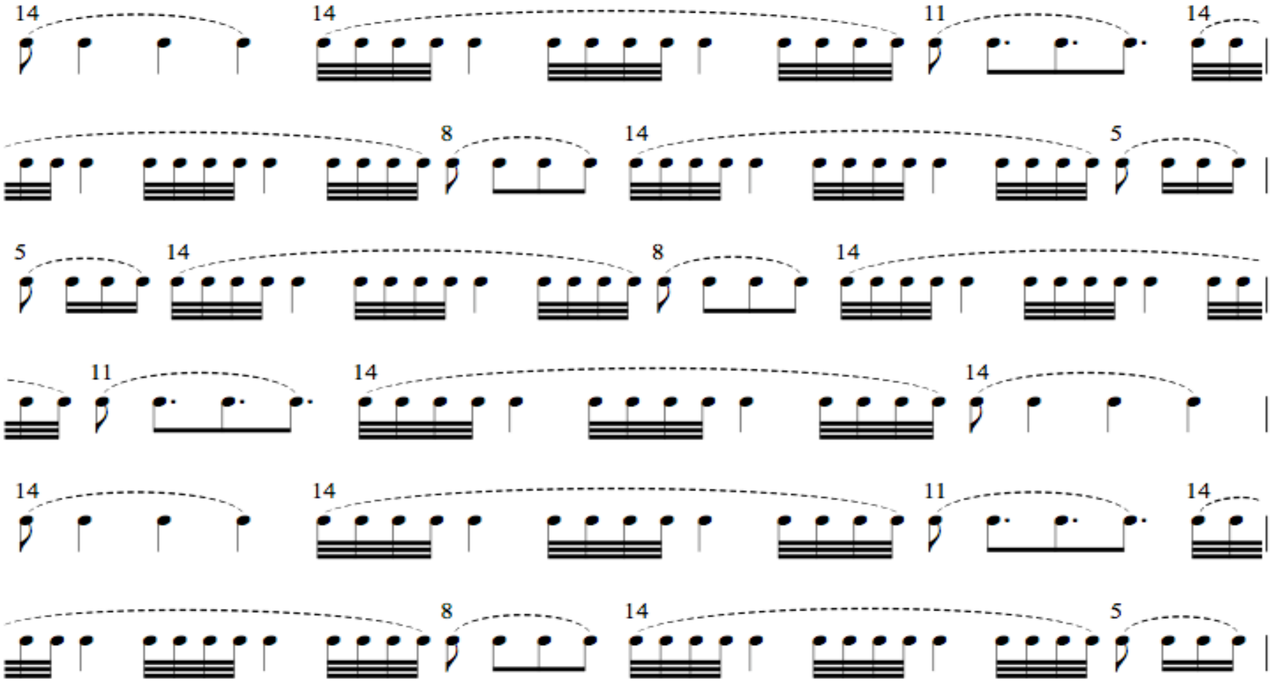
-Krama-krama-viloma
-Krama-viloma-krama

The vakra option utilised in other contexts is completely discarded here since the intermingling of two different yati phrases contains in itself the seed of the concept of vakra.

In order to develop yatis prastara, the sequence has to start on tala sam and never off tala sam.

In the next example, the second phrase analysed previously (gopuchayati mixed with sama) serves as the starting point for the development. The krama (lasting two cycles of tala 10) is followed by the viloma (once again, of the numerical sequence and not of the phrase itself) to finally conclude the whole development with a repetition of the krama version.

(track 127)



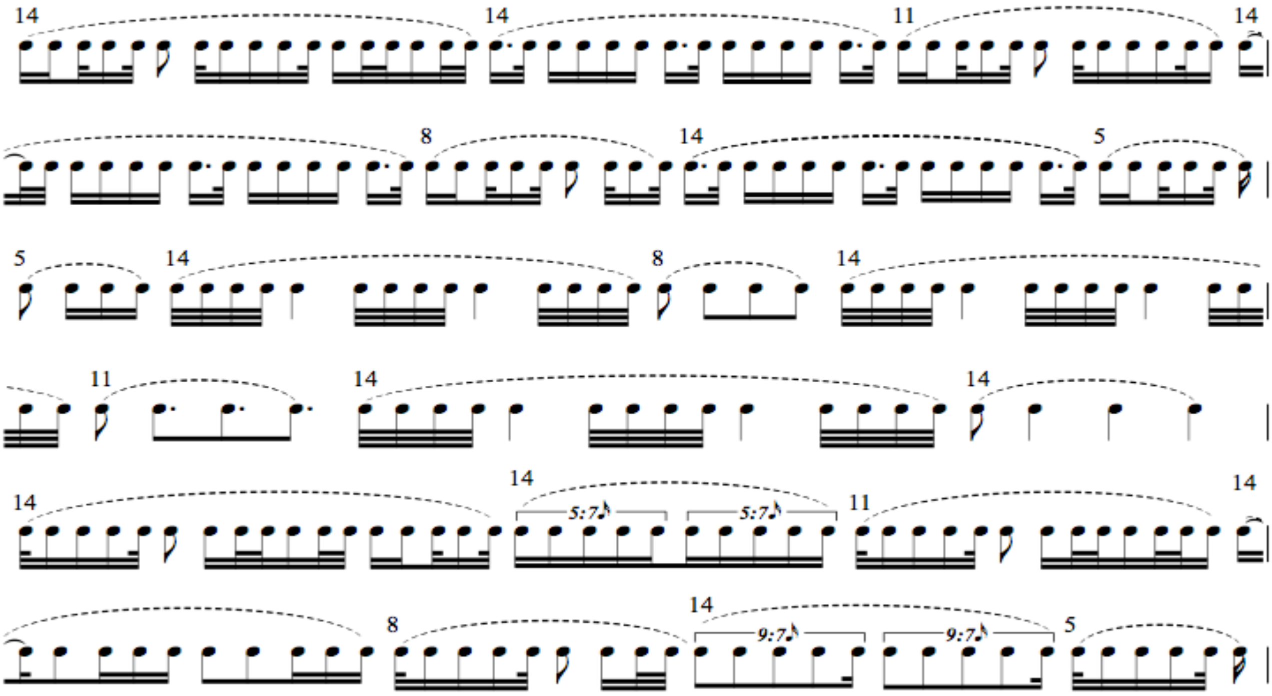
However, this option is not the one that karnatic musicians would favour the most. Many a time the development of krama-viloma-krama is purely numerical, and every segment can create a completely different phrase, while keeping the same numbers or phrase durations.

It is in this context that the technique of superimposing gatis can be found more frequently than as an isolated occurrence (although this can also be the case). The superimpositions tend to be used in the repetition of the krama.

In the example below, which takes as starting point the same yatis prastara calculations as the previous example, the cells of the gopuchayati of the krama version are permutated in the second krama, whilst the samayati calculations serve as the frame to superimpose 5:7♪, 7:7♪ and 9:7♪ twice each. In this case, the number of notes for the three superimposed gatis remain the same.

The viloma version is the same yatis prastara as in the previous example.

(track 128)



Eventually (but not exceptionally), a long sequence of krama-viloma-krama can be thought of in advance as a unit. When this is the case, the total number of matras of the chosen number of cycles of the tala are divided by three and the yatis prastara is constructed within these boundaries.

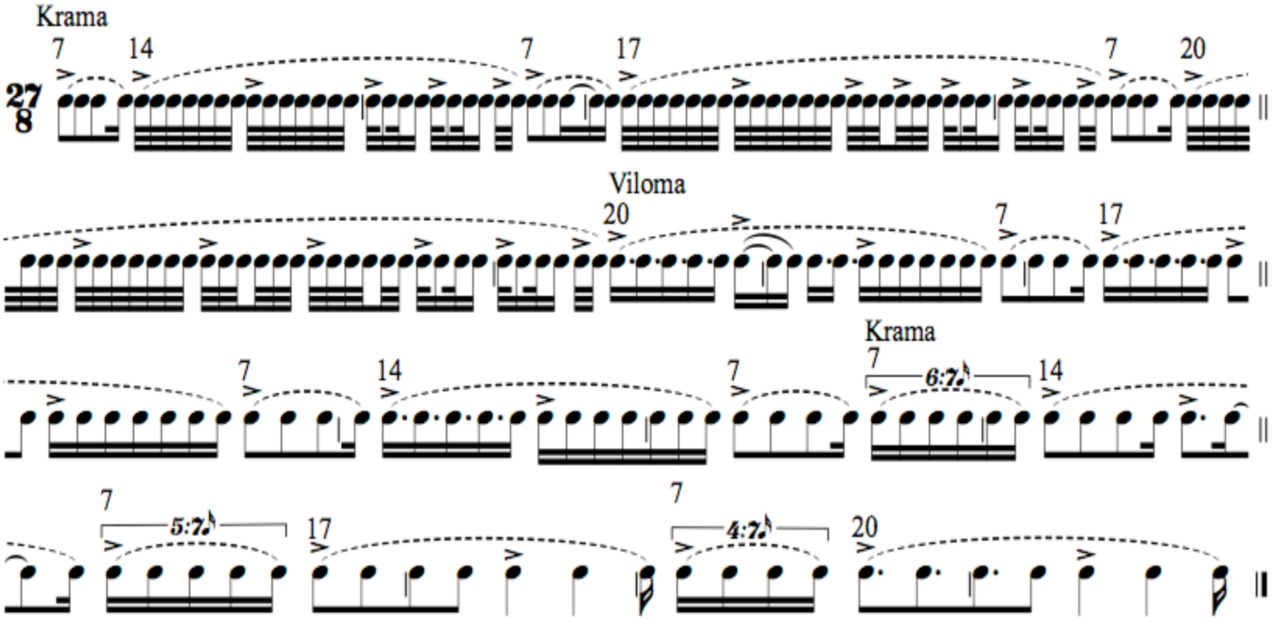
The example below is constructed on a Shadanga tala of 27 beats (these types of talas will be explained in chapter 27). This tala is written as a 27/8.

The complete sequence is set to four cycles of the tala, giving 216 matras. When divided by three, it gives a framework of 72 matras on which the krama of the yatis prastara is to be constructed.

The combination of yatis is samayati with gopuchayati. The number of matras for the samayati is 7 and the palas of the gopuchayati are 14, 17 and 20 matras long.

In the first krama, the gopuchayati increases by adding notes in the middle. As a viloma it actually functions as a srotovahayati. The phrase is different to the krama phrase and omits notes from the middle as well. When the sequence of numbers is repeated in the second krama, the number 7 prevails in both yatis. In the gopuchayati palas, 7 is the number of notes that is increased by elongating different notes in the palas, and the 7 serves as a frame to superimpose gatis in the samayati. On this occasion the gati decreases by one matra at a time with the following result: 6:7𝅘𝅥𝅯, 5:7𝅘𝅥𝅯and 4:7𝅘𝅥𝅯.

(track 129)


Krama
Viloma
Krama
6:7
5:7
4:7

Chapter 17

DOUBLE & TRIPLE MUKTHAYS

These mukthays have been referred to several times in previous chapters. In essence, they are musical objects made up of two or three mukthays performed one after the other (not intermingled, as was the case with yatis prastara), and without any gap separating the different mukthays. However, the possibilities are somewhat more ample and less straightforward than this concise definition infers.

Of the myriad explained and left out mukthays, the following are the ones that can potentially be used in double or triple mukthays:

-Sama
-3 types of Yati
-3 types of 3-fold
-2 types of Compound
-2 types of Tirmana-compound
-Sub-mukthays

In a similar way to yatis prastara, the construction of mukthays in this context avoids the structural aspect that forms the blueprint of some other mukthays (sama, types A & B of yati mukthays, and compound). Any of these mukthays can be constructed on any number of beats, preferably longer or shorter than the number of beats of the tala. In compound mukthays, any number of matras can be chosen for the seed phrase.

In addition to these possibilities, two more options can be added to create double and triple mukthays:

-Tirmanas (provided that there are only 3 steps)
-Yati phrases (provided that there are only 3 palas).

As was the case for yatis prastara, both concepts of increasing or decreasing palas in yati phrases and yati mukthays can be mixed, as long as they keep their characteristic patterns. Consequently, a yati phrase could increase or decrease by elongating or shortening note values, and vice versa - a yati mukthay could be increased or decreased by adding or omitting notes (in both cases, a creative combination of both notions is possible in this context).

DOUBLE MUKTHAYS

Double mukthays tend to conform more to the concise definition given at the beginning of the chapter.

In terms of theoretical information there is essentially nothing else to add. However, the analysis of a few examples can help to clarify how these mukthays are worked out.

Analysis of examples

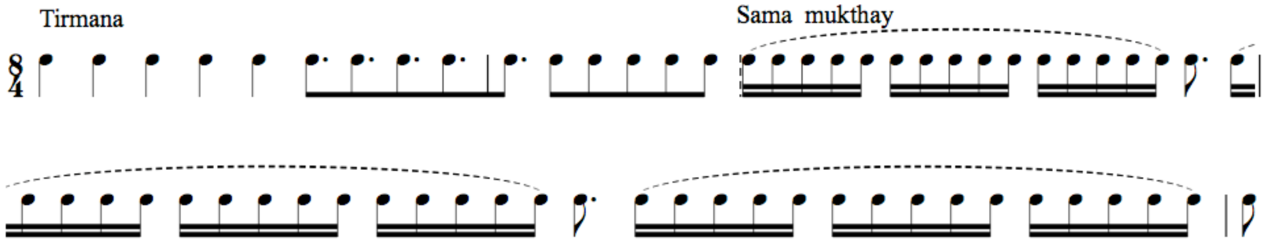
1) The first double mukthay takes three cycles of tala 8, consequently 96 matras long, and is made up of three steps of a tirmana, constructed in the following fashion

-5 notes x 4 matras of separation: 20 matras
-5 notes x 3 matras of separation: 15 matras
-5 notes x 2 matras of separation: 10 matras

that gives a total of 45 matras, followed by a sama mukthay structured

15 (3) 15 (3) 15 that gives a total of 51 matras.

It is interesting to note the inner division of the sama mukthay in three short phrases of 5 matras each, which could be considered as a sama mukthay in itself. The musician plays with the idea of a short mukthay that is repeated three times. *(track 130)*

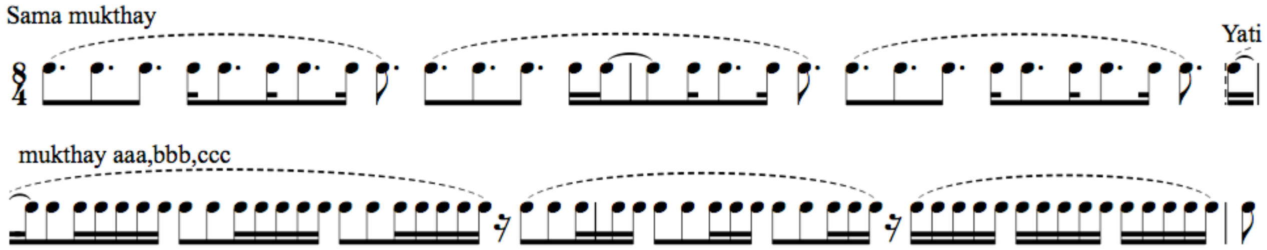


2) The second double mukthay is constructed on four cycles of tala 8 (128 matras) and consists of a sama mukthay structured
21 (0) 21 (0) 21

followed by a yati mukthay of the type A (aaa, bbb, ccc) with the following length per pala

9 9 9 (1) 7 7 7 (1) 5 5 5

In the 'B' phrases two ♪ have been omitted, whilst the number of notes of these 'B' phrases (five) is preserved in the 'C' phrases. *(track 131)*

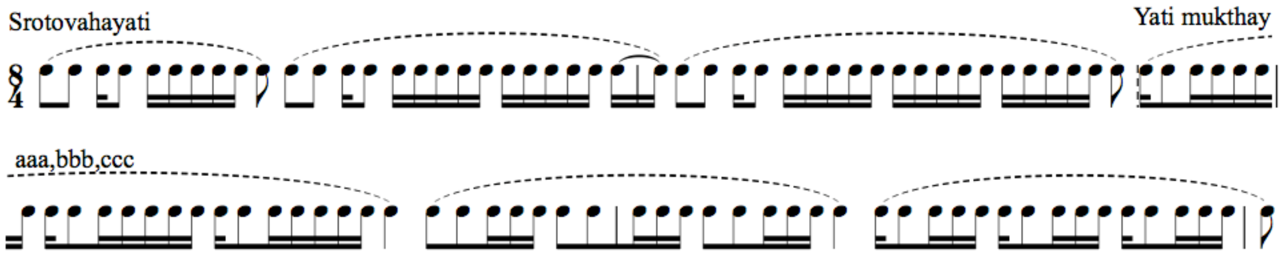


3) The third example, also in four cycles of tala 8 (128 matras), is made up of three steps of a srotovahayati, increased by adding in the middle of the phrase, with the following structure
14 (0) 19 (0) 24

The second mukthay is once more a yati mukthay of the type A (aaa, bbb, ccc) with the following durations per pala 8 8 8 (4) 7 7 7 (4) 6 6 6

In the reduction of matras of the 'B' phrases, the omission of notes is intermingled with the elongation of note values: the last two ♪ of the original 'A' phrases are omitted while the first note becomes an ♪

(track 132)



TRIPLE MUKTHAYS

An important feature in triple mukthays is that the transparent succession of mukthays seen in double mukthays becomes more blurred and less straightforward, as if anticipating the rather imaginative concept of mukthay combinations[1].

Also, besides all the possible mukthays described previously for the double mukthays, a yatis prastara can be considered as yet another mukthay, as long as it is not developed with the krama-viloma-krama option.

It is in this context where the initial definition given for double and triple mukthays become insufficient to explain how these mukthays are structured. In essence, karnatic musicians create triple mukthays with the objective of constructing a musical object that would defy a clear analysis or definition of the different parts, although there is not a single vestige of randomness or arbitrariness in their development: all the mukthays can be analysed as such, but the construction, and moreover the manner in which they are entangled with each other, are the elements that prevent triple mukthays from being considered a simple sequence of three consecutive mukthays.

Analysis of examples

1) The first triple mukthay, constructed on four cycles of tala 9, uses the following elements:

-3-fold mukthay based on a 20 matras long pala (which is common to khanda and chatusra) using the type B possibility. The phrase is created on khanda, and following the pattern of type B, the original phrase is also performed in khanda 2nd speed anuloma and chatusra jathi 5. Since there are no gaps, the total length of this 3-fold mukthay is of 11 beats.

-Yati mukthay of the type B (a, ab, abc) with the following duration of palas
7 (1) 7 10 (1) 7 10 13

The development of this mukthay exclusively uses the elongation of certain note values. The three 𝅘𝅥𝅯 of the phrase 'A' are turned into ♪ and ♪. in 'B' and 'C' phrases respectively.

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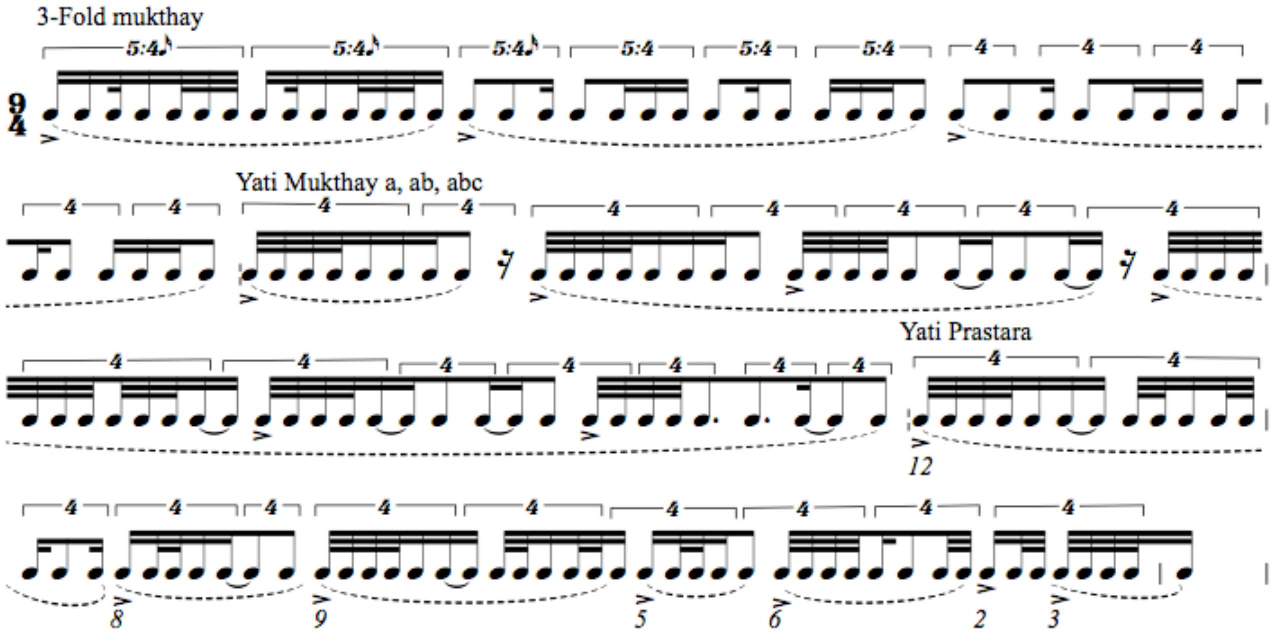
[1] *These will thoroughly be explained in the next chapter*

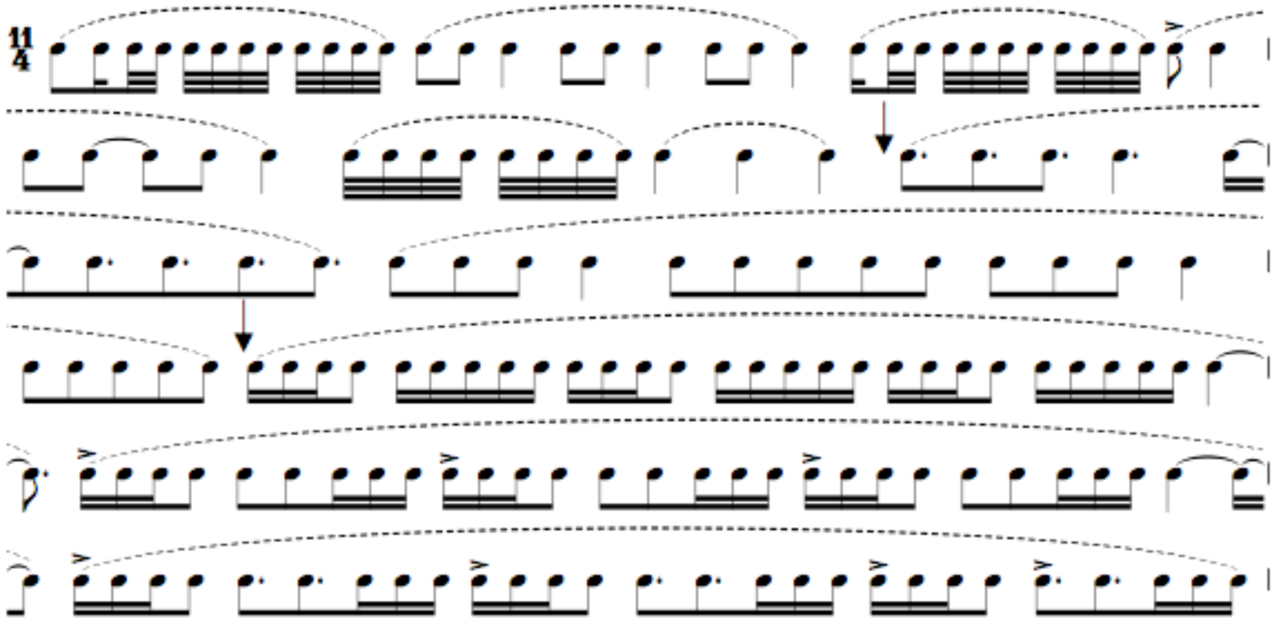
It can be observed that the third time the ‘A’ phrase is repeated, the three ♪ are ornamented and turned into two groups of three 𝅘𝅥𝅯

-The third mukthay is a yatis prastara, intermingling two gopuchayatis. The first one is 12 9 6 3 and the other one is 8 5 2.

The last matra of the 3 matras pala falls on tala sam. *(track 133)*


3-Fold mukthay
5:4
5:4
5:4
5:4
5:4
5:4
4
Yati Mukthay a, ab, abc
Yati Prastara
12
8
9
5
6
2
3

2) The second example responds more to the aforementioned concept of ‘blaring’ mukthays by different means. It is constructed on six cycles of tala 11[2]. *(track 134)*



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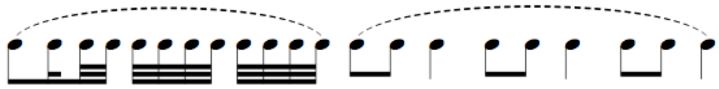
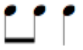
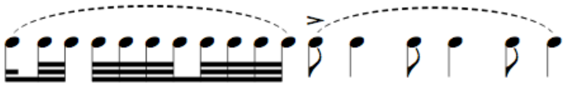
[2] *Arrows in the transcription indicate the beginning of each new mukthay.*

-The first mukthay is a gopuchayati with the construction 32 24 16. However, the musician has fragmented the phrase into two parts and the omission takes place in a rather unorthodox way.

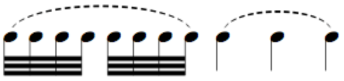
In the first pala, the first fragment is 8 matras long, whereas the second fragment is 24 matras.



In the second pala, the first fragment is 6 matras long, whereas the second fragment is 18 matras long. Consequently, the omission of notes in the first fragment has been of only 2 matras whilst in the second fragment the first ♪ of the cell  that is repeated three times, is systematically left out.



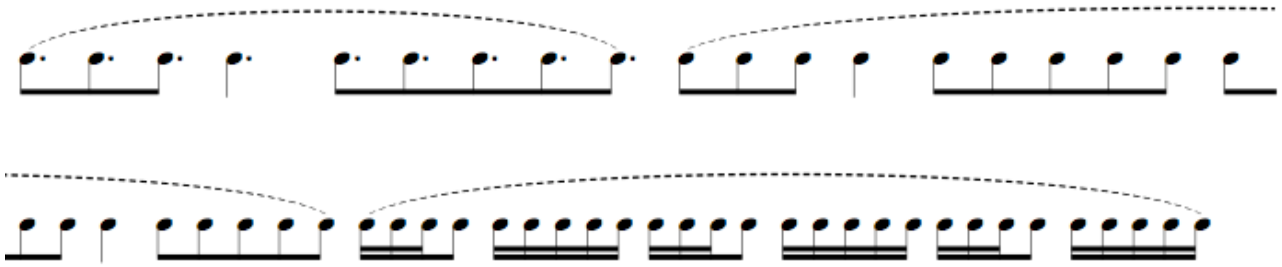
In the third pala, the first fragment is 4 matras long, whereas the second fragment is, logically, 12 matras long.



-The second mukthay of the sequence is one of the unnamed mukthays, that I termed tirmana-compound mukthays because it takes key ideas from both techniques.

This type is based on the repetition of the second pala two times and the third pala three times; the separation between notes is reduced in a tirmana fashion but with the compound mukthay notion of multiplying every note value by the same number of matras.

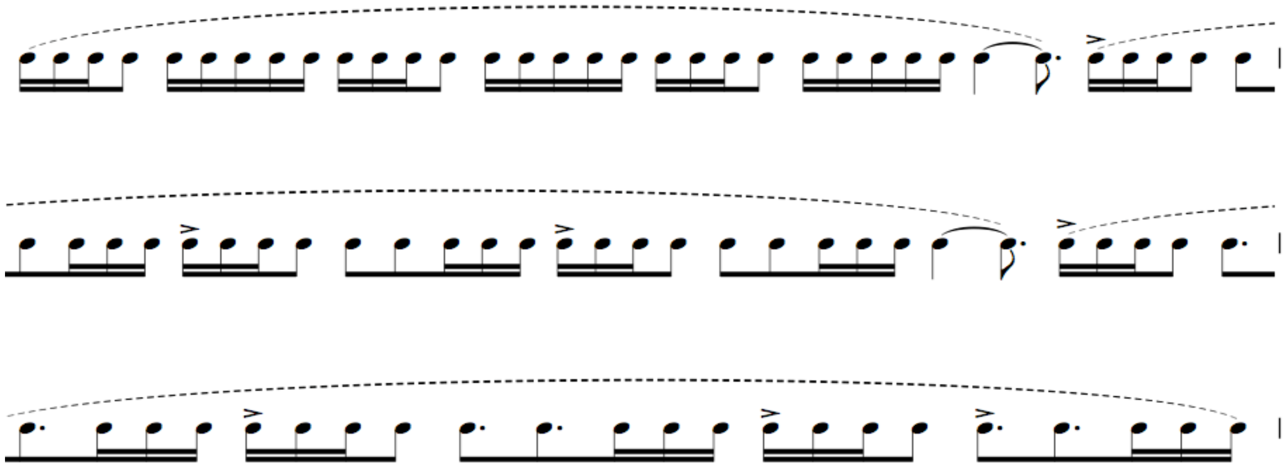
In the first pala, the seed phrase (10 matras long) is multiplied by 3 matras, in the second pala (performed twice), multiplied by 2 matras and the third pala (performed three times), is multiplied by 1 matra.



It is at this point that the lack of clarity as to where a mukthay begins and another one starts appears for the first time.

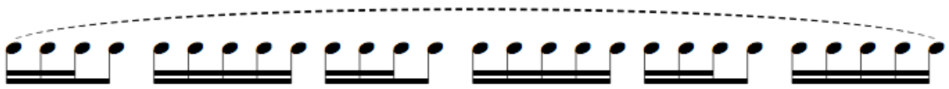
-The third mukthay is a yati mukthay type A (aaa, bbb, ccc), with the following structure

10 10 10 (7) 12 12 12 (7) 14 14 14



The original 10 matras of the seed phrase is divided into two small cells of 5 matras each and the increase is applied exclusively to the second cell. The first two 𝅘𝅥𝅯 of the second cell are turned into an ♪ and ♪. in the ‘B’ and ‘C’ phrases respectively.

However the phrase that served as third pala of the second mukthay



is simultaneously the AAA phrase of the previous yati mukthay. This overlapping is one of the techniques most frequently utilised by karnatic musicians to create triple mukthays. It is, however, by no means the only ‘trick’ to blur the structure of triple mukthays. In the next chapter (mukthay combinations), more possibilities of blurring or disguising the inner structure of a triple mukthay will be presented.

Chapter 18

MUKTHAY COMBINATIONS

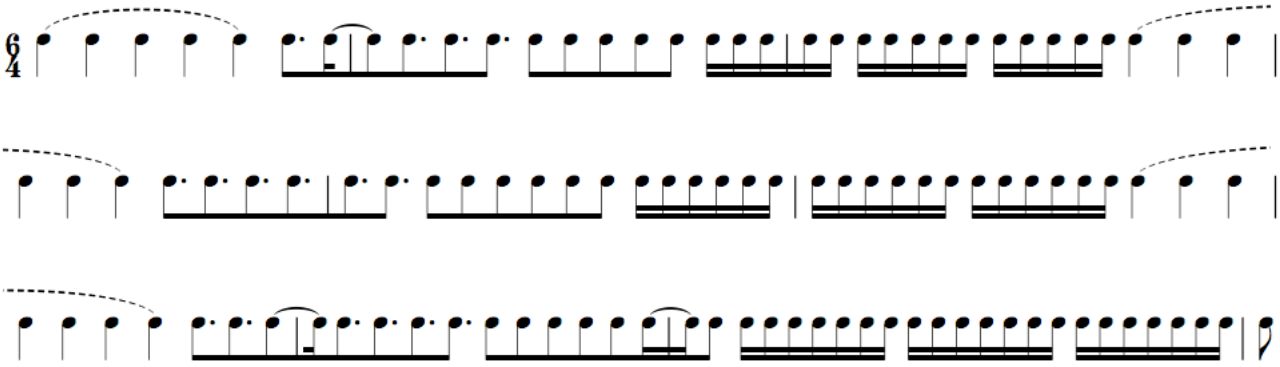
Due the nature of the technique and the almost limitless creative possibilities they encompass, mukthay combinations are not only almost impossible to define, but any attempt to define them also simply goes against their very essence.

In a very strict sense, a mukthay combination is a sequence that takes as its starting point, a double or triple mukthay that is then 'repeated' three times. In every 'repetition' there should be a development, using on a larger scale, a mukthay concept different to the ones employed to construct the double or triple mukthay. It thus becomes an entanglement of different mukthay concepts applied to the construction and development of this musical object.

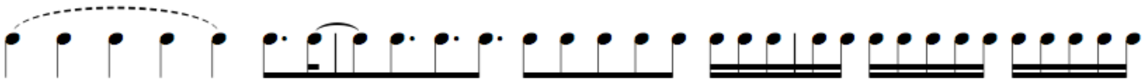
In light of the fact that there is no a theoretical backbone beyond what has already been exposed, and that mukthay combinations really defy any possible definition, description or encapsulation, the best way to get acquainted with them is by trying to dissect a few examples as far as possible.

Analysis of examples

1) The first example takes a double mukthay as starting point, with the elements of tirmana (3 steps) and sama mukthay as the 'building' blocks for the development of the overall sequence. It is constructed on nine cycles of tala 6. I have chosen this example first because of the transparency of its overall development. The whole sequence is *(track 135)*

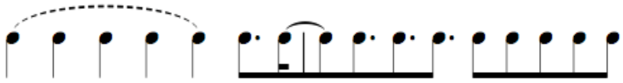


The first time the double mukthay is performed is based on a 5-note phrase throughout

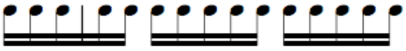


where the three steps of a tirmana are followed by a simple sama mukthay.

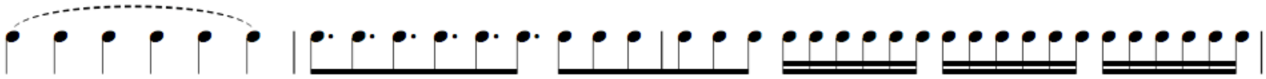
The tirmana's calculations are
5 notes x 4 matras of separation: 20 matras
5 notes x 3 matras of separation: 15 matras
5 notes x 2 matras of separation: 10 matras



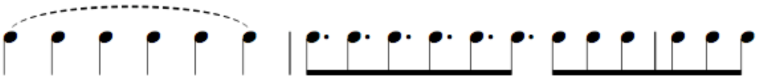
and the sama mukthay is 5 (0) 5 (0) 5



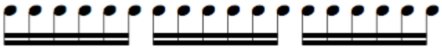
The second time the double mukthay is based on a 6-note phrase throughout



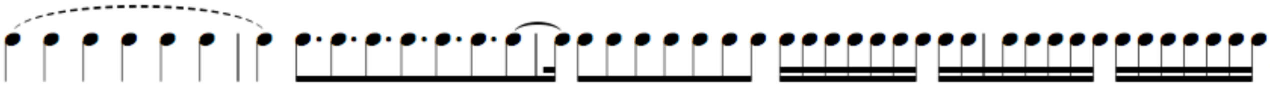
The calculations are
6 notes x 4 matras of separation: 24 matras
6 notes x 3 matras of separation: 18 matras
6 notes x 2 matras of separation: 12 matras



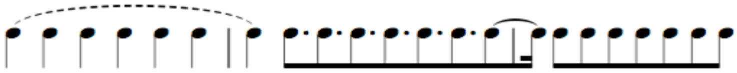
and the sama mukthay is 6 (0) 6 (0) 6



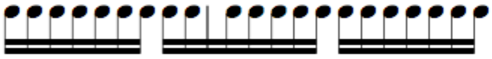
The third time the double mukthay is based on a 7-note phrase throughout



The calculations are
7 notes x 4 matras of separation: 28 matras
7 notes x 3 matras of separation: 21 matras
7 notes x 2 matras of separation: 14 matras

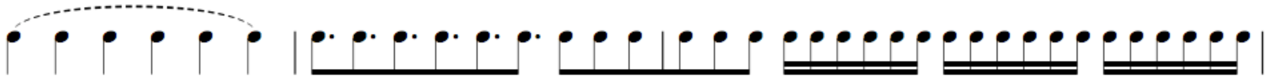


and the sama mukthay is 7 (0) 7 (0) 7



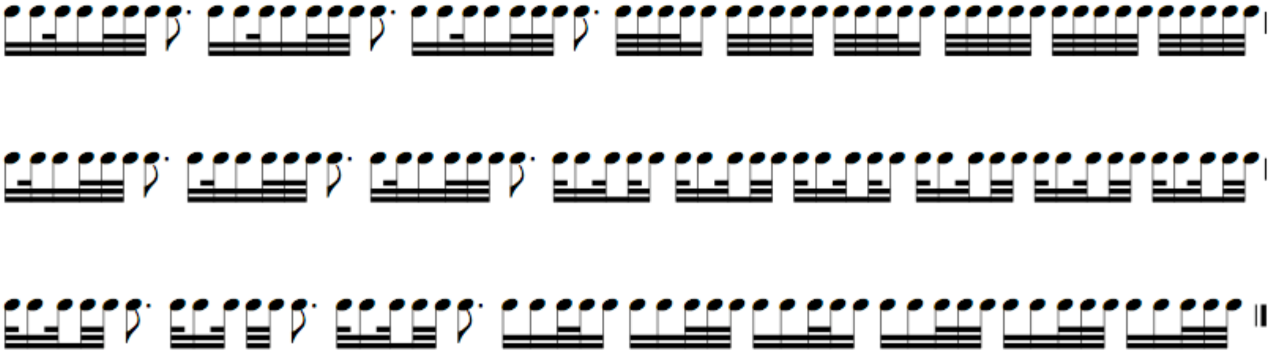
It can be inferred that the way the tirmana has been developed through the different ‘repetitions’ is by applying a yati phrase concept to the overall sequence of tirmanas: every block takes one more note than the previous one. Similarly, all sama mukthays obey the same logic by adding one note per pala.

The thinking behind the construction of this mukthay combination is basically the same applied to a type A yati mukthay. The middle 'phrase' (or second block of the double mukthay in this case) is where all calculations are realised in order to complete three cycles of the tala. In this particular case it is the six-note phrase that makes it possible to fit the double mukthay into three cycles of the tala.



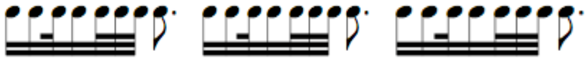
Afterwards, a simple calculation and thinking lies behind: in order to make it coherent, it has to obey some form of mukthay concept applied to a larger format. In this mukthay combination the overall idea is that of a yati phrase, increasing by one extra note. Therefore, one note of the tirmana as well as the sama mukthay are 'omitted' in the first block and this note is added to the third block. When the mukthay is heard, the original construction based on the six-note phrase is displaced within the tala and consequently the only resolving point of the whole sequence appears on the 10th tala sam.

2) This second example is also based on a double mukthay made up of a sama mukthay and a sub-mukthay and performed within three cycles of tala 10. *(track 136)*

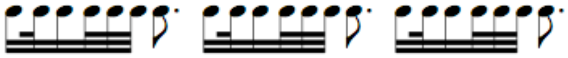


The development of the sama mukthay in the three blocks follows the concept of a gopuchayati phrase.

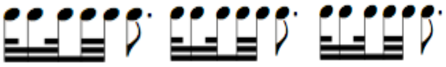
In the first block, the length of the palas is 8 (0) 8 (0) 8



In the second block, the length of the palas is 7 (0) 7 (0) 7



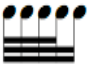
In the third block, the length of the palas is 6 (0) 6 (0) 6



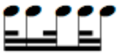
Similarly, the development of the sub-mukthay follows a srotovahayati logic. In every block the whole phrase is increased by 1 matra. However, instead of adding this matra at any point of the phrase, every cell of the sub-mukthay is increased by ½ matra.

This is the way the first cell of the sub-mukthay is developed

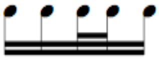
Block A: 6 𝅘𝅥𝅰



Block B: 7 𝅘𝅥𝅰

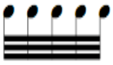


Block C: 8 𝅘𝅥𝅰

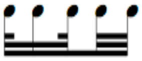


And the second cell of the sub-mukthay

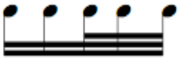
Block A: 5 𝅘𝅥𝅰



Block B: 6 𝅘𝅥𝅰

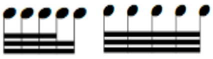


Block C: 7 𝅘𝅥𝅰

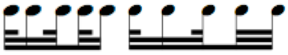


The two cells of the sub-mukthay following each other is thus

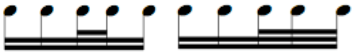
Block A



Block B

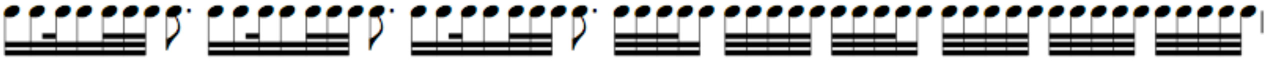


Block C

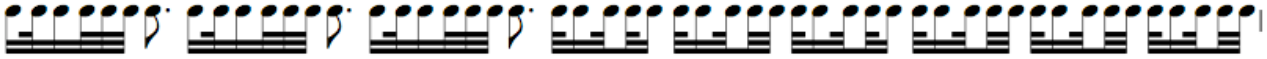


Every double mukthay would then look like this

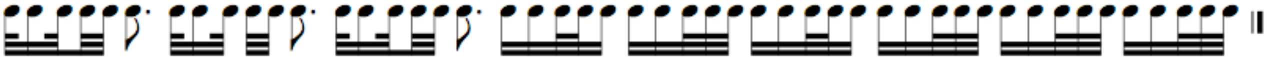
Block A



Block B



Block C

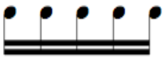


As opposed to the first example, this mukthay combination is not constructed on the middle block: it is structured around the idea of having the same number of matras in every block and each double mukthay, but deleting one matra in blocks B and C from the first mukthay and adding it to the second mukthay.

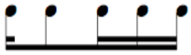
3) The third example responds more clearly to a stereotypical mukthay combination, where the boundaries of which phrase belongs to which mukthay not only overlap but become even unrecognisable. The only clue that the musician gives to the listener is a simple sama mukthay at the beginning of every block. The rest is a continuous spider web of phrases that can, somehow, even be analysed as two different mukthays simultaneously. The large scale idea behind the mukthay combination is a mixture of a 3-fold mukthay notion with a srotovahayati. The essential and basic idea at a micro structural level is the seed phrases (of 5, 6, and 7 matras respectively) that are developed alongside the notion of transforming these phrases into khanda, tisra and misra at some point of the development.

The seed phrases are

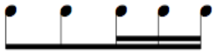
5 matras



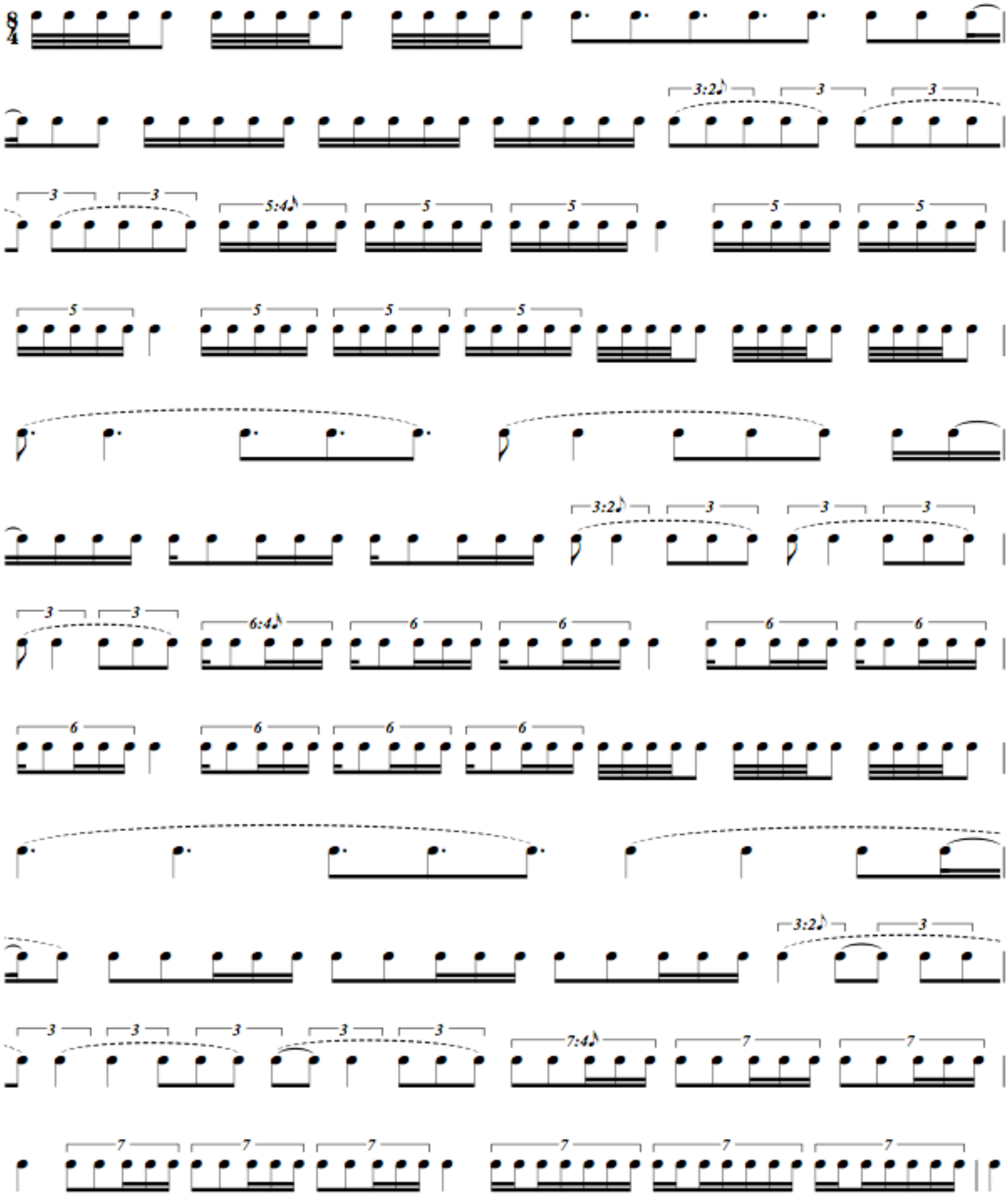
6 matras



7 matras



The whole mukthay is developed in twelve cycles of tala 8 *(track 137)*


8
4
3:2♪
3
3
3
3
5:4♪
5
5
5
5
5
5
5
5
3:2♪
3
3
3
3
6:4♪
6
6
6
6
6
6
6
6
3:2♪
3
3
3
3
3
3
7:4♪
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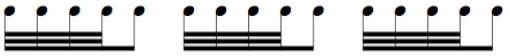
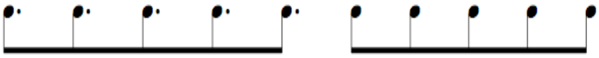
7

The first element, as mentioned before, is a simple sama mukthay of 3 beats that does not develop at all. This can be heard three times marking the beginning of every block.

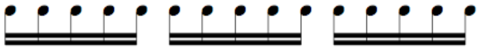


The second element is a tirmana-compound mukthay based on the 5 matras seed phrase. In the first pala the phrase is multiplied by 3 matras, and in the second pala by 2 matras.

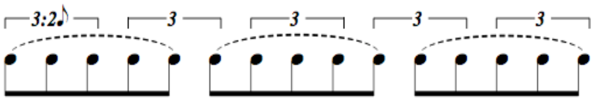


This is the point at which the overlapping of mukthays and the spider web begins: the seed phrase of 5 matras, that is the last pala of the tirmana-compound mukthay, is repeated three times, which turns it into a sama mukthay. Simultaneously, on a larger scale, it becomes the first pala of a 3-fold mukthay of a 15 matras phrase (the common number between tisra and khanda). The phrase is actually constructed on khanda while the palas in chatusra and tisra use jathi 5.

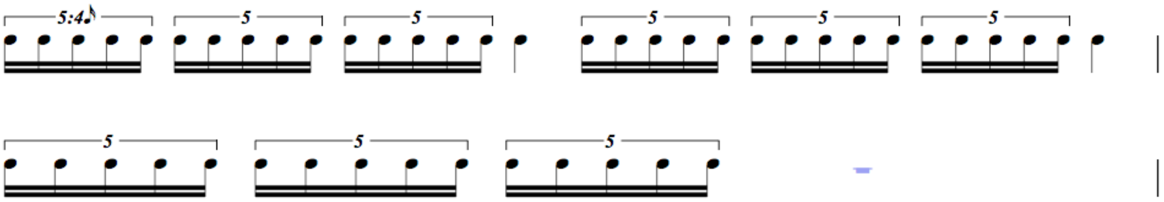
Therefore, the seed phrase of 5 matras accomplishes three functions: the last pala of a tirmana-compound, by repeating it three times becomes a sama mukthay and it is the first pala of a three-fold mukthay.



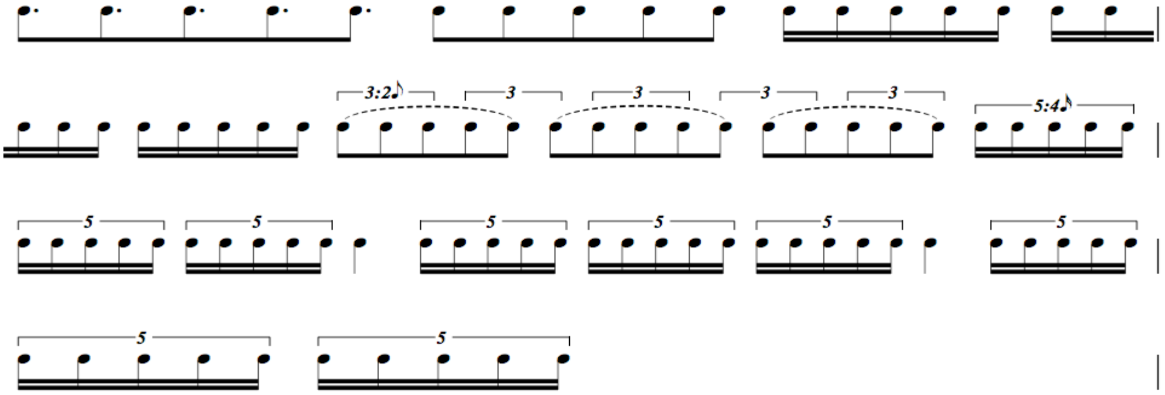
The phrase in tisra jathi 5



And, finally, the phrase in khanda as the last pala. However, this is not the end of the block: the phrase in khanda, the last pala of the 3-fold mukthay, is repeated three times, turning it into a sama mukthay of 15 matras per pala with a gap of 4 matras. Consequently, the idea of the 5 matras seed phrase becoming khanda gati responds to two different mukthay criteria: it is the last pala of a 3-fold mukthay, and simultaneously, the first pala of a sama mukthay.

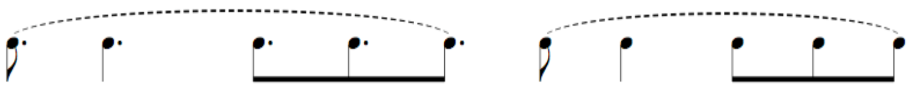


The whole first block, leaving out the short mukthay of three beats, looks as follows

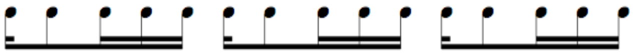


The second block begins with the short mukthay of 3 beats and the whole construction explained for the 5 matras seed phrase is used now for the 6 matras seed phrase.

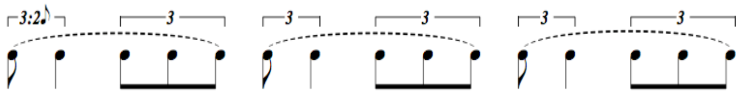
First the tirmana-compound mukthay in which every note value of the seed phrase is multiplied by 3 and 2 matras respectively in the first two palas:



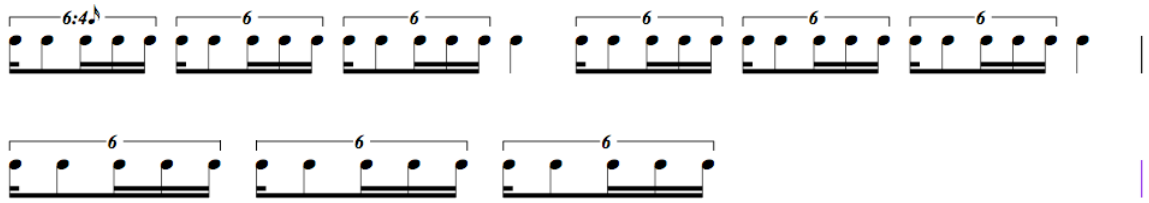
This is followed by the seed phrase that functions as the last pala of the tirmana-compound mukthay, as a sama mukthay by repeating it three times, and as the first pala of a three-fold mukthay of 18 matras. Therefore, jathi 6 is utilised.



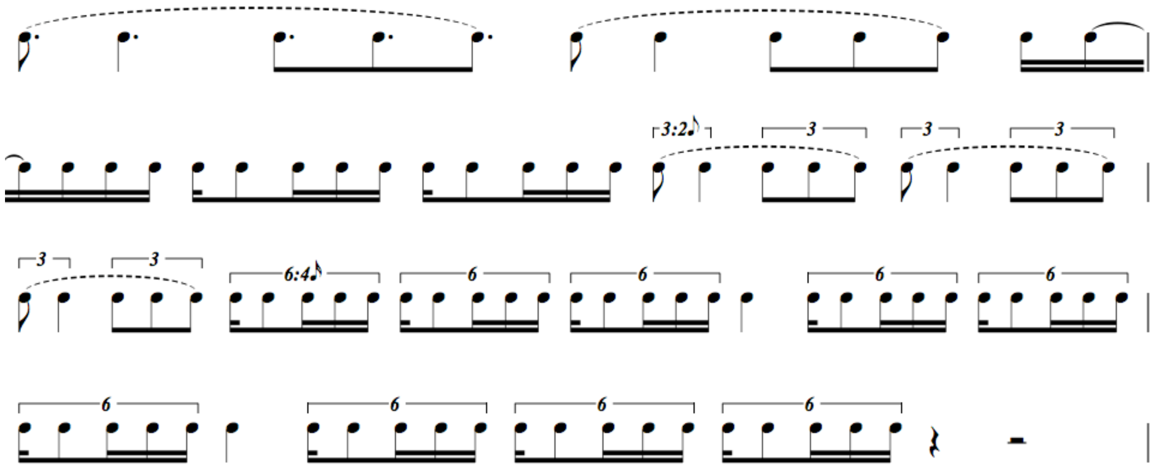
The second pala is in tisra 1st speed.



The last pala is in tisra 2nd speed, that as was the case with the khanda phrase of the first block, is repeated three times to become a sama mukthay

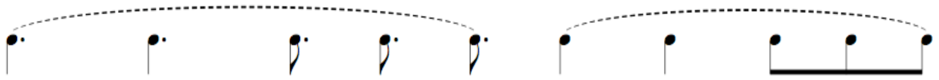


The whole second block, without the initial sama mukthay of three beats, looks as follows:

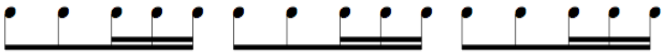


I deliberately left the three beats rest at the end of the block so it can be observed that actually this was the initial calculation and the musician decided to add the simple 3-beat sama mukthay at the beginning in order to complete the four cycles of the tala. As with the very first example analysed, the middle block is where the calculations for the 'triple mukthay' take place. One note is deleted from the seed phrase of the first block that is then added to the seed phrase of the third block.

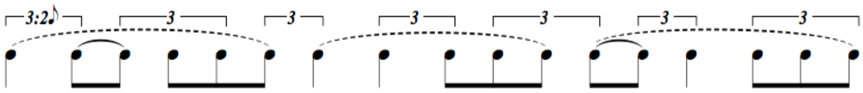
The development in the third block should be more transparent at this point. After the short sama mukthay, comes the tirmana-compound, with the same multiplications of every note value as in the previous two blocks: 3 matras for the first pala and 2 matras for the second pala



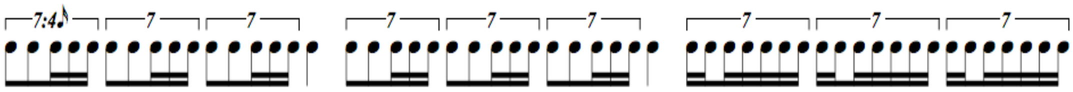
followed by the last pala, that once again functions as three different mukthays: by repeating the last pala of the tirmana-compound mukthay three times becomes a sama mukthay and it is the first pala of a 3-fold mukthay of 21 matras, with the common number of tisra 1st speed and misra. Therefore, the chatusra and tisra palas utilise jathi 7.



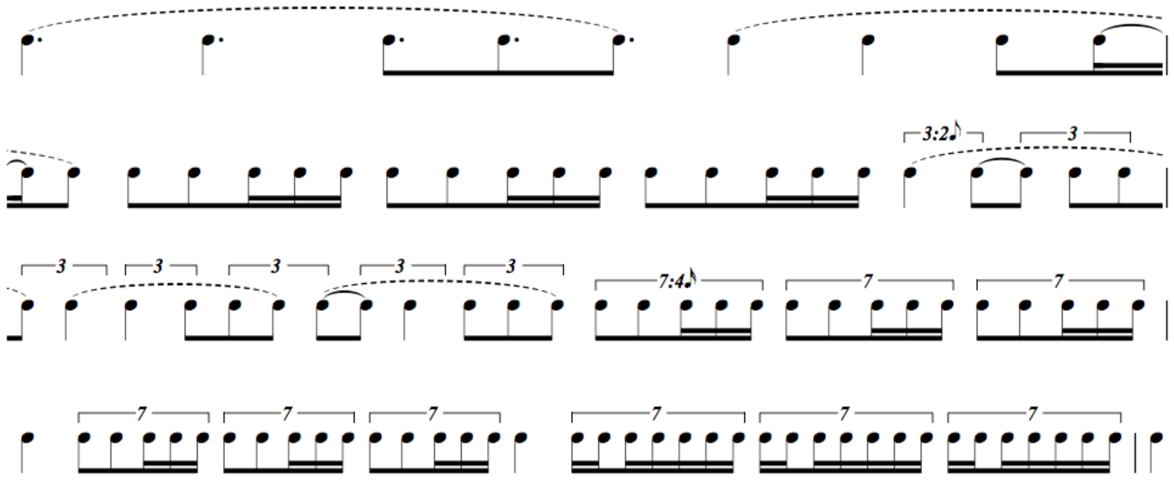
Second pala in tisra jathi 7



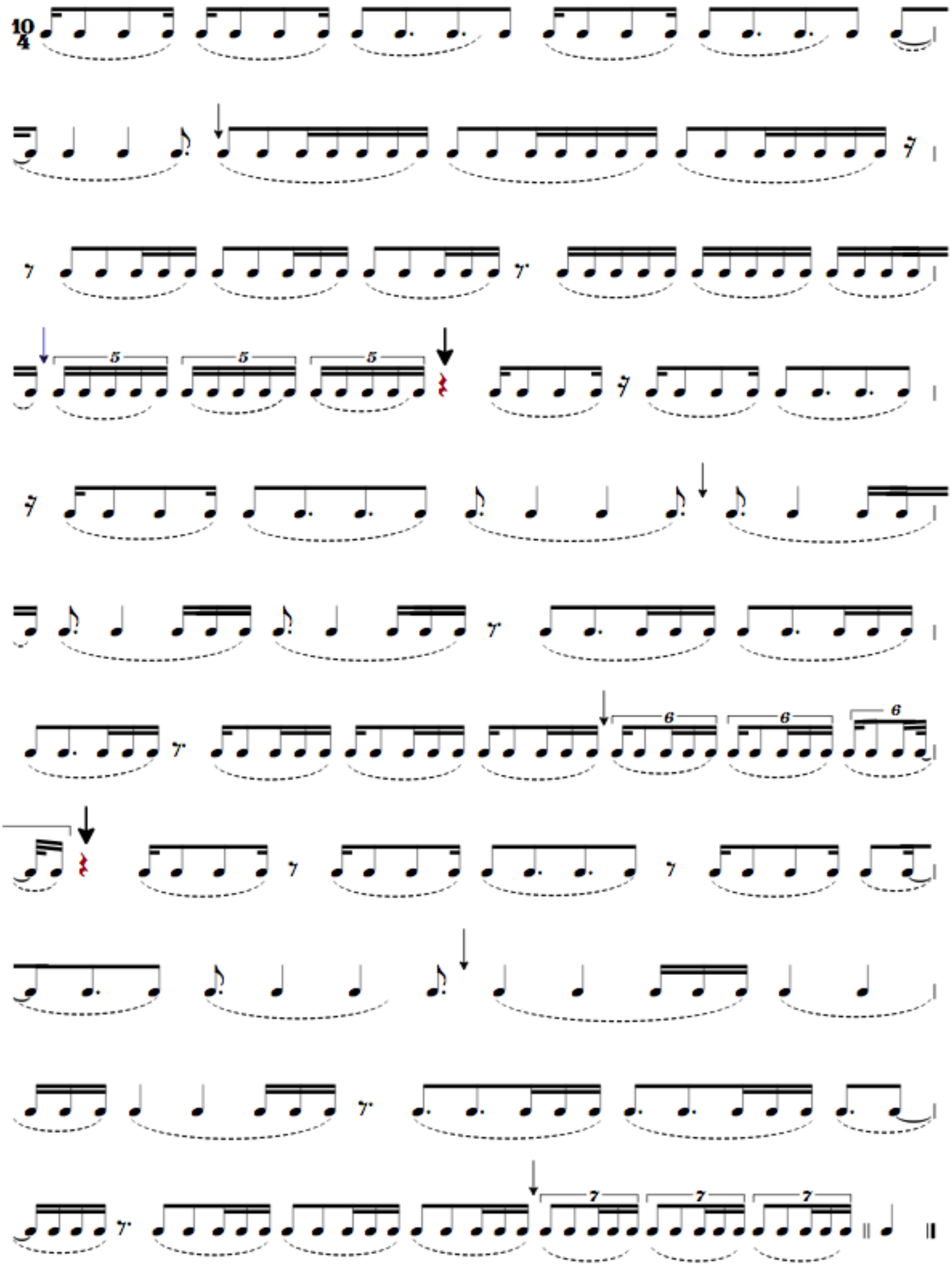
The last pala is in misra, that as in the two previous blocks, is repeated three times becoming a sama mukthay.



The whole third block, without the short sama mukthay, looks as follows:



4) The last example is constructed in eleven cycles of tala 10, and for the first time, a gap of one beat is inserted between blocks[1]. *(track 138)*



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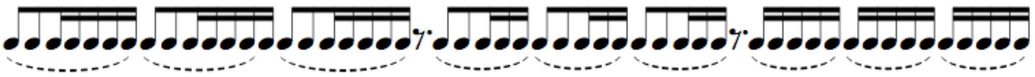
[1] *The thin arrows indicate the beginning of each mukthay and the thick arrows show the gap and the beginning of each block.*

The very basic idea behind its construction is quite similar to the previous mukthay: a 5-matras phrase that becomes khanda, a 6-matras phrase that becomes tisra 2nd speed and a 7-matras phrase that becomes misra.

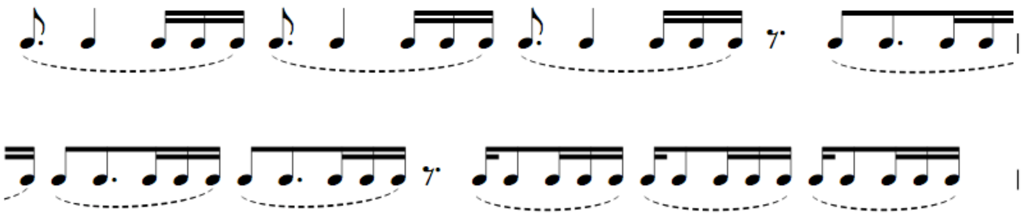
In order to link this idea, the 5, 6 and 7 matras phrases are the last palas of a yati mukthay type A (aaa bbb ccc) in each block. The yati mukthay is developed on a large scale as if it were a strotovahayati.

-The structure of the 1st block is 9 9 9 (3) 7 7 7 (3) 5 5 5



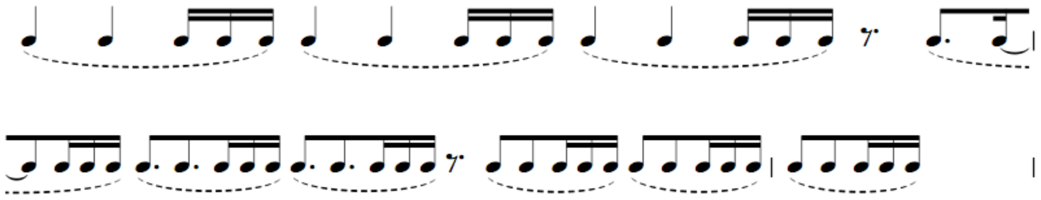
The 'B' phrases use the concept of yati phrases of omitting notes in relationship to the phrases 'A', whilst the 'C' phrases keep the same number of notes as the B phrases.

-The structure of the 2nd block is 10 10 10 (3) 8 8 8 (3) 6 6 6



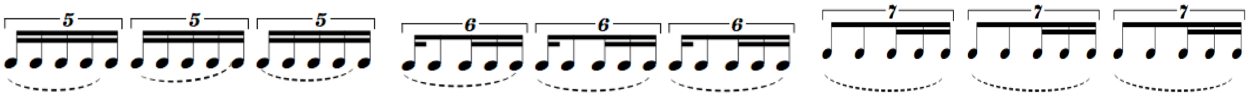
In this yati mukthay, 'B' and 'C' phrases rigorously follow the principle of maintaining the same number of notes in all phrases and decrease the note values of the first two notes.

-The structure of the 3rd block is 11 11 11 (3) 9 9 9 (3) 7 7 7



It can be observed that not only the 'B' and 'C' phrases keep the same number of notes as the 'A' phrases, but also that this mukthay is somehow a continuation of the one in the 2nd block as it also maintains the number of notes in five.

With this construction, the link of each 'C' phrase to khanda, tisra and misra respectively is logical from a structural viewpoint. Every gati becomes the 3rd mukthay of every block by repeating every beat three times. Every mukthay is 3 beats long, but in different gatis that are increased following the pattern of a srotovahayati. The phrase in each gati is a repetition of the previous 'C' phrase of the yati mukthay, maintaining five notes in each gati.



The total length of the three blocks of yati mukthays is 234 matras or 58 +1/2 beats. The sama mukthays in the three different gatis sum up to 9 beats; consequently both mukthays add up to 67 +1/2 beats, still far from the 110 beats that are required to complete eleven cycles of tala 10. 42 +1/2 beats need to be created.

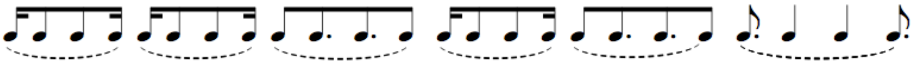
As the first mukthay of the triple mukthay, a yati mukthay of the type B is chosen. Possibly the idea of using it as a first mukthay is to somehow make less clear to a listener the thinking used to construct the second and third mukthays.

A first objective in this first mukthay is to construct it in such a way that it would add up to x number of beats plus the ½ beat.

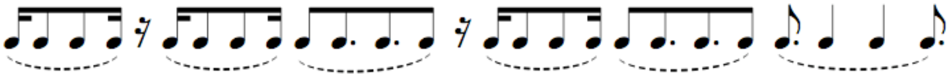
In the construction of this mukthay the length of all phrases remain intact, whereas the number of matras in the gap is the changing element. Each note in the 'B' phrase is elongated by one matra; the same procedure is applied to each note of the 'C' phrase.

In the 1st block there are no gaps between palas. The length of palas is

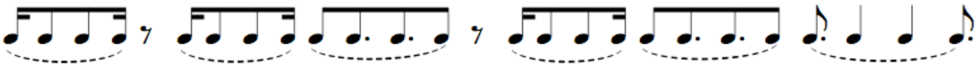
6 (0) 6 10 (0) 6 10 14



In the 2nd block, the gap is of one matra: 6 (1) 6 10 (1) 6 10 14



And in the 3rd block the gap is of two matras: 6 (2) 6 10 (2) 6 10 14



Obviously, the calculations have been made on the 2nd block so that, when multiplied by three, they will result in sufficient beats to either complete the 110 beats of the whole sequence, or to leave some matras over to be used as gap between the blocks. But, **if a gap is used in between blocks, it needs to be longer than any gap used to separate palas of the different mukthays.**

Consequently, the length of the mukthay in the 2nd block is 54 matras, when multiplied by three giving 162 matras or 40 +1/2 beats. The remaining two beats to complete the eleven cycles of tala 10 are used as gaps of one beat each, separating the three blocks.

Chapter 19

PORUTTAM

A simple definition of *poruttam* would be a sequence of at least 3 cycles of a tala in which fragments of the theme are interwoven with different rhythmical techniques; some of these techniques have already been seen so far in the text, other techniques will be explained later on. However, there are more parameters and ramifications that turn this definition into a more elaborate concept.

There are two different ways of constructing a poruttam as well as an entirely different set of techniques associated with each of these methods. Perhaps because the basic concept remains the same, karnatic music does not seem to have two different names for the two different ways of developing the concept of poruttam. Notwithstanding this, in order to explain the two different ways of constructing and developing poruttam, alongside the fact that both use entirely different techniques, I simply decided to divide the whole poruttam concept into two separate chapters and call the first construction 'A' and the second 'B'.

The only two points common to both types of poruttam are the choice of theme fragments (and subsequent deletion of notes in every fragment), and the concept of filling the empty space provided by the omission of these notes with concrete techniques.

-Theme fragments: in karnatic music, every theme is fragmented into two, three or, sometimes, even four segments or cells. This fragmentation has multiple consequences, particularly in the development of melodic material but also in the development of some rhythmical elements (rhythmical sangatis using anuloma-pratiloma was a clear example of this idea). If a musician decides to use poruttam in a piece, the theme will usually be fragmented in three cells, or alternatively a theme will be constructed where the musical flow can be easily subjected to this fragmentation into three cells.

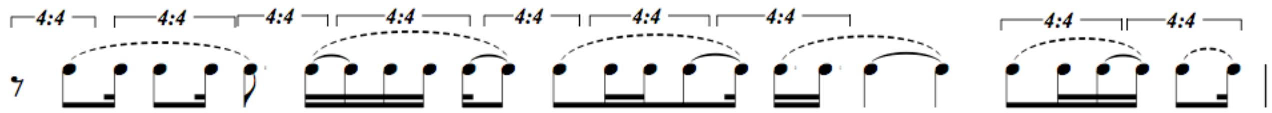
Once the three cells have been established, the musician then proceeds to omit the number of notes he considers appropriate. The general idea is to leave just the first 3 to 5 notes of every fragment (essentially enough musical material to make these few notes recognisable) and delete the rest. For calculation purposes the last note of each fragment can be shortened as much as the musician likes.

-Filling the empty space: the first note of every fragment of the theme serves as a sort of resolving point. Between the last note of one cell and the first note of the following cell, the omission of notes creates an empty space that is filled with different sets of techniques, depending on the choice of construction. Every technique will resolve on the first note of the following cell, as it would on a tala or anga sam.

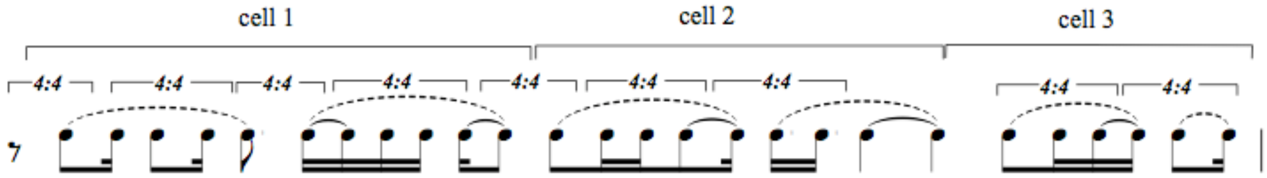
STRUCTURE OF PORUTTAM A

The explanation of this whole subject is based on a 12-cycle sequence of poruttam A created on the theme of a *pallavi* in tala 11 already seen in chapter 10.

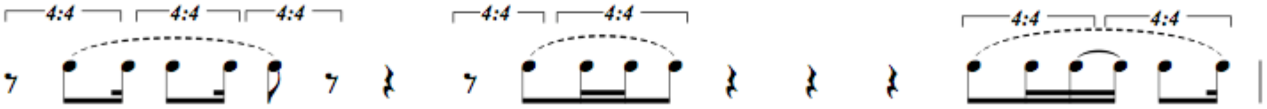
The theme is *(track 76)*



This theme is fragmented into three cells

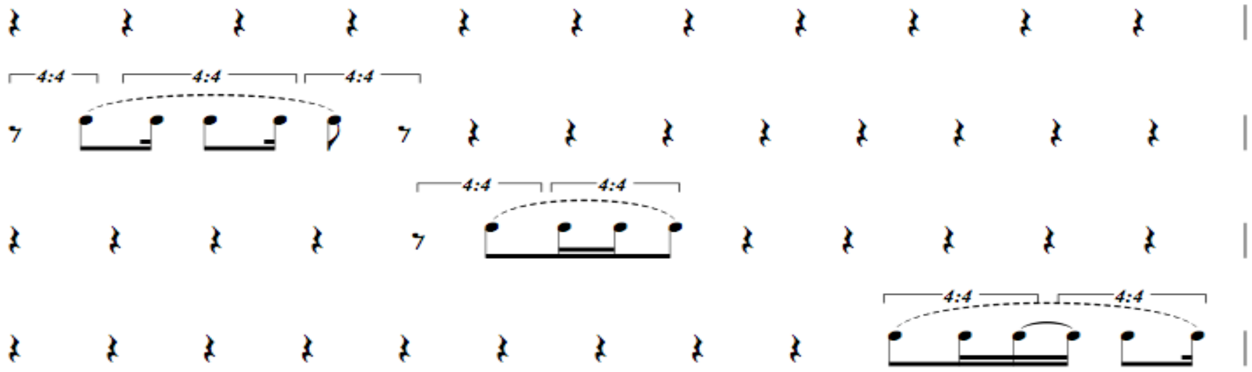


Thus, the cells of the theme are subjected to the deletion of a number of notes and the shortening by one ♪ of the last note of cells 1 and 2.



Actually, up until this point, all the steps are common to both types of poruttam. The first element that differentiates a poruttam A from its B counterpart is the way the cells are distributed within the tala and how much space is created between them.

In poruttam A, every cell, whilst always staying in its original position within the tala according to the original theme, is performed in different cycles of the tala (as shown in the example below). Usually this way of spacing the cells into different cycles of the tala produces a sequence of four cycles. The rests represent the empty space that will be filled by different techniques.



It can be observed that the first cell is preceded by a whole cycle with rests. This implies that a sequence of poruttam A never starts with the first cell followed by a technique; it always commences by first using a technique that resolves on the first note of the first cell.

This is due to the fact that most of the time a sequence of poruttam A will last 8 or 12 cycles (eventually, although rarely, 16 cycles). Therefore, the construction of 4 cycles shown above will be repeated twice or thrice. Since each cell of the theme needs to be separated by at least a whole cycle (consequently, the last cell cannot be followed immediately by the first cell), this first technique preceding the first cell ultimately forms part of the techniques used in the cycle separating the last and first cells.

This construction produces segments of different durations to be filled. The first technique always has the duration of one cycle plus the *eduppu* (beginning point of a theme within the tala). **The fact that there are three cells will invariably produce three different techniques per block:**

-The first technique starts one cycle before and leads to the first cell.

-The second technique occurs between the end of the first cell and the beginning of the second cell.

-The third technique occurs between the second and third cells[1].

Construction and development of techniques

Before the creative part can be explained, there are two important elements to take into consideration:

-Durations between cells: these distances need to be calculated beforehand. In the case of the example to be analysed, the durations between cells are as follows:

-The cycle preceding the first cell plus the matras off tala sam before the eduppu: **11 beats plus two matras** (46 matras in chatusra).

-Between the end of the first cell and the beginning of the second cell: **13 beats** (52 matras in chatusra). It should be noted that, in this particular example, the second technique will always start on the second half of the beat and will similarly resolve on the second half of the beat, since the second cell begins on the third matra.

-Between the end of the second cell and the beginning of the third cell: **14 beats** (56 matras in chatusra).

These distances remain unaltered regardless how many times the sequence of 4 cycles is repeated. No cell will ever be performed in a different place than its position in the original theme. Techniques must always fit into the framework of the given duration.

-Potential techniques to be utilised: not all techniques seen so far are suitable for use in the context of a poruttam A sequence. The following techniques are the ones most employed by karnatic musicians:

-Gati Bhedam (followed by a short mukthay, or not).

-Jathi Bhedam (followed by a short mukthay, or not).

-Combination of gati and jathi bhedam: poruttam A is the only rhythmical concept where both techniques can be interwoven or follow one another.

-6 types of yati phrases (with a short mukthay or not).

-3 types of yati mukthays.

---

[1] *What occurs when the last cell finishes before the end of the tala is explained later on.*

-Sama mukthays (followed by a mini-mukthay, or not).

-3 types of 3-fold mukthays[2].

-Tirmanas and tirmana-mukthays. There are no restrictions as to how many steps can be used.

-Compound mukthays: the number of matras will always be half the number of beats of the fragment to be filled and will not have any relationship with the number of beats of the tala.

-Compound-related mukthays.

-Sub-mukthays.

-Yatis prastara.

-There is a constellation of mukthays with no names that essentially constitute combinations of two or more different concepts of mukthays[3]. However, many of these unnamed and rare mukthays are used in poruttam A (as well as in double, triple and mukthay combinations). One example of these unnamed mukthays will be shown and explained in the analysis of the 12-cycle poruttam[4].

There are just a few relevant rules as to how to create and connect techniques:

-Each block of 4 cycles should have 3 differentiated techniques (as listed above) that will last for the entire duration of the fragment between theme cells.

-Every technique used in the first block will be connected in the same place in subsequent blocks by using the same or similar technique. For instance, if the first technique in the first block is a srotovahayati with the palas 5 9 13 17, the first technique in the second and third blocks should hold a relationship with the srotovahayati (or with one or more of its numbers) in one way or another. This relationship could vary from a rather obvious one, almost a repetition of the technique, to a more far-fetched connection.

-Changes of gatis are allowed after each cell, since the cell is considered as a sort of tala sam.

Analysis of example

The best way to fully understand the poruttam A construction, the connections between techniques and phrasing development, is by analysing a very clear, yet elaborate sequence of 12 cycles by B.C. Manjunath[5].

---

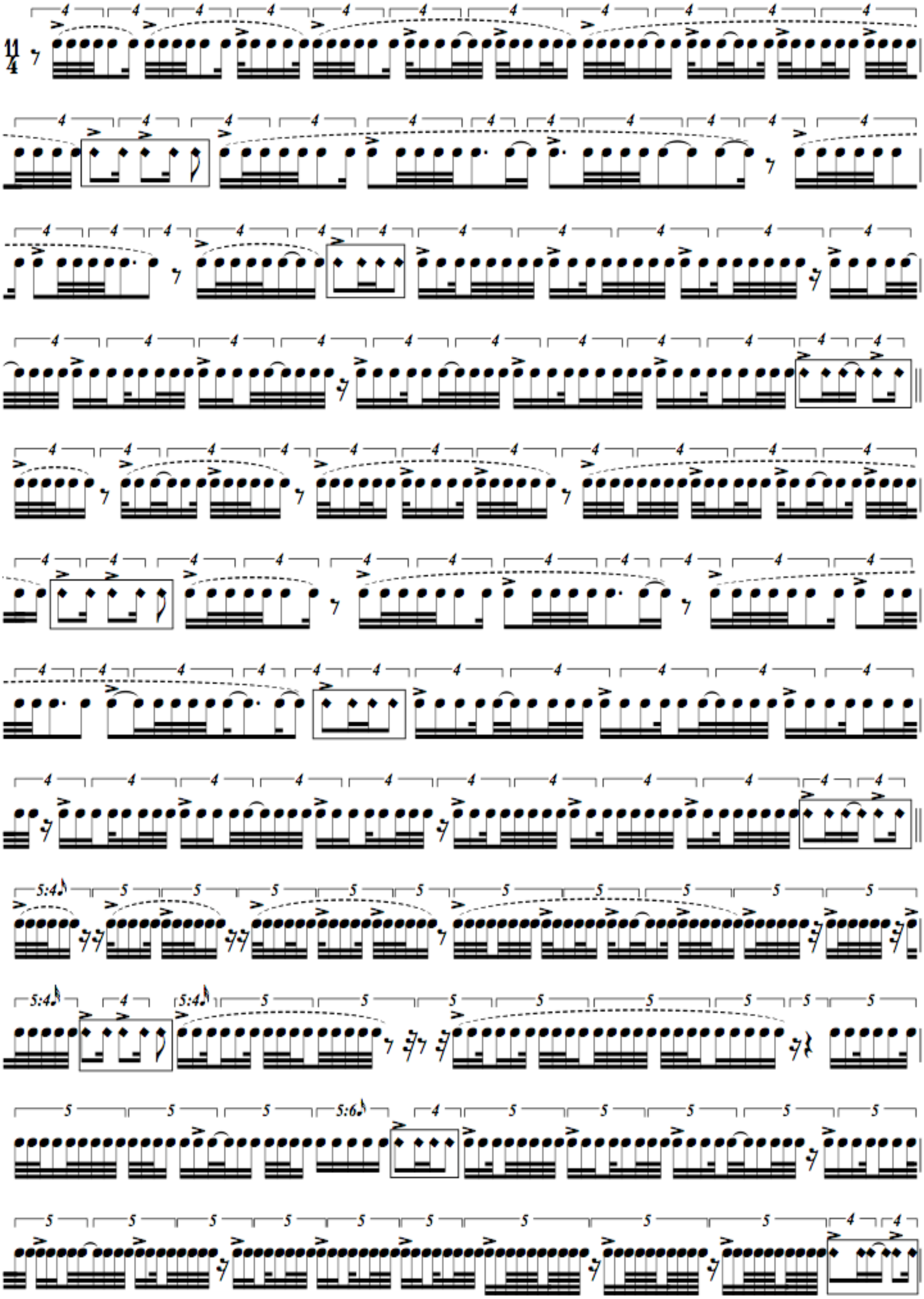
[2] *Four types in reality, counting the option that will be explained in the chapter of* Nadai Bhedam.

[3] *The amount of these mukthays is quite high and many a time responds more to the creativity of a particular musician than to a specific set of rules of construction.*

[4] N*eedless to say that western creators can equally try to construct mukthays that are outside the scope of this text by combining two or more concepts as karnatic musicians frequently do.*

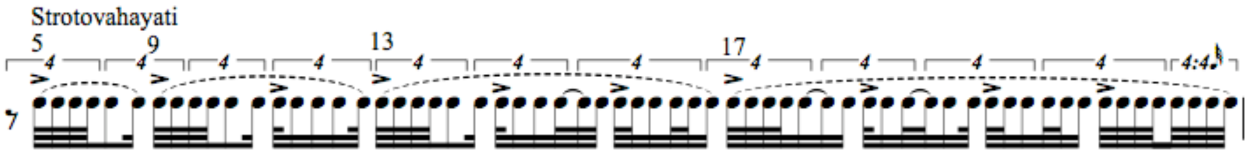
[5] *The theme cells are boxed and with a diamond-shaped note-head.*

(track 139)

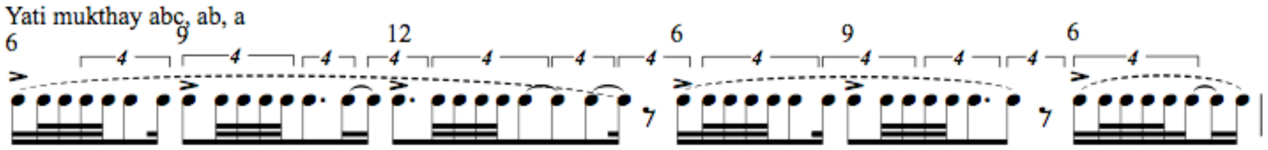


Techniques used in 1st block

1) 11 beats plus 2 matras (46 matras in chatusra): a srotovahayati structured (2) 5 (0) 9 (0) 13 (0) 17. It uses the option of adding matras at the end of every pala.

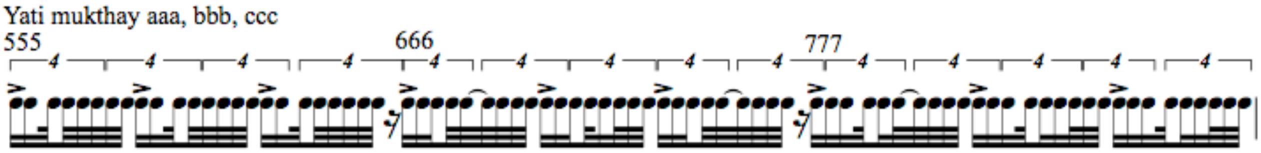


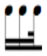
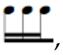
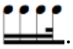
2) 13 beats (52 matras in chatusra): yati mukthay type B. It increases the number of matras using the pattern abc (gap) ab (gap) a. The length of the palas is[6] 6 9 12 (2) 6 9 (2) 6

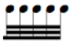
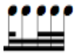
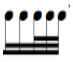


The 'B' and 'C' phrases use the same number of notes as the 'A' phrase. They increase by leaving the group of four 𝅘𝅥𝅯 intact while adding one matra per remaining note.

3) 14 beats (56 matras in chatusra): yati mukthay type A. It also uses the option of increasing the number of matras with its characteristic pattern aaa (gap) bbb (gap) ccc. Length of palas is 5 5 5 (1) 6 6 6 (1) 7 7 7



The seed phrase in the first pala of 5 matras is divided in two parts; the first part  is increased by a 𝅘𝅥𝅯 in the first part of the 6-matra pala , whereas a 𝅘𝅥𝅯 is added in the 7-matra pala .

The second part  consistently uses the increase of note values, following the pattern of increasing by a 𝅘𝅥𝅯 the second note in the 'B' phrases  and the first one in the 'C' phrases .

The whole block, mixed with the theme cells would look as follows:

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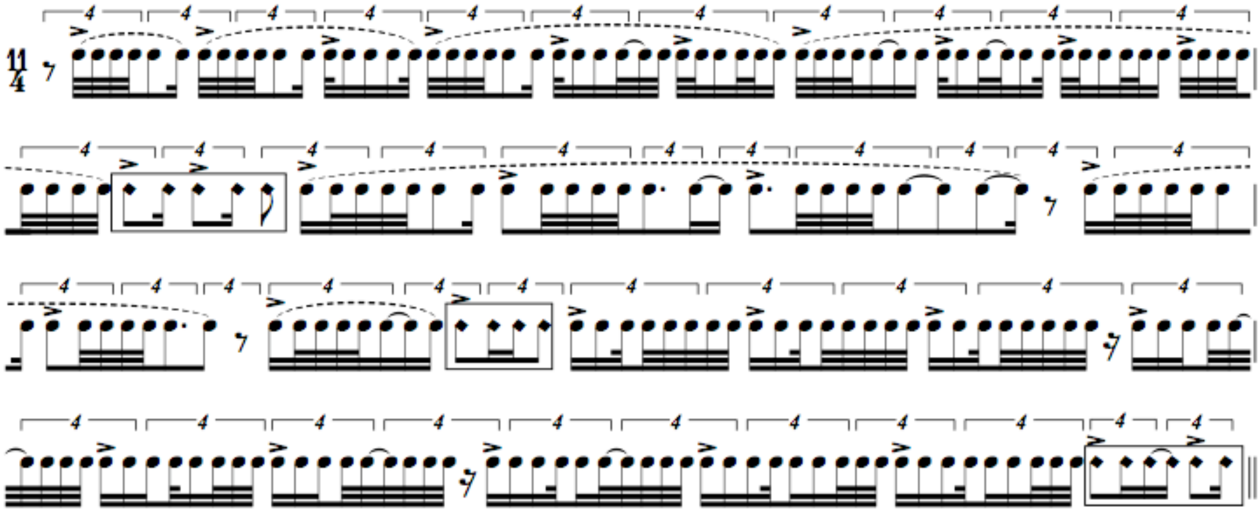
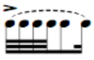
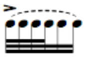
[6] *It can be observed that the first and last two matras of the yati mukthay do not receive any bracket; this is due to the fact that those notes start and finish respectively in the second half of the beat.*

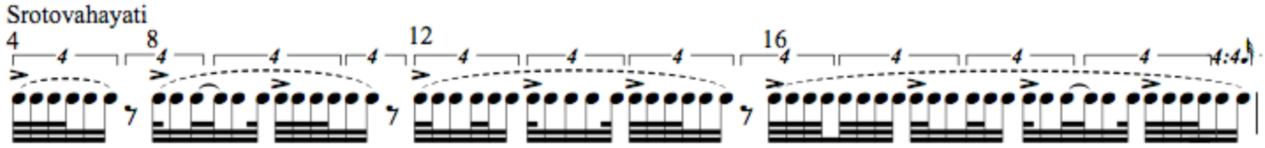


Techniques used in 2nd block

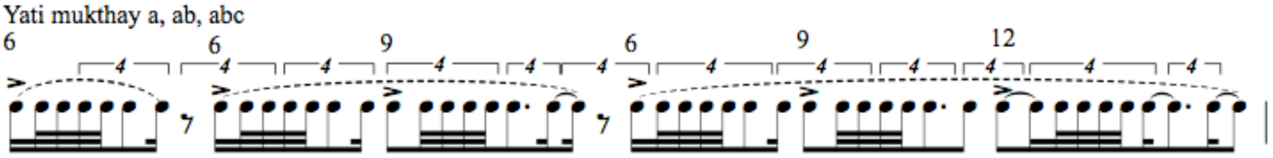
The three techniques exposed in the first block need to be developed or connected with the techniques to be used in the second block.

1) 11 beats plus 2 matras (46 matras in chatusra): a srotovahayati different in calculations to the first one, but that is clearly related because it uses the same number of matras to increase the palas, and more importantly, because the whole passage sounds almost identical. Instead of starting with the 2 matras gap, that in this context would most likely sound like a mistake rather than as an intentional gap, the musician takes one matra off every pala of the first block (thus releasing 4 matras), that, united to the 2 matras of the gap in the first block, provides 6 matras to distribute as a gap in between palas. The calculations are then
4 (2) 8 (2) 12 (2) 16

The only changes are that in the first pala the ♪ of the first cell  has been decreased into a 𝅘𝅥𝅯  and that the choice of adding notes is from the beginning rather than from the end.

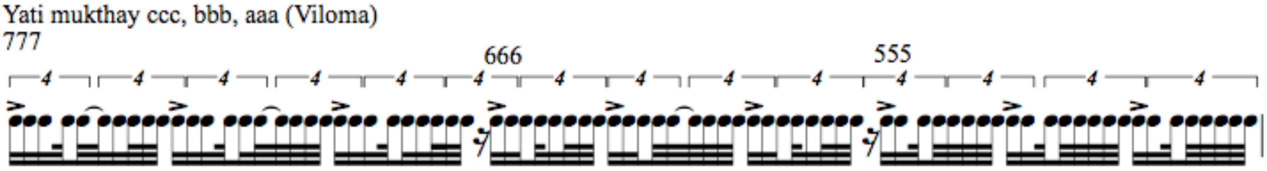


2) 13 beats (52 matras in chatusra): yati mukthay, type B. It also uses the option of increasing the number of matras but the pattern is reversed, thus a (gap) ab (gap) abc. Length of palas is 6 (2) 6 9 (2) 6 9 12

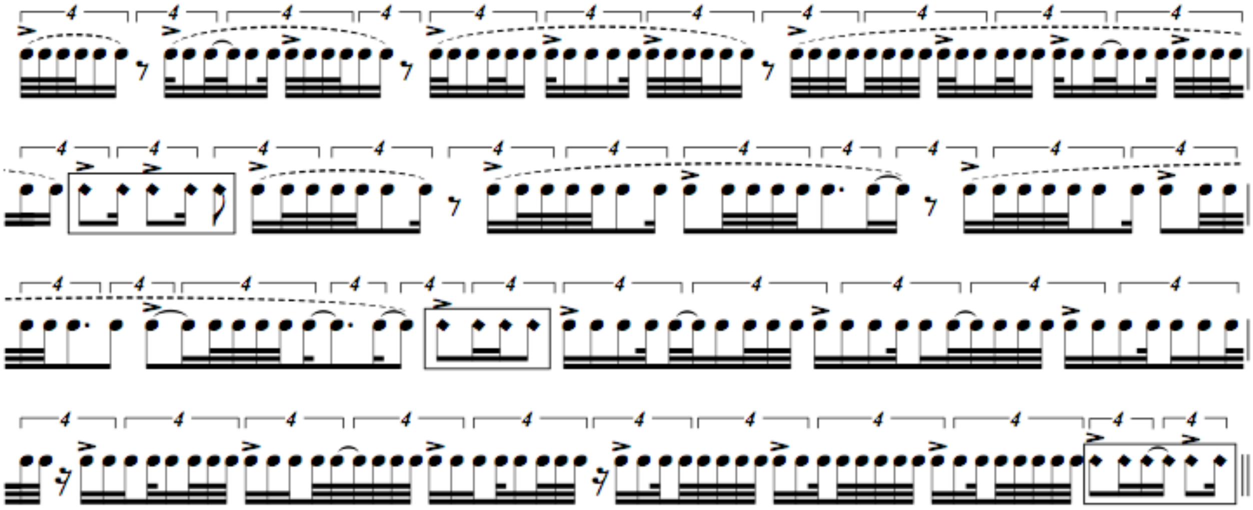


Each pala remains identical to the first block.

3) 14 beats (56 matras in chatusra): yati mukthay type A. It is the viloma[7] version of the first block, thus using the pattern ccc (gap) bbb (gap) aaa. The length of palas is 7 7 7 (1) 6 6 6 (1) 5 5 5



Thus, the whole second block looks like this:



Techniques used in 3rd block

In this third block, the development on the two previous blocks is realised entirely in khanda. This change of gati (an application of the rhythmical sangati concept) widens the amount of possibilities, since the original length of phrases in chatusra when re-grouped in khanda, is shorter than the duration of the fragments between cells.

1) 11 beats plus 2 matras (55 matras in regular khanda plus ½ beat or, 115 matras of khanda 2nd speed anuloma):

The original length of the srotovahayati was 46 matras. To bridge the difference between chatusra and khanda in order to complete the original length, would require the use of one of the following options or a combination of them[8]:

---

[7] *As explained in the yati mukthay chapter, the viloma and vakra versions of a type A yati mukthay do not need to happen as a sequence or block; they can be used in different parts of a piece or used as a developmental idea in mukthay combinations and poruttam A sequences.*

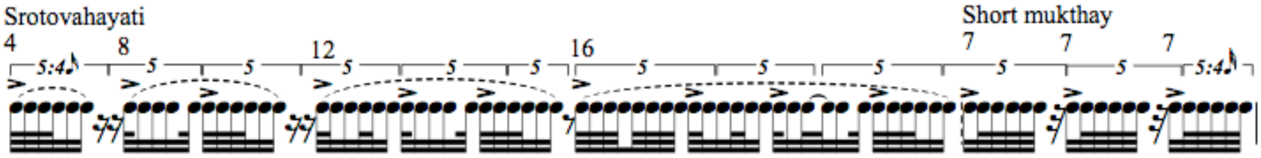
[8] *More options would also be possible, but the ones presented are the ones used more frequently.*

-Modification of the gaps on the srotovahayati constructed for the first or second blocks.

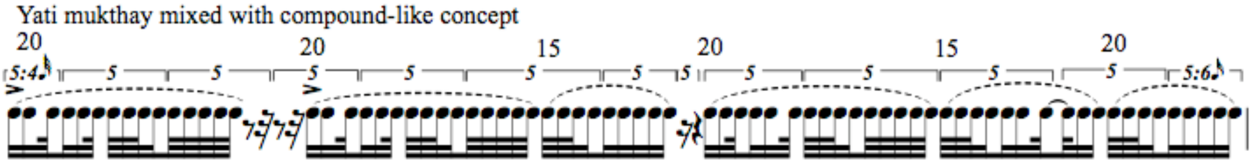
-Coherent change of the duration of palas that follows criteria similar to the one used for the creation of the srotovahayati in the second block.

-Short mukthay following the yati phrase and resolving the fragment onto the second cell.

The musician has opted for the latter, but since the fragment has an extra ½ beat before attacking the first cell, the musician fills this ½ beat with 5 matras of khanda 2nd speed anuloma (thus a 5:4♪.), and instead of thinking in the number of matras in the regular speed, he thinks in the number of matras provided by using 2nd speed anuloma. The mukthay is then 7 (1) 7 (1) 7.



2) 13 beats (52 matras in chatusra): unnamed mukthay combining the concept of a yati mukthay type B with a compound-related mukthay together with the notion of sub-mukthay.

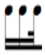
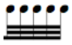


To begin with, the first phrase is not related to any of the palas of the yati mukthay type B. The seed phrase of the third technique (yati mukthay type A) is the source of the development (which constitutes another way of creating a more entangled development of ideas).

Secondly, the numbers do not relate to any of the mukthay concepts seen so far. Although the musician follows a large structure of a yati mukthay type B (a (gap) ab (gap) abc), the numbers do not follow what anyone at this point would expect from such a construction[9].

20 (10) 20 15 (10) 20 15 20

This numerical construction clearly defies any mukthay construction explained so far, but a close dissection of the different concepts utilised will show that there is a logic behind its creation.

The two cells of the seed phrase of the last technique (yati mukthay type A) form the core of the mukthay:  is repeated twice and  is the last group of the first pala, and as will be seen, the seed for the development of the entire mukthay.

The larger structure of a yati mukthay type B has already been established. But the 'A' phrase is divided into two cells in the same fashion as a sub-mukthay.

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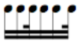
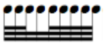
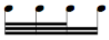
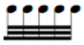
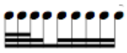
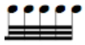
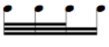
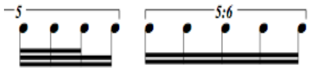
[9] *Once again, the musician thinks in number of matras of 2nd speed anuloma rather than in regular khanda.*

Cell 1  and Cell 2 

The second pala ('B' phrase) takes only the second cell, and once again splits it into  and . The last 5 matras are developed in the 'B' phrase with the idea of a compound: each matra is multiplied by two. This multiplication is applied only to the second cell of the pala, following the notion of a sub-mukthay. The 'B' phrase thus looks like this 

Lastly, the logic in the construction of the 'C' phrase does not follow the pattern of the yati mukthay type B, but the logic combining once again the ideas of compound mukthay with that of a sub-mukthay.

If in the 'B' phrase, the seed cell  was multiplied by two, in the 'C' phrase it is multiplied by three matras. 5 notes multiplied by 3 matras is 15 matras of 2nd speed anuloma, which results in a 5:6♪. for all practical purposes. Added to the first 5 matras cell  this results in the 20 matras that, at least initially, could confound the logic behind the mukthay's construction.[10]. The 'C' phrase thus looks like this



3) 14 beats (70 matras in khanda):

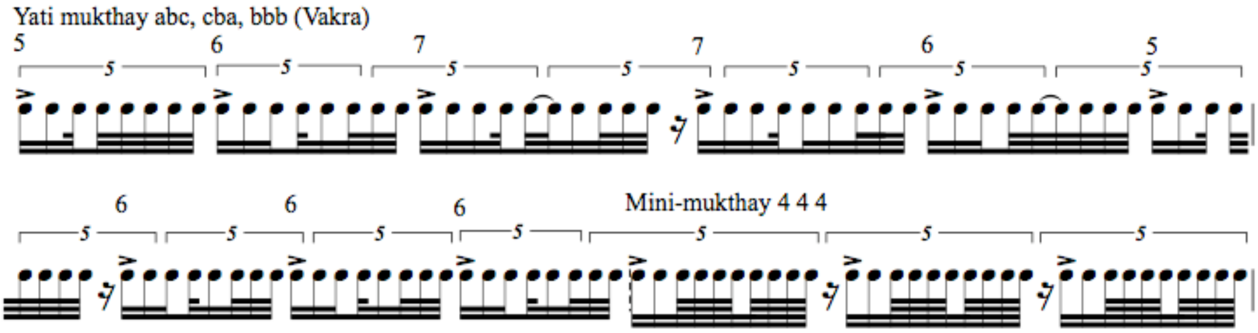
The very last technique is the vakra version of the yati mukthay type A of the first block, but in khanda. The pattern of the mukthay is abc (gap) cba (gap) bbb. The length of palas is 5 6 7 (1) 7 6 5 (1) 6 6 6

The fact that this vakra version is performed in khanda allows for a final mukthay that would give a clear climax to the whole section. The 16 matras of difference between the 14 beats in chatusra and khanda have been organized as a short and extremely active mukthay, with the calculations 4 (1) 4 (1) 4

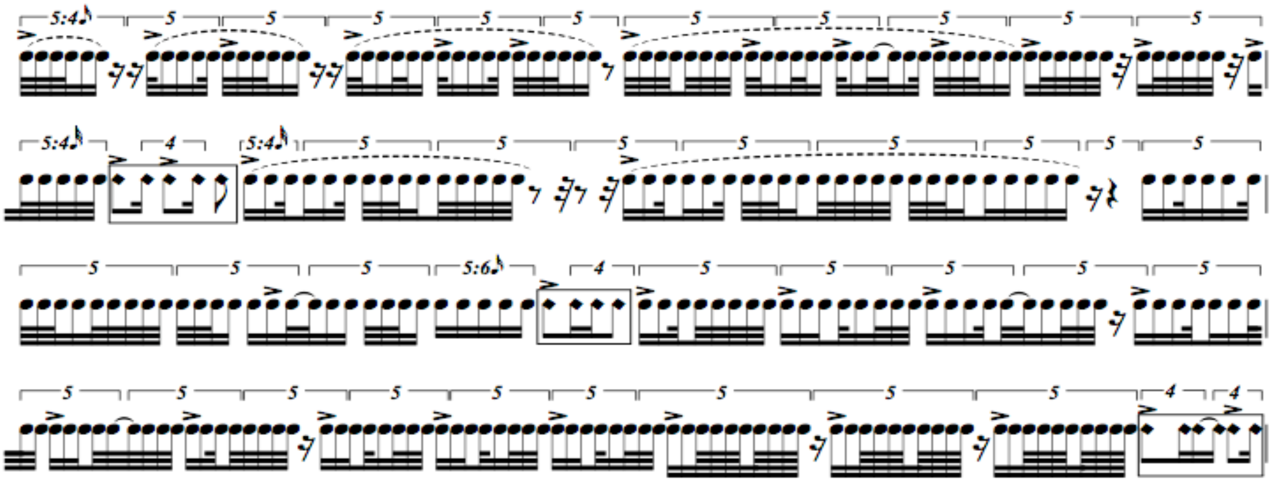
This last technique thus looks like this:

---

[10] *The notion seen in the chapter of mukthay combinations, of mixing different types of mukthays in large and smaller structures, is a constant element of creation in karnatic musicians. Whereas in a mukthay combination the core was a double or triple mukthay that needed to be repeated three times and developed in each of these repetitions (thus creating long musical objects), in the mukthay just analysed, the same general principles of combining different mukthay constructions are used but in a much shorter fashion. This becomes part of what I have called a 'constellation' of mukthays that would make the whole subject of mukthays an extremely lengthy subject for the purposes of this text.*



The whole third block, mixed with the theme cells:



Procedure for a last cell that does not resolve on tala sam

In the example presented in this chapter, the last cell lasted for the whole length of the phrase, which is rather unusual. Most poruttam A sequences will have a third cell that does not finish on tala sam.

This fact has two consequences:

a) Every first technique of all blocks, except the very first one, should add the number of matras remaining to finish the cycle to the calculations made for the first block. Therefore, the first technique, the one leading from the last to the first cells, will always be longer in second and subsequent blocks than in the first one.

b) An extra cycle at the end of the last cell should be added to finish the sequence. The duration of this last technique will be the result of adding the number of matras remaining to finish the cycle plus one entire cycle.

Since this is in reality a fourth technique, used only once, it tends to be quite contrasting to the rest of the sequence and very active and climatic in character (similar to the short mukthay of the analysed example, but on a larger scale).

Different ways of using the blocks

1) As a whole sequence: this is the manner in which the poruttam A has been explained in this chapter. If performed in this fashion, it usually is played by one performer with the rest of melodic instruments (or percussion instruments other than the mridangam) playing only the theme cells. It could be performed in a composed or improvised section of a piece.

2) Spread across different parts of a piece: in some forms of karnatic music, the poruttam A is a fully composed section and follows a concrete set of rules as to where in a piece it should be performed. Depending on the form, a division of the whole sequence is asked for, and then the different blocks are performed in different parts of a composed section of a piece. The completion of the three cells forming a block of 4 cycles is never split. The division of the sequence refers only to the blocks.

3) As a question-answer improvised section between two performers: in karnatic music there exist a number of improvisational sections, each one of them with its own set of rules, elements that must be used, could be used or should be avoided altogether. A common factor to most improvisations is the dialogue established by at least two instruments.

Poruttam A can be combined with an improvised section called *Soram Prastara.* In this context, every block is performed by a different instrument, usually developing on what the 'main artist' has exposed. In this context a poruttam A could indeed be longer than 16 cycles and it mixes with the main developmental and structural principles of the particular improvisational section.

Chapter 20

MOHARAS

This creative technique is the only one in the whole constellation of karnatic rhythmical devices where every conceivable parameter is based on or has as the most important element, the numbers 4 or 8.

The parameters taken into consideration to create a mohara are:

-Number of cycles of the sequence

-Number of phrases per cycle

-Inner construction of phrases

-Structure of the whole sequence and subsequent phrase displacements within the beat or tala

a) Number of cycles: in a mohara, the number of cycles will always be either four or eight. Any other number is discarded. Except with very short talas (3-6 beats), the customary amount of cycles nowadays is four.

b) Number of phrases: this number is always **four** and the process to determine their length is to take the number of matras of one cycle and divide it by four**;** this will provide the duration for each phrase. However, not all talas and gati combinations can produce four equal phrases.

If chatusra is chosen, it is always possible to have four phrases of the same duration in every tala. But, if a mohara uses, for instance, khanda in tala 11, the 55 resulting matras cannot be divided by four, therefore this option would never be considered. This is due to the fact that there is no possibility to use gaps between phrases. A cycle must always be divided into four equal phrases without any gap. The phrases will be named A, B, C and D throughout the whole chapter.

c) Inner construction of phrases: only a few options are possible, mostly revolving around numbers 4 or 8. These are:

-Divide the number of matras by 2 equal halves   -4+x[1]   -8+x   -4+x+4

If, for instance, tala 14 and chatusra are taken, each phrase would be 14 matras long and the possibilities for the inner construction of every phrase would be
-7+7   -4+10 or 10+4   -8+6 or 6+8   -4+6+4

'A', 'B' and 'C' phrases are constructed on the same inner division and are quite similar, usually variations on 'A'. The 'D' phrase has a contrasting feel to the other phrases, and, whenever possible it will utilise a different inner division to the other three phrases.

---

[1] *The x refers to the number of matras remaining to complete the length of the phrase. The two digits could change their position.*

d) Structure of sequence: every cycle will be divided as follows:

A	B	C	D	
A	B	C	D	
A	B	C	½ D	A
A *(continued)* ½ D	C	Mukthay		

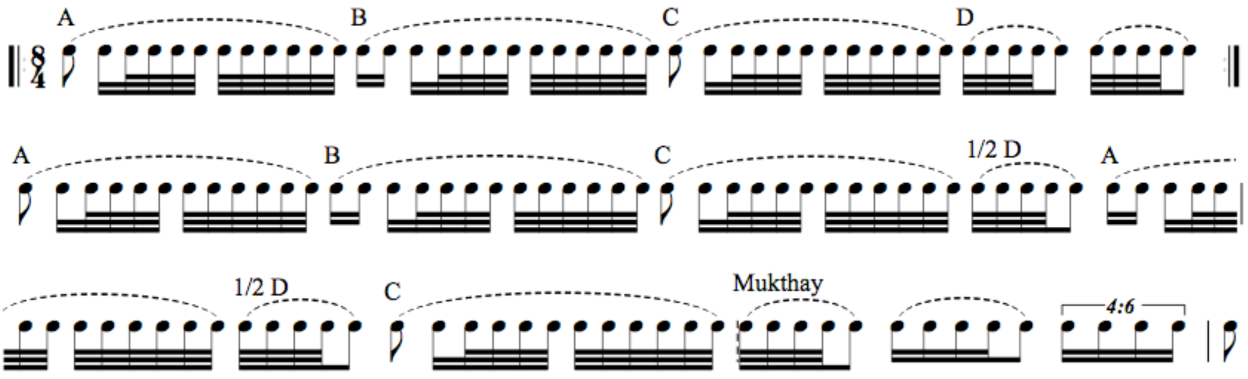
'½ D' actually refers to the first cell of the 'D' phrase, whatever its length may be. In the 3rd cycle of the sequence, only the first cell of the 'D' phrase will be performed, followed by the 'A' phrase, that will necessarily continue into the 4th cycle.

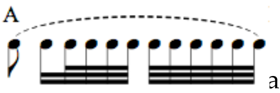
After the 'A' phrase is finished, the second '½ D' is performed. However, this is how musicians refer to it whereas in reality this '½ D' could be the first or second cell of the 'D 'phrase, or in case the phrase is divided into three cells, any combination of two of them as well.

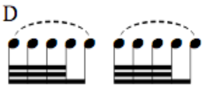
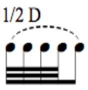
The 'C' phrase follows suit, often starting in a different place in the beat than the three previous times. Ultimately, the sequence concludes with a mukthay.

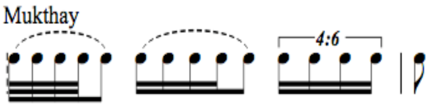
Analysis of examples

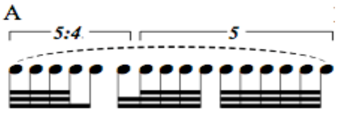
1) The first example is a mohara constructed in Adi tala (8 beats) with chatusra gati. Therefore, all possible parameters use numbers 4 or 8, and the 'D' phrase will have the same inner division as the rest. Phrases are constructed with a 4+4 feeling and there are no displacements. The mukthay is a variation of a 3-fold mukthay, using the same phrase in 3 different speeds of chatusra, constructed 4 (2) 4 (2) 4 | T.S *(track 140)*

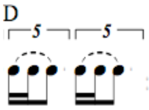


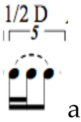
The 'A ' phrase is  and the 'B' and 'C' phrases are basically a repetition of 'A'.

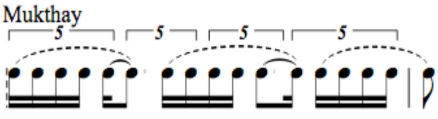
'D' is slightly contrasting . The '½ D' of the 3rd cycle is , repeated in the 4th cycle.

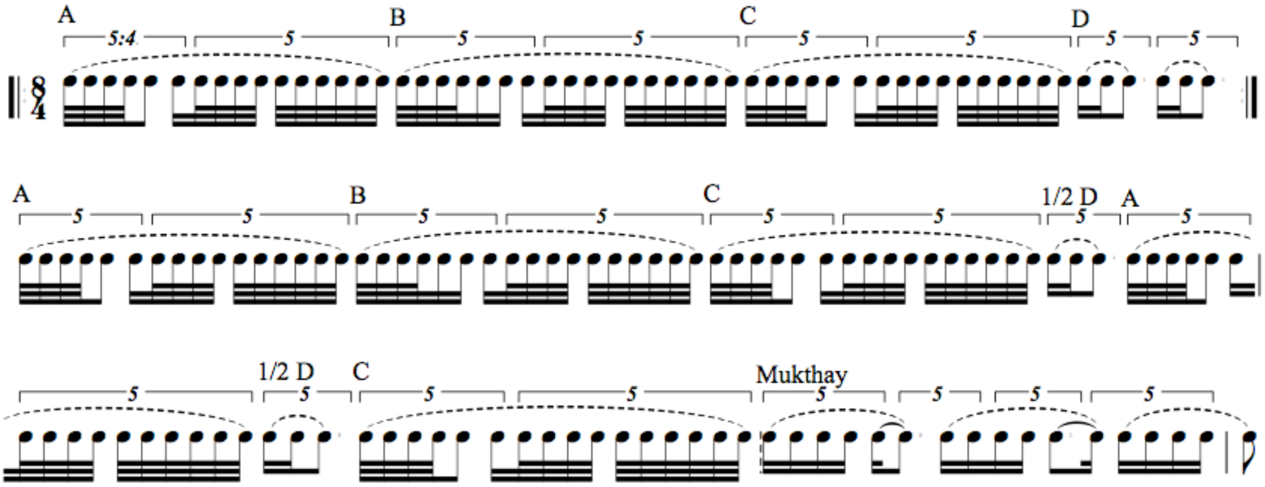
The mukthay is 

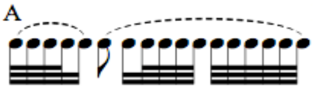
2) Also in Adi tala but with khanda gati. The 'A' phrase is divided 4+6 

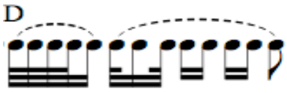
and the 'D' phrase is 5+5 

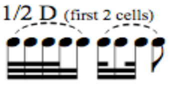
. The '½ D' in the 3rd and 4th cycles is 

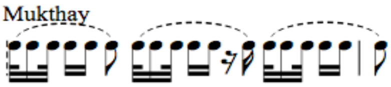
and the concluding mukthay is structured 4 (4) 4 (4) 4 | T.S 
Mukthay
5
5
5
5
. The whole mohara is thus *(track 141)*


A
5:4
5
B
5
5
C
5
5
D
5
5
8
4
A
5
5
B
5
5
C
5
5
1/2 D
5
A
5
5
1/2 D
5
C
5
5
Mukthay
5
5
5
5

3) Constructed in tala 11 and chatusra gati. 'A' phrase is divided 3+8 

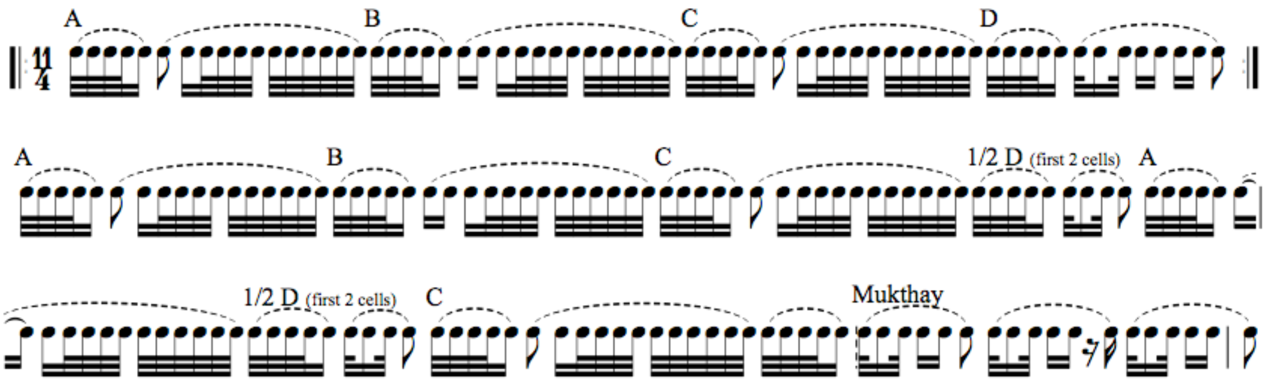
and the 'D' phrase is also 3+8 

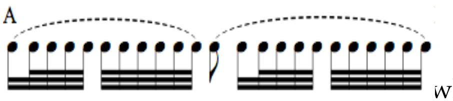
although, the way the '½ D' of the 3rd and 4th cycles is realised is quite unusual, since it omits notes from the middle 
1/2 D (first 2 cells)
.

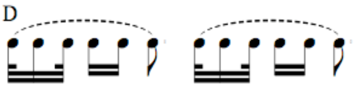
Finally, the mukthay is once again constructed on 4 (2) 4 (2) 4 | T.S, but with a slight variation in the second gap, leading to the third pala 

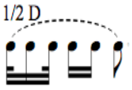
. The whole mohara looks thus:

(track 142)

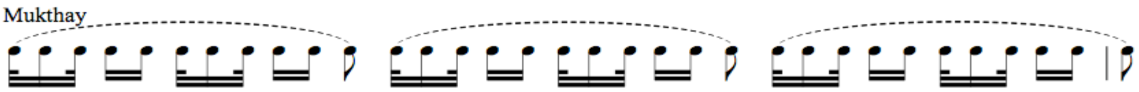

11/4
A
B
C
D
A
B
C
1/2 D (first 2 cells)
A
1/2 D (first 2 cells)
C
Mukthay

4) The last example is structured in tala 14, also in chatusra. 'A' phrase is divided 6+8 

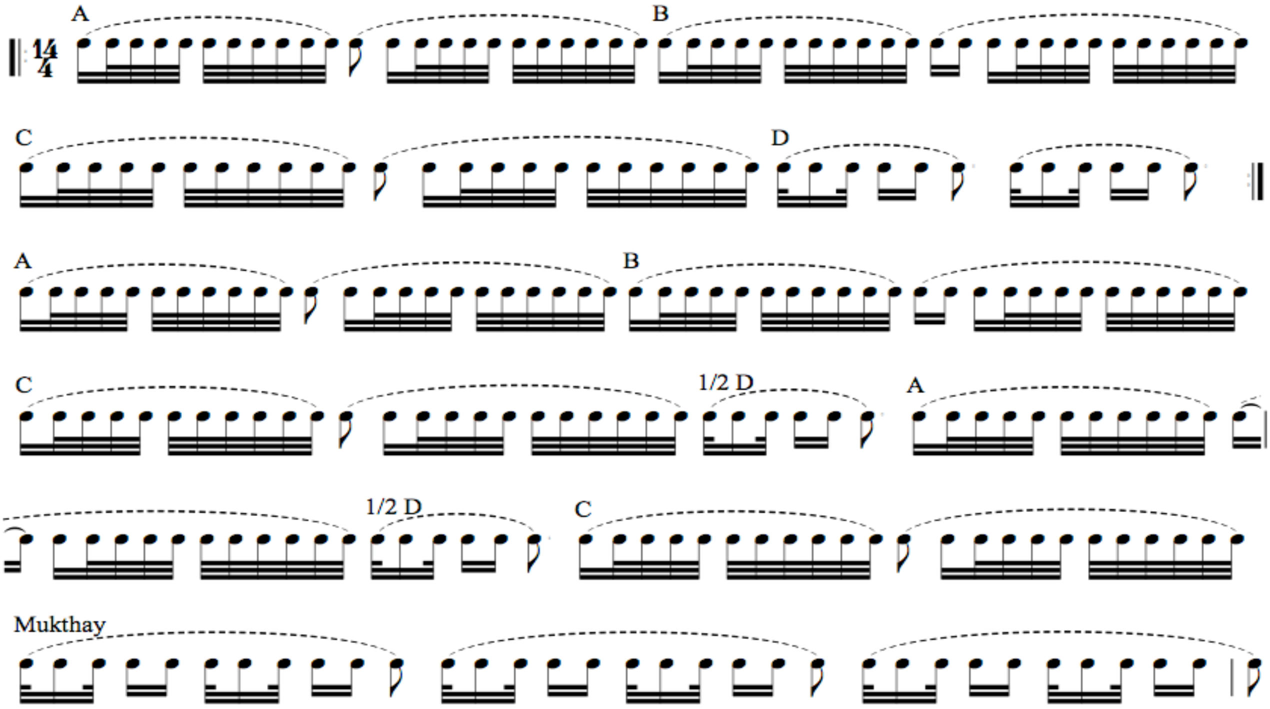
whereas the 'D' phrase is divided 7+7 

'½ D' uses the first cell 

and the final mukthay is structured on 10 (2) 10 (2) 10 | T.S



This mohara contains more phrase displacements than any previous example. The whole sequence looks thus: *(track 143)*


14/4
A
B
C
D
A
B
C
1/2 D
A
1/2 D
C
Mukthay

MIXED GATI MOHARAS

Mixed Gati Moharas are a very intricate variation in which two gatis alternate throughout the usually eight cycles that the sequence lasts, and applies mainly the concept of rhythmical sangati in combination with phrasing through gatis changes[2] in the development.

The main difference with regular moharas lies in the following:

a) The tala is divided into two equal halves (even talas are used much more frequently than odd talas). Each half will always take a different gati (the choice of gatis for each half remains unaltered for the whole mohara), regardless of which phrases or displaced fragments of phrases are used in that particular half.

b) 'A' and 'C' phrases share the same inner division of the phrase and gati, whilst 'B' and 'D' phrases share the other gati, but not necessarily the same inner division.

c) Once the first '½ D' cell is used, phrases are displaced and proceed through the two different gatis. Also, final mukthays change gati at one or two points, depending on whether the second gati is slower or faster than the first one.

d) Since the sequence is structured in eight cycles, phrases tend to be much longer than in regular moharas. This has several consequences:

-Phrases with 3 or even 4 cells are used more frequently.

-A phrase can be split into two halves (which would respond to the first possibility of dividing a phrase) and two different inner divisions can be applied to each half.

-A sort of yati phrase idea can be used, provided that numbers 4 or 8 are still the main core of the whole phrase and only three cells are used.

A general scheme of an 8-cycle mixed gati mohara with the second gati slower than the first is presented below.

Gati 1	**Gati 2**
A	B
C	D
A	B
C	D
A	B
C	½ D A
A *(continued)* ½ D	C
C *(continued)* Mukthay--------------	--

---

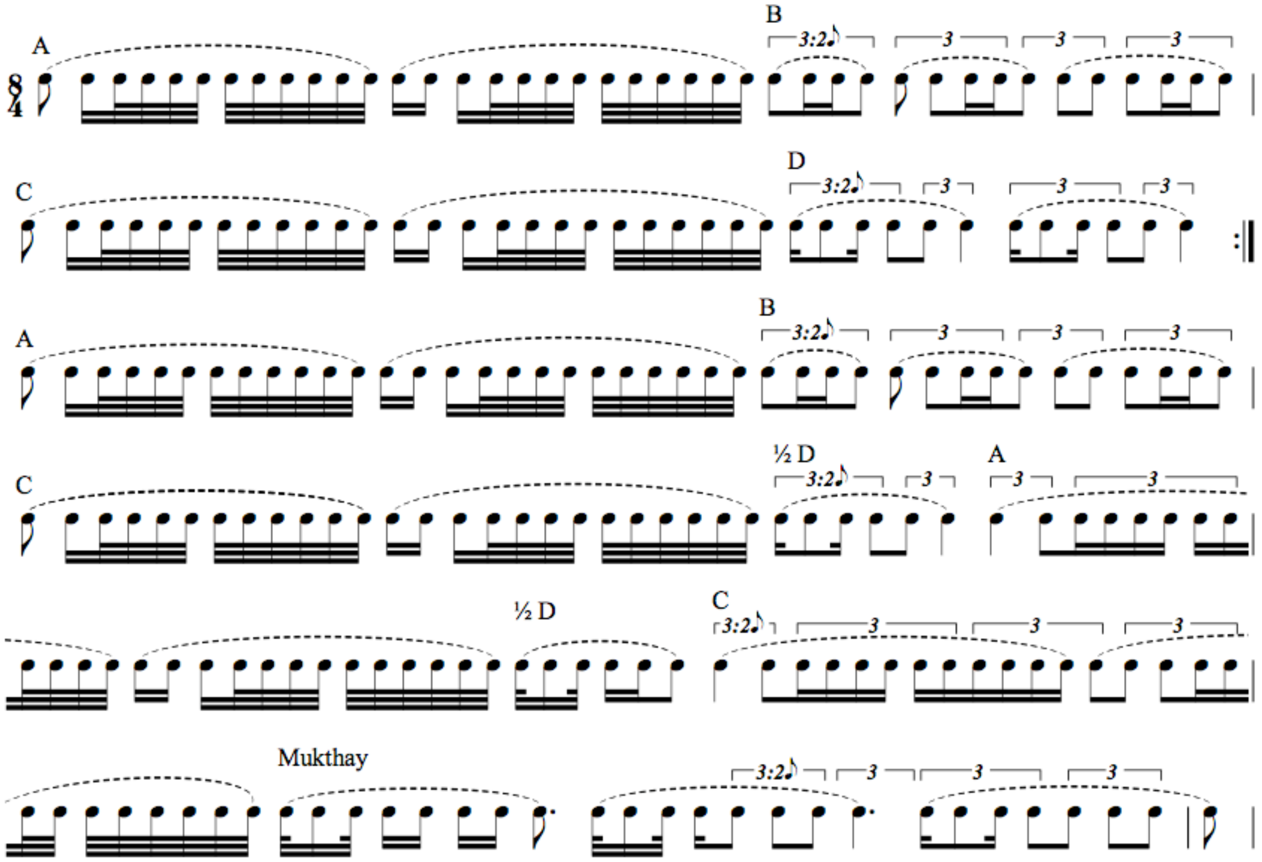
[2] *This concept will be explained in detailed in chapter 28.*

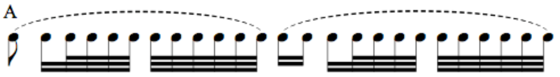
The following scheme responds to the second gati being faster than the first one:

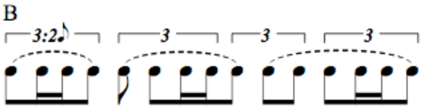
Gati 1	**Gati 2**
A	B
C	D
A	B
C	D
A	B
C	½ D A
A *(continued)* ½ D C	C *(continued)* Mukthay
Mukthay *(continued)*-----------------	---

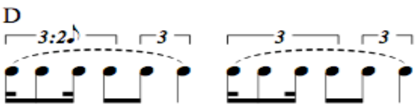
Analysis of examples

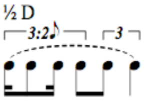
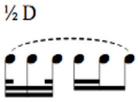
1) The first one uses gatis chatusra and tisra 1st speed in every half of Adi tala (8 beats). *(track 144)*



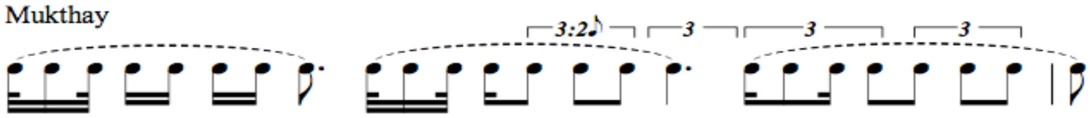
'A' and 'C' phrases are divided 8+8  . 'B' phrase, in tisra, uses three cells, with a yati phrase idea, keeping the number 4 as the central phrase in a construction 3 4 5.



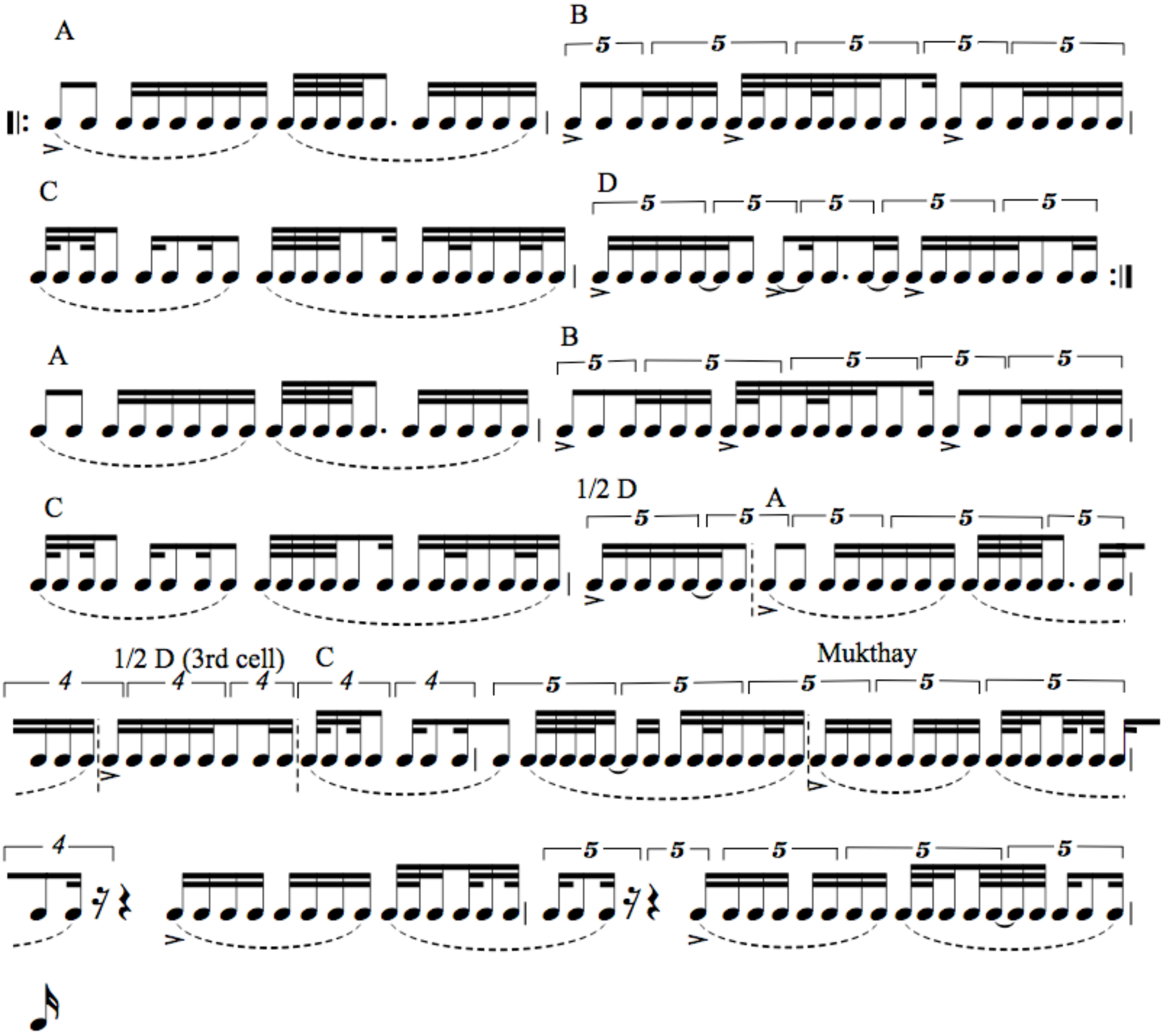
Finally, ‘D’ is divided in 6+6. 

The first ‘½ D’ takes the first cell in tisra  and the second one in chatusra .

Also, the first ‘½ D’ provokes a displacement of ‘A’ and ‘C’ phrases which are performed changing gati where this gati change takes place in the overall structure. This gati change does not imply a rupture in the phrasing; on the contrary, the phrase remains unaltered whilst the sensation for a listener is that of a tempo change. The same is true for the mukthay that also goes through a gati change in the middle of the phrase.

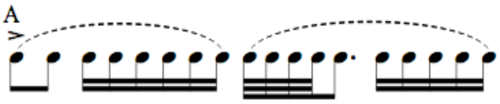

Mukthay
3:2♪
3
3
3

2) The last example of the chapter is constructed in tala 10 using chatusra and khanda in each half of the tala. *(track 145)*

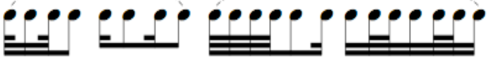

A
B
5
C
D
5
A
B
5
C
1/2 D
A
5
1/2 D (3rd cell)
C
4
Mukthay
5

‘A’ and ‘C’ phrases are built around the division of their 20 matras in two fragments of 10 matras. Furthermore, the first fragment is divided in 4+6 whilst the second one is 5+5.

A

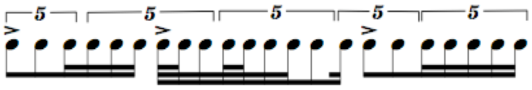


C

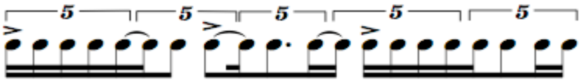


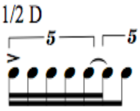
‘B’ and ‘D’ phrases, of 25 matras length, share the division in 8+8+9.

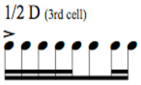
B



D

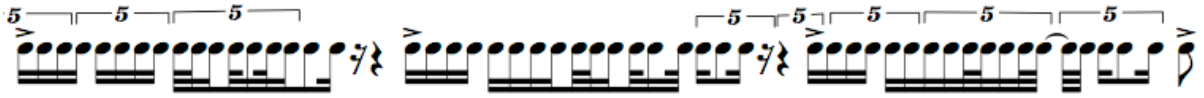


The first ‘½ D’ is played in khanda 

and the second, in the 7th cycle, in chatusra although it takes the third cell of 9 matras 

. This choice of the third cell provokes more intricate displacements in the gati changes of ‘A’ and ‘C’ phrases.

Finally, the final mukthay starts in the 7th cycle. Subsequently it goes through two gati changes.



C) *Motta Kannakku*

In karnatic music there exist two different major techniques that fall under the name or concept of motta kannakku. The translation of this Tamilian term to English is 'total calculations', which does not throw much light on their true nature.

In essence, motta kannakku is a concept where either superimposition of gatis over given frames occurs, or where the frame is shorter or longer than one beat. This short and simple definition gives birth to two differentiated and, possibly along with mukthays, the largest bodies of theory and practice of the rhythmical aspect of karnatic music: Nadai Bhedam and Combinations Anuloma-Pratiloma.

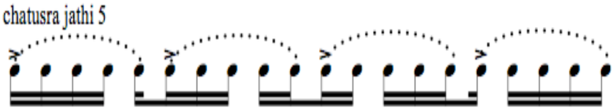
Chapter 21

NADAI BHEDAM

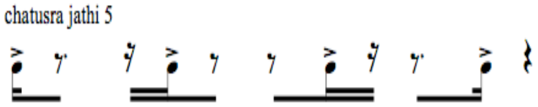
Nadai Bhedam is a technique that embodies the concept of polypulse par excellence (as opposed to the concept of using vertically two different gatis with the same jathi, as seen in chapter 3, that constitutes an 'illusion' of polypulse since the gati goes with the laya). Nadai Bhedam also uses the gati/jathi combinations as a starting point, but with a completely different goal and result than gati bhedam or anuloma-pratiloma.

In order to understand the essence of nadai bhedam, a step-by-step process of how to arrive at one will clarify the subject.

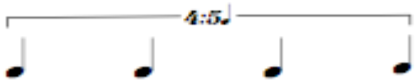
1) The first step is to go back to the very basics of karnatic rhythmical methodology and have a very clear picture of all gati/jathi combinations. For instance, if a 4:5♩ is wanted, chatusra jathi 5 will constitute this first step. *(track 146 with the first three steps)*



2) The second step is to isolate the accents, in a similar fashion to the procedure seen to obtain pratiloma speeds.



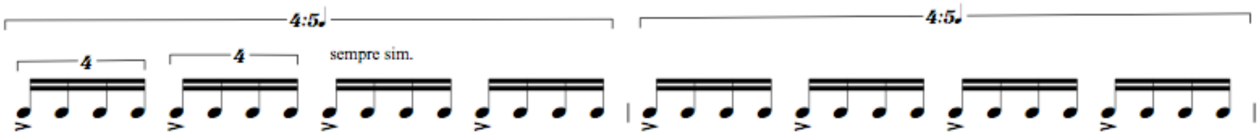
3) Thirdly, convert every accent in a ♩; since the gati gives the number of accents and the jathi provides the number of beats, the result is indeed four accents or ♩ in the time span of 5 beats.



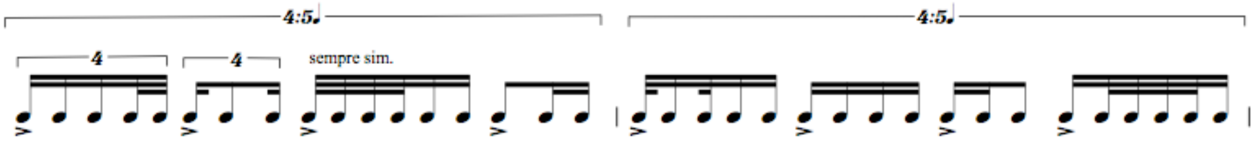
4) The next step is to superimpose any gati over every ♩ that has resulted of the isolation of the accents of chatusra jathi 5. This superimposed gati on the frame provided by the accents is called **Nadai**.

Therefore, on a 4:5♩ frame, chatusra, tisra or misra nadais can be superimposed. It is important to note that khanda will never be a nadai in a frame of 5 beats, since it would in fact be a gati bhedam.

In the example below, chatusra nadai has been chosen. In order to perform this concept, it is important to keep in mind where the accents of the chatusra jathi 5 fall in relationship to the beat. *(track 147)*



5) Finally, a phrase can be created on chatusra that will always attack every ♩ of the 4:5♩ frame.



Conceptually, nadai bhedam is **always utilised as a polypulse** and never as a continuous change of frames (the latter pertains to the 'territory' of anuloma-pratiloma combinations).

Relationship between tempi

Although any nadai bhedam is felt and performed with a clear perception of polypulse in relationship to the laya, no karnatic musician will try to find out the actual tempo that the nadai bhedam implies.

However, obtaining the tempo of a nadai bhedam frame within a western context can, eventually, be quite helpful to the performer and/or the creator. If the tempo of the nadai bhedam within the frame of 4:5♩ is sought for, all one needs to do is to multiply the tempo by 4 and divide the result by 5. If ♩=60, the tempo that every accent of the frame of 4:5♩ will produce will be 60x4=240:5=**48**. Consequently, two tempi are effectively being used simultaneously. The one of the laya (♩=60), and a second one provided by the nadai bhedam frame (♩=48).

The terminology used by karnatic musicians is quite helpful in clarifying which ♩ one is referring to, whether the one provided as a result of isolating the accents of a gati/jathi combination, or the actual ♩ of the 'metronomic' tempo.

In this context the following terms have a slightly different meaning to the way they have been used thus far:

-Gati: number of accents of the frame (since this is the original gati used to produce the frame).

-Jathi: number of beats needed to resolve the frame (the jathi always provides the number of beats).

-Nadai: the gati superimposed on the created frame.

NOTATION

In terms of notating nadai bhedam in western music, two different systems could be employed: the first one below corresponds to the process employed to build nadai bhedam and is probably easier to understand or trace back to how it originated. The second one is the result of multiplying the number of the gati by the nadai to obtain the total number of matras whilst finding a frame expressed in ♩, ♪, 𝅘𝅥𝅯 or 𝅘𝅥𝅰 that would be the closest to that number of matras: this is basically the system most globally accepted, especially since the notation of irregular groupings in early computer notation programs was conceived like this.

In spite of this, I personally think that the notation of 'double bracket', as shown in the chart below, is needed to convey the concept and use of nadai bhedam if the original gati/jathi combination is to be traced back and the nadai to be perceived as a gati in a different tempo (rather than as a complex irregular grouping). Therefore, is not only essential musically but also possible nowadays with the evolution of notation programs. In the chart below, which offers all the conceivable combinations of nadai bhedam, both notations are offered.

NADAI BHEDAM CHART

Gati	Jathi	Nadai	Western notation *(following Karnatic logic)*	Existing Notation
Tisra	4	Tisra	┌——3:4♩——┐ ⌐3¬ ⌐3¬ ⌐3¬	┌— 9:8♪ —┐
		Khanda	┌——3:4♩——┐ ⌐5¬ ⌐5¬ ⌐5¬	┌— 15:16𝅘𝅥𝅯 —┐
		Misra	┌——3:4♩——┐ ⌐7¬ ⌐7¬ ⌐7¬	┌— 21:16𝅘𝅥𝅯 —┐
Tisra	5	Tisra	┌——3:5♩——┐ ⌐3¬ ⌐3¬ ⌐3¬	┌— 9:10♪ —┐
		Chatusra	┌——3:5♩——┐ ⌐4¬ ⌐4¬ ⌐4¬	┌— 12:10♪ —┐
		Misra	┌——3:5♩——┐ ⌐7¬ ⌐7¬ ⌐7¬	┌— 21:20𝅘𝅥𝅯 —┐
Tisra	7	Tisra	┌——3:7♩——┐ ⌐3¬ ⌐3¬ ⌐3¬	┌— 9:7♩ —┐
		Chatusra	┌——3:7♩——┐ ⌐4¬ ⌐4¬ ⌐4¬	┌— 12:14♪ —┐
		Khanda	┌——3:7♩——┐ ⌐5¬ ⌐5¬ ⌐5¬	┌— 15:14♪ —┐
Chatusra	3	Chatusra	┌———4:3♩———┐ ⌐4¬ ⌐4¬ ⌐4¬ ⌐4¬	┌— 16:12𝅘𝅥𝅯 —┐
		Khanda	┌———4:3♩———┐ ⌐5¬ ⌐5¬ ⌐5¬ ⌐5¬	┌— 20:12𝅘𝅥𝅯 —┐
		Misra	┌———4:3♩———┐ ⌐7¬ ⌐7¬ ⌐7¬ ⌐7¬	┌— 28:24𝅘𝅥𝅰 —┐
Chatusra	5	Tisra	┌———4:5♩———┐ ⌐3¬ ⌐3¬ ⌐3¬ ⌐3¬	┌— 12:10♪ —┐
		Chatusra	┌———4:5♩———┐ ⌐4¬ ⌐4¬ ⌐4¬ ⌐4¬	┌— 16:20𝅘𝅥𝅯 —┐
		Misra	┌———4:5♩———┐ ⌐7¬ ⌐7¬ ⌐7¬ ⌐7¬	┌— 28:20𝅘𝅥𝅯 —┐
Chatusra	7	Tisra	┌———4:7♩———┐ ⌐3¬ ⌐3¬ ⌐3¬ ⌐3¬	┌— 12:14♪ —┐
		Chatusra	┌———4:7♩———┐ ⌐4¬ ⌐4¬ ⌐4¬ ⌐4¬	┌— 16:14♪ —┐
		Khanda	┌———4:7♩———┐ ⌐5¬ ⌐5¬ ⌐5¬ ⌐5¬	┌— 20:28𝅘𝅥𝅯 —┐

Khanda	3	Chatusra	┌ 5:3♩ ┐ ┌4┐┌4┐┌4┐┌4┐┌4┐	┌ 20:12𝅘𝅥𝅯 ┐
		Khanda	┌ 5:3♩ ┐ ┌5┐┌5┐┌5┐┌5┐┌5┐	┌ 25:24𝅘𝅥𝅰 ┐
		Misra	┌ 5:3♩ ┐ ┌7┐┌7┐┌7┐┌7┐┌7┐	┌ 35:24𝅘𝅥𝅰 ┐
Khanda	4	Tisra	┌ 5:4♩ ┐ ┌3┐┌3┐┌3┐┌3┐┌3┐	┌ 15:16𝅘𝅥𝅯 ┐
		Khanda	┌ 5:4♩ ┐ ┌5┐┌5┐┌5┐┌5┐┌5┐	┌ 25:32𝅘𝅥𝅰 ┐
		Misra	┌ 5:4♩ ┐ ┌7┐┌7┐┌7┐┌7┐┌7┐	┌ 35:32𝅘𝅥𝅰 ┐
Khanda	7	Tisra	┌ 5:7♩ ┐ ┌3┐┌3┐┌3┐┌3┐┌3┐	┌ 15:14♪ ┐
		Chatusra	┌ 5:7♩ ┐ ┌4┐┌4┐┌4┐┌4┐┌4┐	┌ 20:28𝅘𝅥𝅯 ┐
		Khanda	┌ 5:7♩ ┐ ┌5┐┌5┐┌5┐┌5┐┌5┐	┌ 25:28𝅘𝅥𝅯 ┐

Misra	3	Chatusra	┌ 7:3♩ ┐ ┌4┐┌4┐┌4┐┌4┐┌4┐┌4┐┌4┐	┌ 28:24𝅘𝅥𝅰 ┐
		Khanda	┌ 7:3♩ ┐ ┌5┐┌5┐┌5┐┌5┐┌5┐┌5┐┌5┐	┌ 35:24𝅘𝅥𝅰 ┐
		Misra	┌ 7:3♩ ┐ ┌7┐┌7┐┌7┐┌7┐┌7┐┌7┐┌7┐	┌ 49:48𝅘𝅥𝅱 ┐
Misra	4	Tisra	┌ 7:4♩ ┐ ┌3┐┌3┐┌3┐┌3┐┌3┐┌3┐┌3┐	┌ 21:16𝅘𝅥𝅯 ┐
		Khanda	┌ 7:4♩ ┐ ┌5┐┌5┐┌5┐┌5┐┌5┐┌5┐┌5┐	┌ 35:32𝅘𝅥𝅰 ┐
		Misra	┌ 7:4♩ ┐ ┌7┐┌7┐┌7┐┌7┐┌7┐┌7┐┌7┐	┌ 49:32𝅘𝅥𝅰 ┐
Misra	5	Tisra	┌ 7:5♩ ┐ ┌3┐┌3┐┌3┐┌3┐┌3┐┌3┐┌3┐	┌ 21:20𝅘𝅥𝅯 ┐
		Chatusra	┌ 7:5♩ ┐ ┌4┐┌4┐┌4┐┌4┐┌4┐┌4┐┌4┐	┌ 28:20𝅘𝅥𝅯 ┐
		Misra	┌ 7:5♩ ┐ ┌7┐┌7┐┌7┐┌7┐┌7┐┌7┐┌7┐	┌ 49:40𝅘𝅥𝅰 ┐

Regarding the chart and its usage:

1) Misra gati as a base for a nadai bhedam frame is studied by musicians but seldom performed for two reasons:

a) Any number combination produced with misra gati already exists if tisra, chatusra or khanda gatis are chosen.

b) Having seven accents restricts the phrasing possibilities quite drastically. This is possibly the most important reason, since for a karnatic musician *28:20*♪ for example, means nothing at all. These numbers could be the result of

⌐———— *4:5*♩ ————¬ ⌐———————— *7:5*♩ ————————¬
⌐*7*¬⌐*7*¬⌐*7*¬⌐*7*¬ or ⌐*4*¬⌐*4*¬⌐*4*¬⌐*4*¬⌐*4*¬⌐*4*¬⌐*4*¬

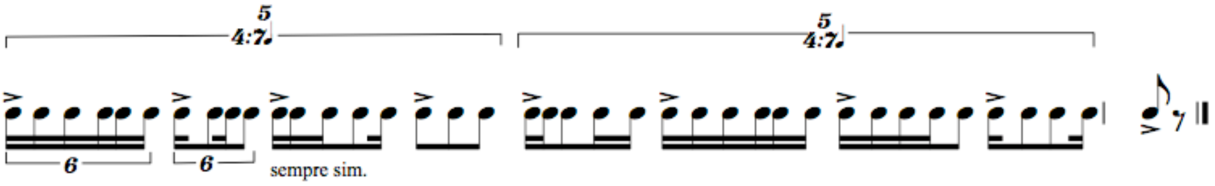
In both cases, there are 28 matras superimposed on 5♩ (or 20♪).

In the first option the feeling would be of a misra gati within a slower tempo than the pulse (♩=48 if the pulse is 60), whereas in the second case, the feeling conveyed would be of chatusra in a faster tempo than the laya (♩=84 if the pulse is 60). The disadvantage of the latter option is that the possibilities of creating elaborate chatusra nadai phrases on seven accents within 5 beats, in a much faster tempo than the pulse, are far more limited than performing misra nadai in four accents over five beats in a much slower tempo.

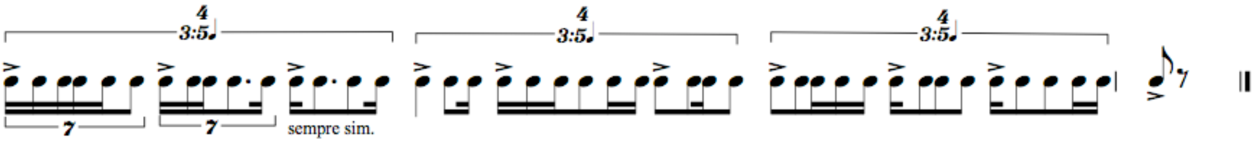
2) Tisra gati (3 accents against a frame of 4, 5 or 7 beats) can sometimes be performed as tisra 2nd speed, providing subsequently six accents instead of three.

3) A frame of 6 beats (or jathi 6) can eventually be employed, especially when using misra nadai within chatusra or khanda jathi 3.

Some examples in every gati, jathi and nadai are presented below[1]. *(tracks 148 & 149)*



(tracks 150 & 151)



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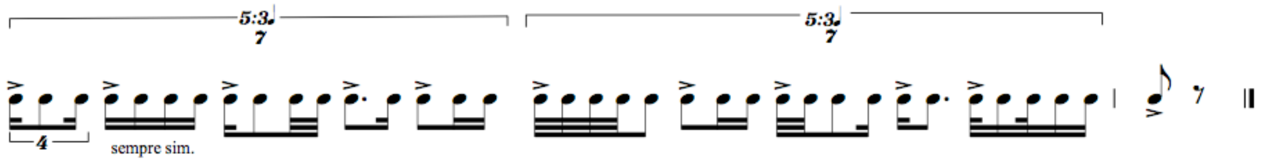
[1] *In each example, the jathi or number of beats is multiple; this does not imply that the phrase is performed simultaneously over two different frames, but simply to show that the same nadai can be part of all these frames. Every frame is recorded in a different track.*

(tracks 152 & 153)



SEQUENCE OF NADAI BHEDAM

Nadai bhedam is seldom used as a one-time occurrence. It is mostly conceived as a sequence that would rarely last less than 30 or 40 seconds, and it follows three stages – from preparation through development to resolution.

A) Preparation: The easiest, but not necessarily the most widespread method, is the one seen in the explanation of how to arrive at a nadai bhedam. The frame provided by any given number of accents (gati) within any given number of beats (jathi) is preceded by the corresponding gati/jathi combination, either using all the matras of the combination or some (not too elaborate) gati bhedam phrasing. This gati/jathi combination becomes the frame and any nadai can be superimposed[2].

The second manner is not so much preparing as 'jumping' from one element to another, usually of greater difficulty than the first option. A gati suddenly becomes the nadai of any of the possible frames where it would certainly be a nadai.

A chatusra gati could go to any of the following frames and become nadai. *(track 154)*

┌──── ***3:5♩*** ────┐
⌐***4***¬ ⌐***4***¬ ⌐***4***¬

┌──── ***3:7♩*** ────┐
⌐***4***¬ ⌐***4***¬ ⌐***4***¬

┌────── ***4:3♩*** ──────┐
⌐***4***¬ ⌐***4***¬ ⌐***4***¬ ⌐***4***¬

┌────── ***4:5♩*** ──────┐
⌐***4***¬ ⌐***4***¬ ⌐***4***¬ ⌐***4***¬

┌────── ***4:7♩*** ──────┐
⌐***4***¬ ⌐***4***¬ ⌐***4***¬ ⌐***4***¬

┌──────── ***5:3♩*** ────────┐
⌐***4***¬ ⌐***4***¬ ⌐***4***¬ ⌐***4***¬ ⌐***4***¬

┌──────── ***5:7♩*** ────────┐
⌐***4***¬ ⌐***4***¬ ⌐***4***¬ ⌐***4***¬ ⌐***4***¬

B) Development: depending on whether all the parameters remain unaltered or if there is any change.

-Development using the same three parameters:

This notion is quite common in karnatic music, since nadai bhedam is exclusively used with the purpose of creating polypulses and never as a source of rapidly changing irregular groupings.

Naturally, depending on which elements are chosen and the length of the development, the number of options can vary. For instance, if a 4:3♩ with chatusra nadai is being developed, karnatic musicians would probably perform some more elaborate techniques inside the frame than if a 5:7♩ with khanda or tisra nadais is chosen. The three options are:

---

[2] *The explanation and music examples have been shown at the beginning of the chapter.*

1) Phrasing around the accents provided by the gati/jathi combination:

In order to establish a feeling of polypulse, the 'down-beats' of the 'new' tempo need to be attacked and emphasised. The phrasing, as in gati and jathi bhedam, is always constructed around the accents of the frame.

2) Skipping accents:

This option will be used only when the feeling of the nadai bhedam has truly been established. There are only two rules to follow in order to maintain the feeling of the nadai bhedam:

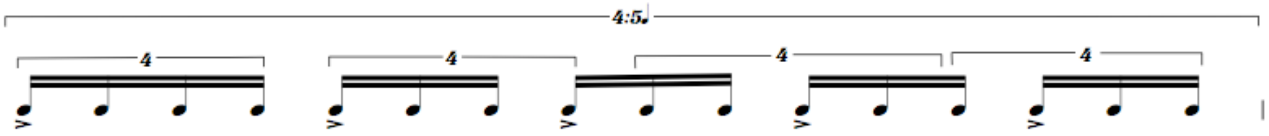
a) Never skip two accents in a row.
b) Never skip the accent that coincides with the beat (the accent that resolves the frame).

3) Applying a gati bhedam, jathi bhedam, yati phrase or mukthay to the nadai:

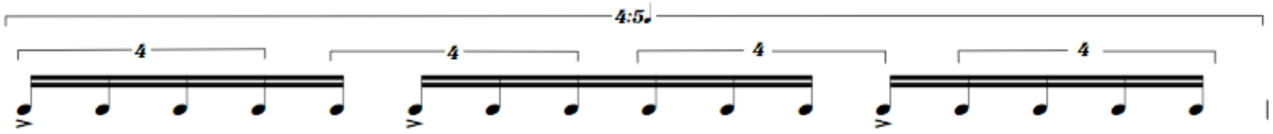
These possibilities are utilised only when the whole sequence is of considerable length and as a one-time occurrence to create tension or at a climactic point. One should not forget that all these techniques are constantly going against the beat (in this case, the beat of the nadai bhedam) and that the latter is already creating tension with the laya.

On the other hand, and possibly due to the accumulation of complex elements, the phrasing applied to any of these techniques is quite simple if used at all (the general tendency is to play all the matras in gati and jathi bhedam while emphasising the regular or irregular accents derived from these techniques and, perhaps use some ♪ in yati phrases and mukthays).

a) Applying gati bhedam: except for a few exceptions, a gati bhedam will need to start off the first accent of the frame. In the example below, the first 4 matras of the frame are played in regular nadai bhedam fashion and a chatusra jathi 3 is applied from the second accent (chatusra jathi 3 needs four accents in three beats - in this case the 3 'beats' of the nadai bhedam frame). *(track 155)*

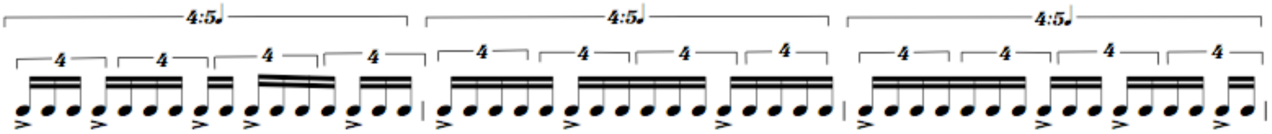


b) Applying jathi bhedam: since the sequence needs to be short to fit into one frame, the jathi bhedam would necessarily start on the first accent. The numbers used in the example are 5 6 5. *(track 156)*

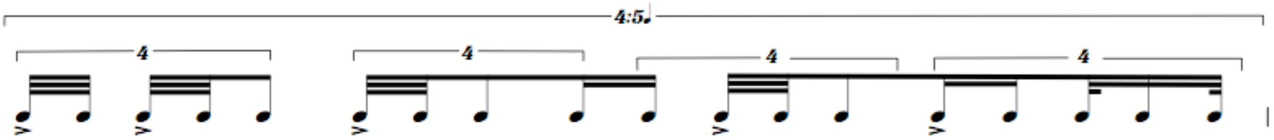


Eventually a short sequence of two or three different jathi bhedam sequences can succeed one another, provided that they always start on the first accent. The following three frames take different numbers, but always 'resolve' at the end of the frame: *(track 157)*

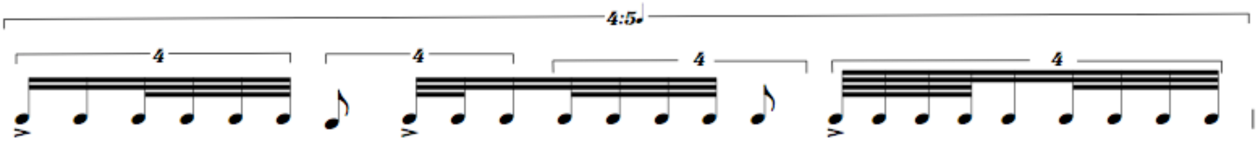
3 4 2 4 3 5 6 5 7 3 4 2



c) Applying yati phrase: simple phrasing, with some 𝅘𝅥𝅯 or ♪ to create certain variety and a feeling of phrasing. In the example below the sequence starts with 1 matra and it is increased by two matras in every pala, without gaps: 1 3 5 7 *(track 158)*



d) Applying short mukthays: as with yati phrases, some simple phrasing is created, in the case of the mukthay to create the perception of a phrase repeated three times. The structure is 4 (2) 4 (2) 4. *(track 159)*



-Development changing one of the parameters:

Prior to explaining the three different options, an important observation should be made: before any change is applied to a parameter, **a minimum of three 'brackets' or frames with the same parameters have to be played**. This 'golden' rule of nadai bhedam was created precisely to avoid rapid changes that would consequently decrease, or altogether lose, the feeling of polypulse[3].

1) Changing the nadai:

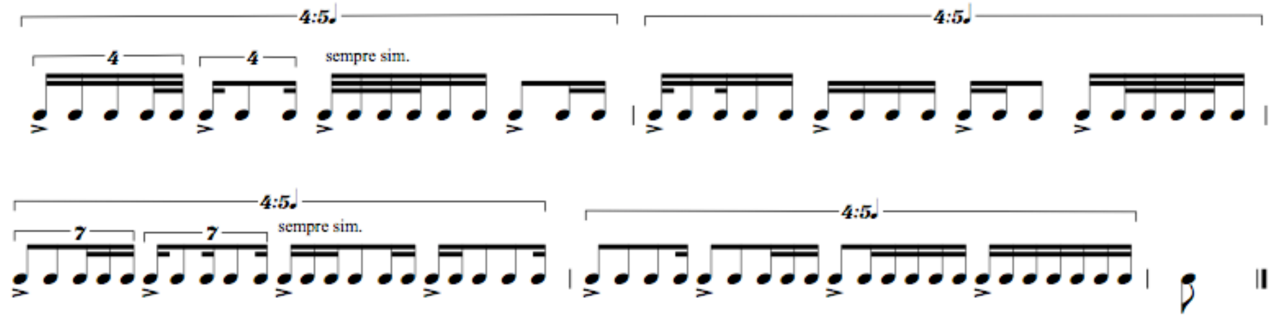
The option most frequently used since the 'tempo' provided by the frame remains intact; it would be the equivalent of a gati change within the pulse. There are no calculations required or any feeling of tempo change.

The example below goes from

⌐———*4:5*♩———¬ ⌐———*4:5*♩———¬
⌐*4*¬⌐*4*¬⌐*4*¬⌐*4*¬ to ⌐*7*¬⌐*7*¬⌐*7*¬⌐*7*¬ *(track 160)*

---

[3] *The examples given for the three possibilities utilise only two frames per gati/jathi/nadai option; this is simply for the purpose of providing examples, and should never be taken as a real possibility while developing a nadai bhedam sequence.*

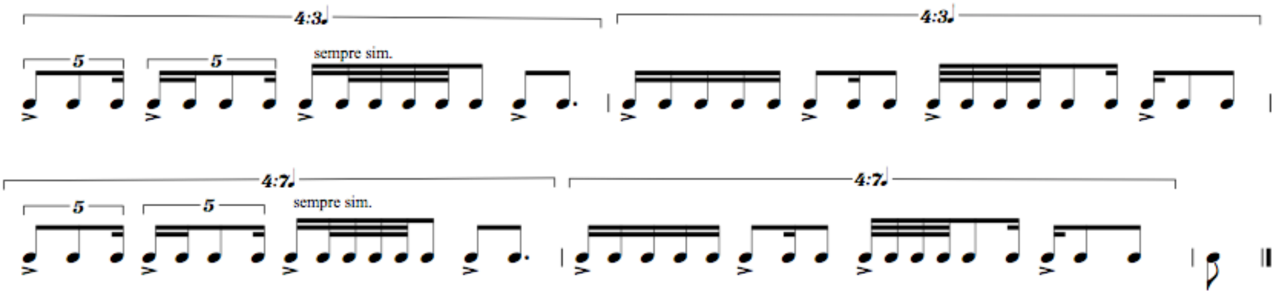

4:5♩.
4
4
sempre sim.
4:5♩.
4:5♩.
7
7
sempre sim.
4:5♩.

2) Changing the number of beats (jathi):

In this option the feeling of a sort of 4/4 metre remains (if chatusra gati is used for the frame, 3/4 and 5/4 if tisra and khanda), but the inner tempo of the nadai bhedam changes. The gati and nadai remain but the period over which the nadai is performed is modified.

The elements used below are

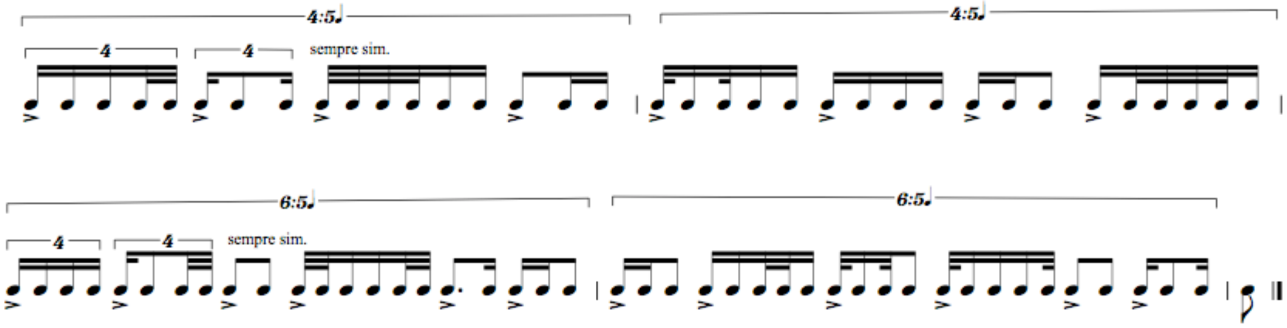
⌐——4:3♩——¬ ⌐——4:7♩——¬
⌐5¬⌐5¬⌐5¬⌐5¬ going to ⌐5¬⌐5¬⌐5¬⌐5¬ *(track 161)*


4:3♩.
5
5
sempre sim.
4:3♩.
4:7♩.
5
5
sempre sim.
4:7♩.

3) Changing the number of accents (gati):

This possibility is used more rarely, since the nadai and number of beats remain, but the change in the number of accents produces a change in the tempo of the nadai bhedam and in the 'inner metre' resulting from the number of accents.
Going from four to six accents, as in the example below, demands a greater ability than the other two options.

⌐——4:5♩——¬ ⌐——6:5♩——¬
⌐4¬⌐4¬⌐4¬⌐4¬ goes to ⌐4¬⌐4¬⌐4¬⌐4¬⌐4¬⌐4¬ *(track 162)*


4:5♩.
4
4
sempre sim.
4:5♩.
6:5♩.
4
4
sempre sim.
6:5♩.

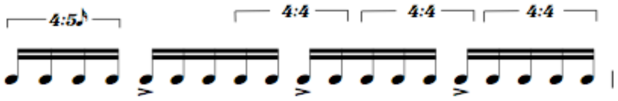
C) Resolution: the sequence needs to have a clear ending. It would never resolve on a tala sam without one of the following three options:

1) Using gati bhedam in a number of accents of the frame:

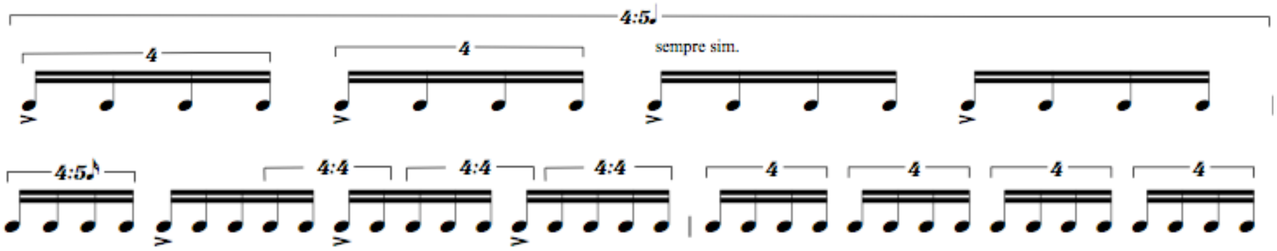
Usually there is a shift in the last two or three accents of the frame from the nadai to the gati bhedam that created the frame. For instance, in a frame of

┌———— *4:5♩* ————┐
⌐*4*¬⌐*4*¬⌐*4*¬⌐*4*¬

only the first and, perhaps, second accents will use the chatusra nadai to give way to a regular chatusra jathi 5 that would go along the pulse. The way to feel this shift would be as if changing from chatusra nadai to khanda nadai in the chosen accent. But, in reality, what happens is that the performer reverses the process that propitiated the frame: if in order to prepare a 4:5♩ frame, chatusra jathi 5 was used to provide the number of accents within the five beats, in the resolution, the chatusra jathi 5 is used to pave the way to return to the pulse. The position of accents does not change, but the performer must feel the 'khanda nadai' that is, in reality, the chatusra gati that goes with the laya, accented every five matras. If only one ♩ of the 4:5♩ frame uses the nadai, then there would remain three accents of chatusra jathi 5.



The best way to notate it would be by taking one frame of 4:5♪ if the nadai is superimposed on only one accent. Afterwards, the number of matras that do not complete one beat should be left without any bracket and then the bracket of 4:4 should be used, as explained for gati and jathi bhedam concepts, for the remaining beats until the chatusra jathi 5 resolves on a beat (usually a tala sam). *(track 163)*



2) Using a mukthay:

As has been explained at various points throughout the book, karnatic musicians are fond of finishing most musical events with a mukthay. Nadai bhedam sequence is no exception. However, if the musician knows in advance that he will end the sequence with a mukthay, he would rarely use this possibility while developing the sequence.[4]

3) Returning to the pulse:

In this option, whichever nadai has been used for the last frame becomes the gati of the laya. Once again, it is the sort of 'jumping' that was explained under preparation, but here the process is reversed and the musician 'jumps' from the tempo of the nadai bhedam to the metronomic tempo without any intermediate step. Therefore, nadai becomes gati. *(track 164)*

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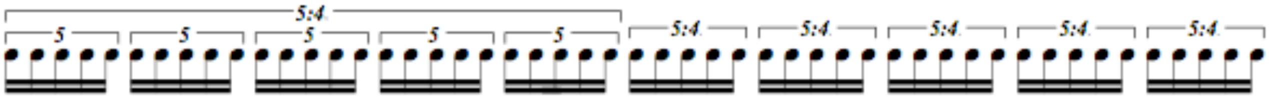
[4] *See the example above for calculations and framework.*



THE RELATIONSHIP OF NADAI BHEDAM TO TALA STRUCTURE

When karnatic musicians employ nadai bhedam and beforehand decide not to change the number of beats (changes of nadai or number of accents-gati- will not influence any calculations), they tend to use a number of beats (jathis) that will fit quite comfortably with the tala.

1) The first and most obvious choice is to take a number of beats for the nadai bhedam frame that is the same or a multiple of the number of beats in the tala. In this manner, every two to four brackets, the nadai bhedam meets the tala sam (eventually even every cycle). For instance, for tala 10 a frame of 5 beats could be chosen, for tala 7 or 14 a frame of 7 beats etc.

2) The second option is to choose a number of beats in the nadai bhedam frame that would create a simple numerical relationship with the tala. In this regard, even numbered talas are easier to work with if 4 or 5 beats are chosen for the frame (only a few repetitions are required to meet a tala sam).

Three beat frames do not function so well with many talas (except for talas that are a multiple of 3, and possibly tala 8). The choice of 7 beats, except when used with tala 7 or 14, implies very long fragments of the nadai bhedam frame before it meets any tala sam.

3) The third option is when there is a change in the number of beats. When this is the case, calculations are required, although karnatic musicians have an amazing capacity to see the whole structural 'puzzle' in their minds while performing.

The following transcription is an example of a sort of 'tree' of nadai bhedam in a tala of 14 beats in which phrasing within the nadai alternates with all the possible parameter changes aforementioned. The steps of the sequence are:

-Khanda x 5 b.
-Khanda nadai in 5:4♩. x 4=16 b.
-Chatusra nadai in 5:3♩. x 4=12 b.
-Tisra nadai in 5:7♩ x 4=28 b.
-Khanda nadai in 5:4♩ x 3=12 b.

-Khanda jathi 4 x 2=8 b.
-Khanda nadai. in 5:3♩. x 5=15 b.
-Chatusra nadai. in 5:7♩ x 4= 28 b
-Tisra nadai in 5:4♩. x 4=16 b.
-Khanda x 14 b.

A few remarks about the notation and use of nadai bhedam in this transcribed sequence:

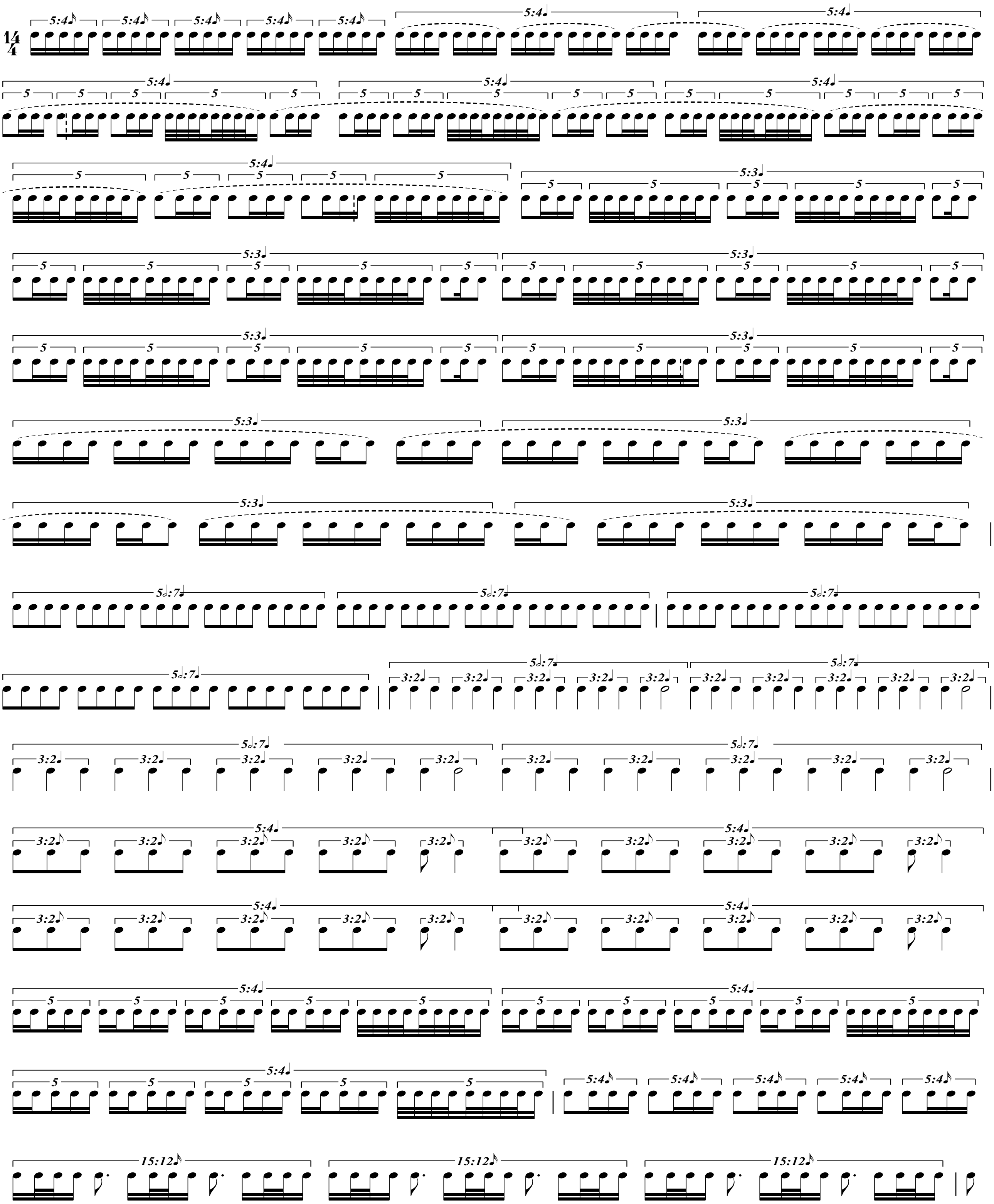
-The notation of the second step, khanda jathi 4, does not conform to the notation proposed in previous chapters. Here this notation has been chosen to show how the gati/jathi combination is the source of the frame of 5:4♩.

-No change of parameter occurs before the same elements have been performed at least four times.

-The sequence is resolved by 'jumping' from khanda nadai in 5:4♩ into regular khanda, but a final mukthay follows suit. Again, a different notation has been chosen for the mukthay so the phrase can be clearly seen.

-Lastly, and as was the case in the tree of gati bhedam of chapter 5, the number of repetitions of a frame has an influence on the 'cell construction' that is repeated as a sort of polyrhythm within the nadai bhedam frame. *(track 165)*

Nadai bhedam sequence in Tala 14 (L5 L5 D D)



Consequently, it can be observed that when many changes occur in a sequence of nadai bhedam, there is not a real 'concern' with, or need to know how many times the first accent of a bracket will coincide with a tala sam. Usually, this meeting happens sporadically. However, this example is quite an exception in the use of nadai bhedam in karnatic music; the tendency is to stay as long as possible within the same parameters and, eventually, change the nadai and, very once in a while, any of the other two parameters.

RELATIONSHIP BETWEEN LAYERS

In karnatic music, a sequence of nadai bhedam can be performed by all the musicians in a sort of 'structural' unison (this unison does not necessarily mean that all musicians play the same phrases but, rather, that the same frames will be used by all performers). This is the case in fully composed pieces (as in a form named *Varnam*) or segments of pieces.

However, the most recurrent usage is when one layer (performed by either one or several musicians) realises the nadai bhedam sequence and another layer plays along the pulse, trying to convey the feeling of this pulse, even if the pulse is also shown by the tala keeper. The phrasing of the layer creating the pulse goes necessarily with the beat and, as was the case with the sequence of nadai bhedam itself, skipping beats or creating short sequences of gati/jathi bhedam or other techniques can occur depending on the length of the sequence and only when both pulses have been clearly established.

There will always be a relationship (common denominator) between the choice of elements in the nadai bhedam and the laya. There are two reasons for this:

-Firstly, in order to avoid any feeling of randomness, if the nadai bhedam layer is performing

┌———— ***4:3♩*** ————┐
⌐***5***¬ ⌐***5***¬ ⌐***5***¬ ⌐***5***¬

the other layer would never perform any material in tisra or misra gati, since none of these gatis hold any relationship to either the original gati that was used to create the frame or the nadai.

-Secondly, to avoid situations like the following one:

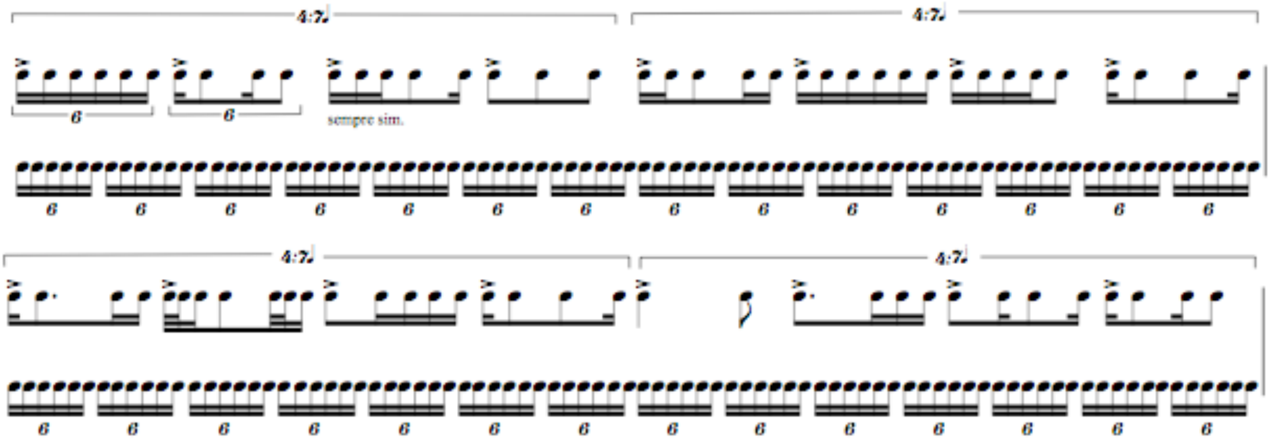
If the previous frame/nadai is played, it will result in 20 matras within three beats. If misra is played along the beat, this layer will be using 21 matras in three beats. Even though one layer is conveying a feeling of khanda within a faster tempo and the other layer is playing with a feeling of misra within the pulse, the extreme proximity of both layers in terms of number of matras being performed can cause (quite) some confusion and the feeling of polypulse could easily vanish.

In the following short examples, the two options that the laya has to choose from are presented. These two options are the result of applying the following principles:

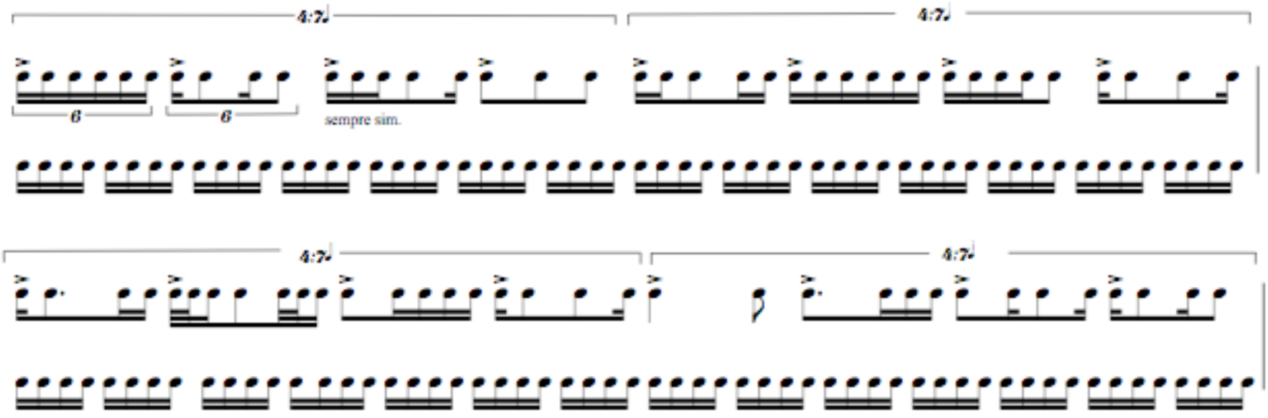
1) Laya utilises as a gati the **same number** as the nadai. Therefore, if the layer of nadai bhedam is performing

┌———— ***4:7♩*** ————┐
⌐***6***¬ ⌐***6***¬ ⌐***6***¬ ⌐***6***¬

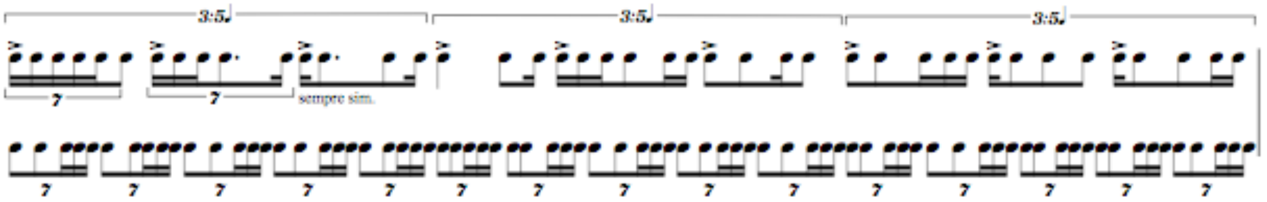
the other layer would perform tisra gati. *(track 166)*


4:7
4:7
6
6
sempre sim.
4:7
4:7

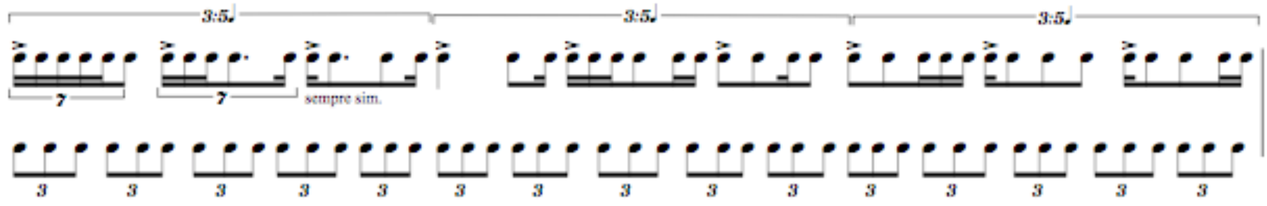
2) Laya stays in the **gati that originated the number of accents** for the frame. If the same case as above is taken, the layer performing along the pulse would employ chatusra gati. *(track 167)*


4:7
4:7
6
6
sempre sim.
4:7
4:7

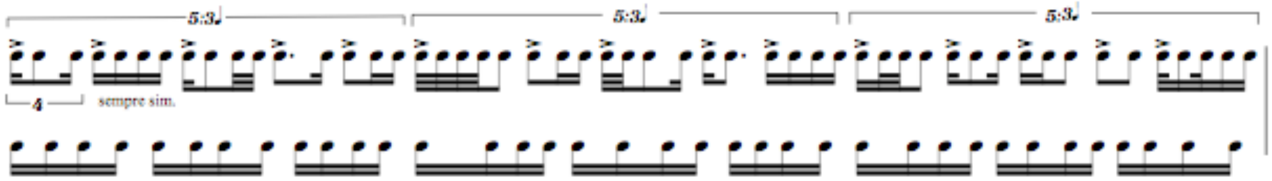
In the next two examples the laya first uses misra gati (same number as the nadai), and then tisra (the gati that originated the frame). *(track 168)*


3:5
3:5
3:5
7
7
sempre sim.

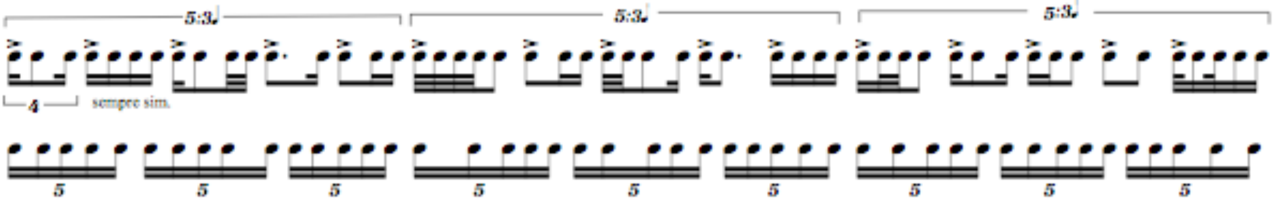
(track 169)


3:5
3:5
3:5
7
7
sempre sim.

The final two examples follow the same patterns: in the first one the laya uses chatusra (same number as the nadai), while the second example utilises khanda as it was the gati that propitiated the frame *(track 170)*



(track 171)

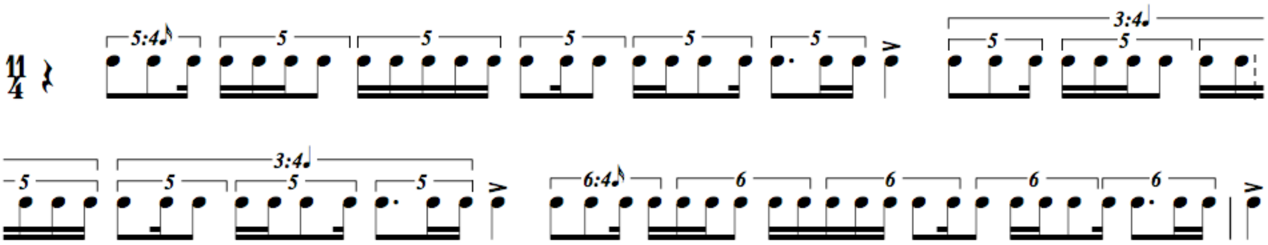


NADAI BHEDAM IN 3-FOLD MUKTHAYS

One of the few contexts where a nadai bhedam frame would happen just once, is as a fourth possibility within the 3-fold mukthays concept.

The choice of number of accents (gati) for the frame will depend of the number of beats used for the construction of the original phrase, and the nadai will be the same number as the gati employed for that phrase.

In the example below, the phrase has been constructed on six beats of khanda. Therefore, the number of accents could be three or six and the nadai would be khanda. The last parameter (the number of beats of the frame) would be chosen depending on how the whole calculation fits into the tala, as well as the desired musical effect. If 3:4♩ is taken, the result will be a phrase sounding slightly slower than the original phrase, whereas if 3:7♩ is taken, the phrase will sound much slower. *(track 172)*



PRACTICE METHOD

1) Anyone attempting to perform this technique must have mastered previously all the gati/jathi combinations and be able to visualise, as well as feel, where the accents of each one of them fall in relation to the beat. This becomes indeed a sine qua non condition to face the world of nadai bhedam, especially since mastering nadai bhedam is the key to practice combinations anuloma-pratiloma with greater understanding and confidence[5].

2) Start isolating the accents and turn every accent into a ♩ within the frame provided by the combination as shown at the beginning of the chapter.

To start with, the frames below seem to be more advisable because they are easier to internalise.

-4:3♩ -4:5♩ -3:4♩ -3:5♩ -5:3♩ -5:4♩ -6:4♩

In an ulterior stage the remaining frames should be added.

-4:7♩ -3:7♩ -5:7♩ -6:5♩ -6:7♩

Frames in misra gati (7:3♩, 7:4♩ and 7:5♩) are possibly best left aside for reasons already given in the chapter, although musicians could eventually dedicate some time to them at a late stage of the learning process.

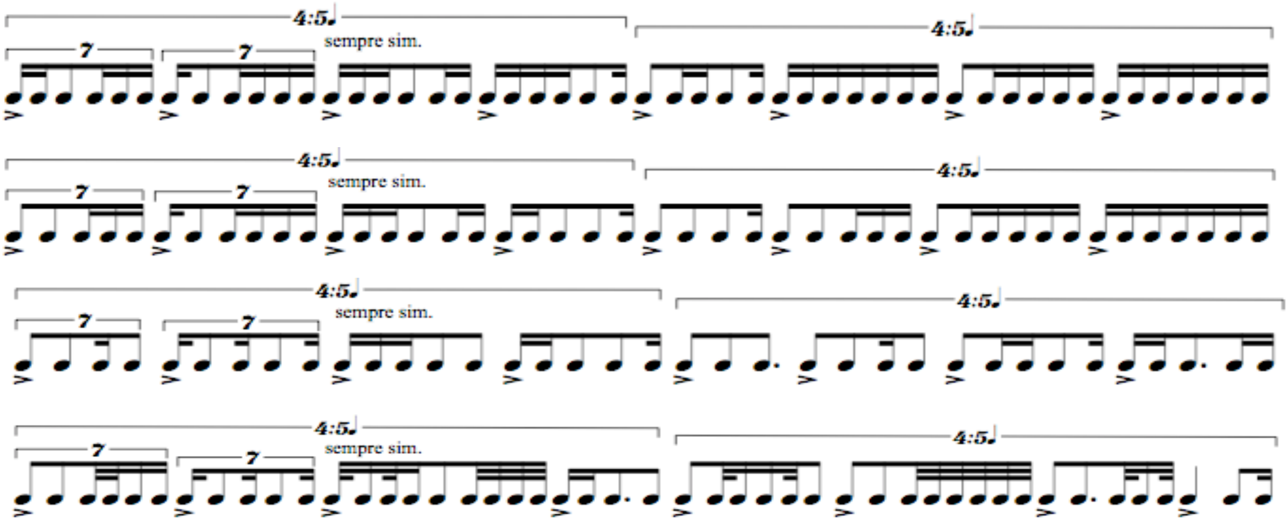
3) Alas, there are no 'magic recipes' or short cuts to superimpose nadais to the previous frames. In the same way all musicians learn how to fit 3, 4, 5 or 7 matras within a beat in the very early stages of rhythmical music education - that is, by intuition and repetition-, one needs to simply repeat the matras of all nadais in all of the frames until one intuitively feels the spacing between matras within a given frame. A great help could be to begin with a computer music program that would give the beat, the accents of the frame and all the matras of the superimposed nadais so that, by listening to them, one can become more familiarised with the different proportionalities that every frame/nadai combination provides and the relation of specific matras to the beat and the jathis[6].

In the early stages of practicing nadai bhedam, it is necessary to focus on achieving absolute precision with all the matras of the nadai and not to attempt to start performing phrases. It is of utmost importance that the feeling of every frame/nadai relationship is fully internalised.

4) Once all the frame/nadai relationships of the first seven frames suggested previously have been internalised, one can start creating phrases of great simplicity (some ♪ or two 𝅘𝅥𝅯 replacing a ♪ are possibly the best note values to start with) and, step by step, add longer note values and syncopations of ♪ and 𝅘𝅥𝅯 combinations. Phrasing against the background of a computer that provides a 'mattress' for all the matras of the nadais is the safest manner to avoid losing the feeling for the matra spacing within a frame. The following four examples, present an increasing level of difficulty, using the same frame and nadai.

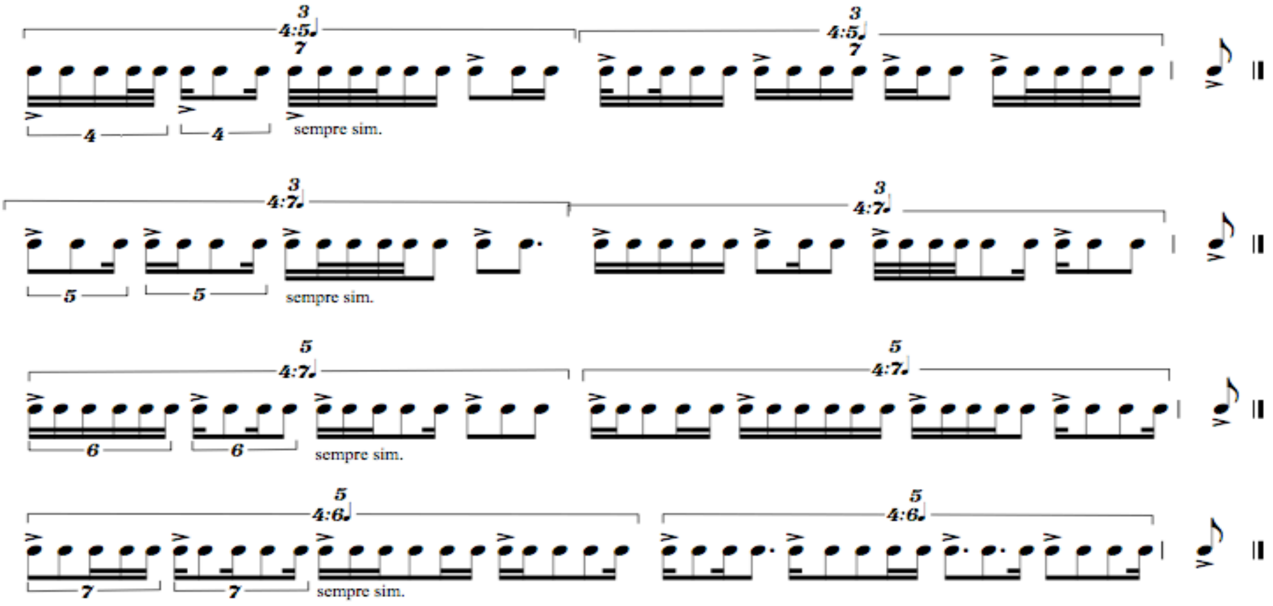
---

[5] *This chain is probably one of the backbones of the whole text and its pedagogical applications: mastering gati/jathi combinations is key to perform nadai bhedam. Nadai bhedam is absolutely essential to gain control over combinations anuloma-pratiloma, while, mastering the latter will enable any performer to perform complex rhythms with much clearer understanding and feeling.*


4:5♩.
7
7
sempre sim.
4:5♩.
4:5♩.
7
7
sempre sim.
4:5♩.
4:5♩.
7
7
sempre sim.
4:5♩.
4:5♩.
7
7
sempre sim.
4:5♩.

5) The musician should alternate performing phrases with and without a computer aid (that is, using the metronome as the sole reference point). At some stage, the musician should eliminate the computer aid and perform all phrases exclusively with the metronome or with someone 'conducting' or keeping the tempo.

Phrases in tisra should first be practiced with 3 accents per frame before proceeding to practice them with 6.


3
4:5♩
7
4
4
sempre sim.
3
4:5♩
7
3
4:7♩.
5
5
sempre sim.
3
4:7♩.
5
4:7♩.
6
6
sempre sim.
5
4:7♩.
5
4:6♩.
7
7
sempre sim.
5
4:6♩.

6) Once these (or similar phrases) are performed with complete confidence, the following step is to implement the three different options of parameter changes explained in the development of a sequence of nadai bhedam. At a very early stage, the phrase should be preceded by performing all the matras of the nadai[7].

---

[6] *A 'karnatic metronome' providing these three elements can be found in the audio files link.*

[7] *For examples of every technique, one can refer to the examples given in that section of the chapter (pages 173-174) and proceed to work out more exercises with the same notions and with all the possibilities.*

a) Keeping the number of accents (gati) and number of beats (jathi), go through all the possible nadais without interruption (three options per frame).

b) Keeping the number of accents (gati) and nadai, go through all the possible number of beats where the nadai would stay as such and not as gati bhedam (usually two, sometimes three options per combination of number of accents/nadai).

c) Keeping the number of beats (jathi) and nadai, go through all the possible number of accents where the nadai would stay as such and not as gati bhedam (usually two, sometimes three options per combination of number of beats/nadai).

Chapter 22

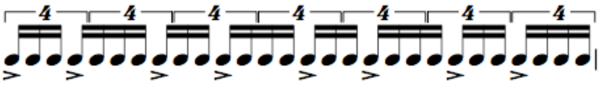
MIXED JATHI NADAI BHEDAM

Mixed Jathi Nadai Bhedam is a technique whereby two different accents alternate systematically whilst a constant nadai is superimposed on each frame provided by the accents. These two accents (mixed jathi) could be any combination of the numbers 3, 4, 5, 6 and 7[1]. Some combinations will create longer sequences than seven beats, the longest seen so far in techniques where a systematic accent has been used (gati/jathi combinations, gati bhedam and nadai bhedam).

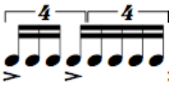
Pedagogically and creatively, this device lays a bridge between the politempi concept of nadai bhedam and the vast and complex world of anuloma–pratiloma combinations. By using two different accents, any feeling of creating a different pulse vanishes, because the nadai feels as though the tempo is changing continuously. However, by using only two accents (versus the wide array of possibilities that will be presented in anuloma–pratiloma combinations), this technique provides the performer with a clear anchor in order to perform the nadai in any position within the beat, something that will become essential when the chapter of combinations anuloma-pratiloma is considered.

All the available combinations and the number of resulting beats are:

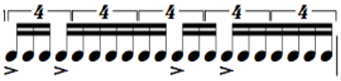
Combination	**Number of beats needed to resolve**
-3+4	7 beats



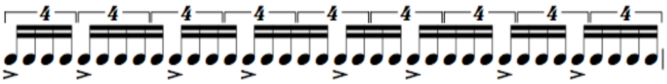
-3+5	2 beats



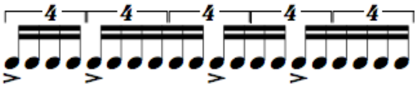
-3+7	5 beats



-4+5	9 beats



-4+6	5 beats



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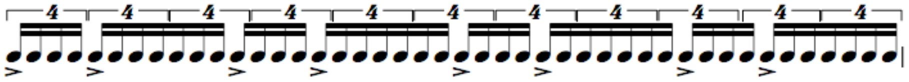
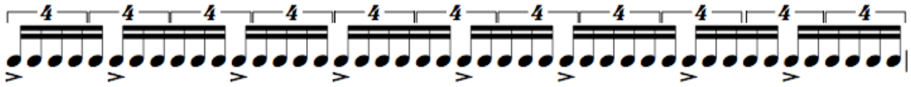
[1] *Except for the combination 3+6 as they are multiple of one another*

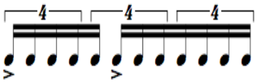
-4+7 11 beats



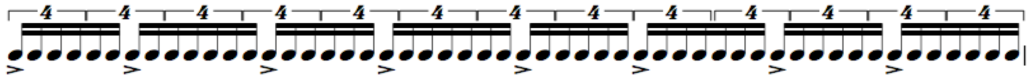
-5+6 11 beats



-5+7 3 beats



-6+7 13 beats



As can be seen, adding up the two accents does not necessarily result in the required number of beats. In the case for instance of 3+5, the sum of these two numbers would produce 8 matras that in chatusra equals two beats.

In the chapter on nadai bhedam, tisra and khanda were used as the initial gati that propitiated a frame for a nadai bhedam. In the case of mixed jathi nadai bhedam, although theoretically possible (and in fact used sporadically by some very good musicians), this notion is rarely used. All frames take chatusra as the underlying gati over which the nadai is superimposed.[2] Therefore, since the underlying gati is chatusra, all mixed jathi nadai bhedam segments will have four double accents, except for the singularities seen above:

-3+5= 8 matras (one double accent in 2 beats)
-3+7=10 matras x 2= 20 matras (two double accents in 5 beats)
-4+6=10 matras x 2= 20 matras (two double accents in 5 beats)
-5+7= 12 matras (one double accent in 3 beats)

The following are two examples of several nadais superimposed on the frames of 3+4 and 5+7. It can be observed that every nadai always starts displaced within the beat; this was also the case with nadai bhedam; the main difference is that in the latter, the accents derived from a gati/jathi combination provided a regularity that enabled the musician to visualise accents whilst simultaneously feeling a different tempo.

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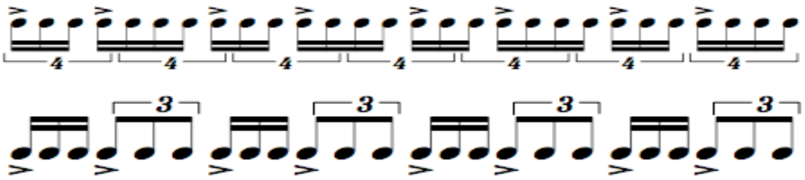
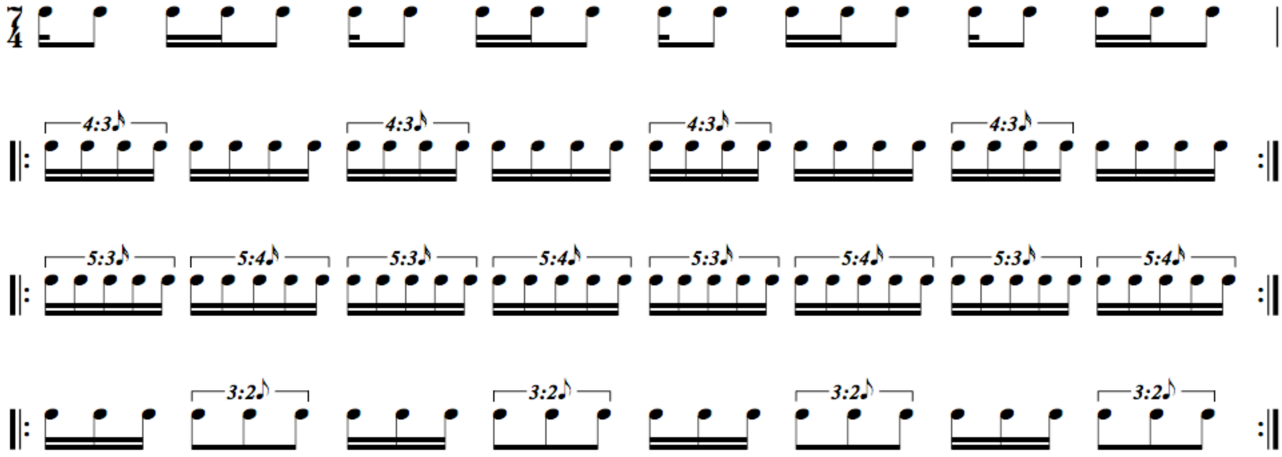
[2] *If one analyses any score of complex western contemporary music, it will be realised that, for instance, an 11:13𝅘𝅥𝅯 or a 21:20𝅘𝅥𝅯 will be the result of either a prime number (11) or the multiplication of two numbers (21), which, in karnatic thinking will always be the result of multiplying the gati by the nadai. But the frame of 13𝅘𝅥𝅯 or 20𝅘𝅥𝅯 in both examples always expresses a number of 𝅘𝅥𝅯 (or eventually ♪) in an underlying chatusra gati.*

However, in mixed jathi nadai bhedam, every nadai displaced within the beat has been preceded by the same nadai in a different frame, also displaced within the beat.

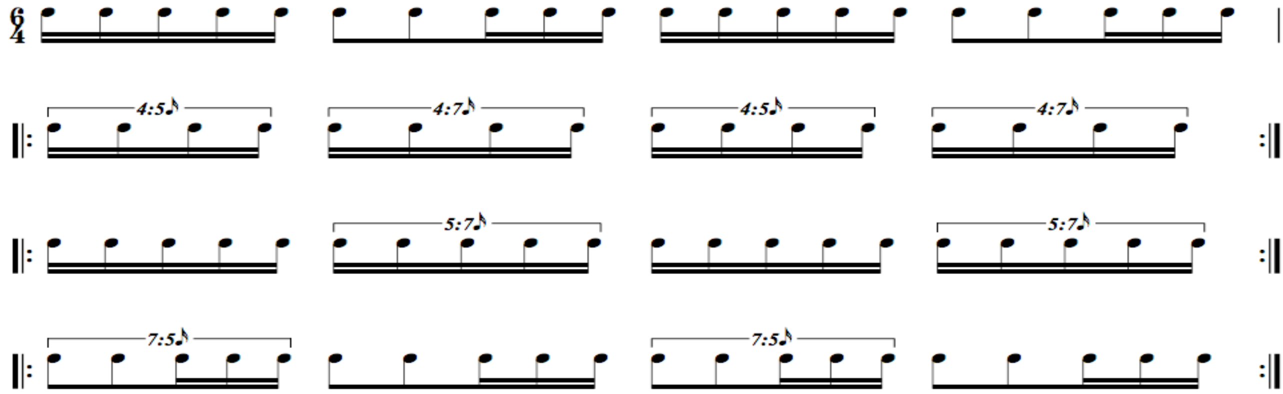
The first line is the laya of chatusra with the double accent 3+4. The second line is tisra nadai superimposed. This implies that tisra actually is chatusra jathi 3 within the first frame and then a regular 3:4♪ within the second frame[3].



Two transcriptions follow on the double accent 3+4 and on 5+7 using several nadais *(track 173)*



(track 174)



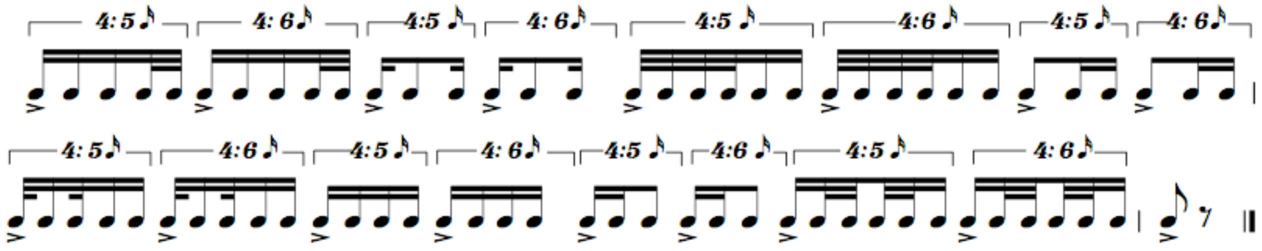
Once the mechanics of constructing a mixed jathi nadai bhedam are clear, the next logical step is to phrase with the chosen nadais.

Here there are four examples of phrasing, one per nadai.

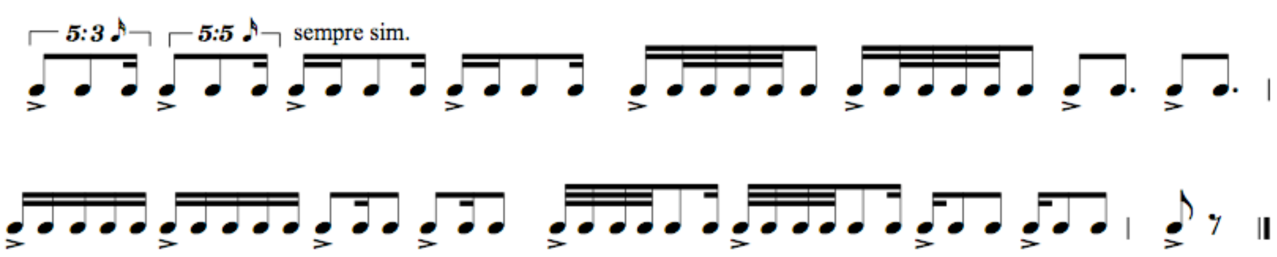
---

[3] *In every mixed jathi nadai bhedam there will always be two nadais that would actually be chatusra taking a jathi.*

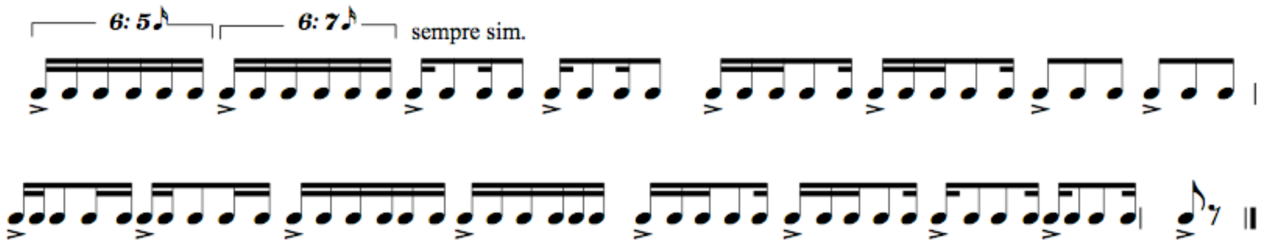
-The first one takes the double accent of 5+6, which results in eleven beats, and chatusra nadai superimposed. *(track 175)*



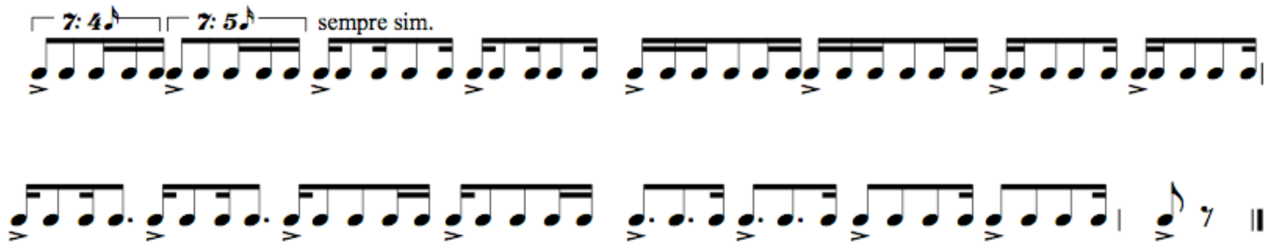
-The second example uses khanda nadai on the double accent of 3+5. As seen before, the nadai is actually a chatusra jathi 5 when used in a frame of 5 matras, whilst it is a 5:3♪ in the other frame. *(track 176)*



-In the third example, tisra nadai is superimposed on the double accent of 5+7 *(track 177)*

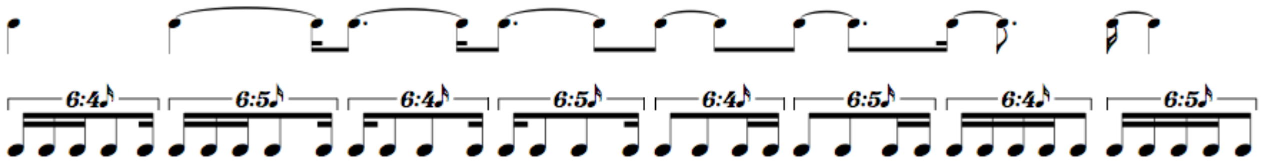


-And in the last example, misra nadai is used over the frames provided by the double accent 4+5. *(track 178)*



Many a times, the notation could make it difficult for a performer to know where he is within the beat. A notational solution for this problem could be to provide a line above the phrase that indicates the length of the frame and indicates its position within the beat, so that the performer knows the starting point of every frame within the beat.

The following example uses the double accent 4+5 with tisra nadai.

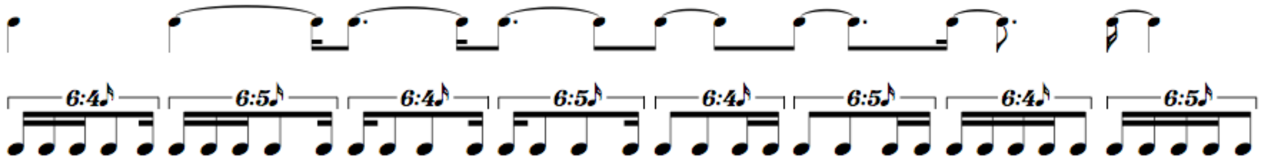


CREATIVE USE

As opposed to a sequence of nadai bhedam, which could be quite elaborate, with precise steps, and it could be as long as three or four minutes of music, mixed jathi nadai bhedam tends to be a short passage in only one layer with no preparation or resolution.

The main element in this device is that **every phrase is always repeated** (eventually ornamented) **in both frames**. There is never a continuous development of phrases through the alternating accents. Karnatic musicians think that a continuous development of phrasing would completely obscure the different frames and that the feeling to be achieved of a continuous change of tempo would be lost. However, at the same time, this continuous repetition of a phrase in both frames could easily become predictable or too repetitive; therefore, this device is used sporadically in a piece and is never a long segment of music.

The other important aspect to remark is, as was the case when the tree of gati bhedam was explained in the chapter of rhythmical sangatis,[4] a segment of mixed jathi nadai bhedam can start on a point other than a beat, as long as it resolves on a tala or anga sam. If the example above is taken



the starting point could also be the second matra of the third beat, the third matra of the fifth beat or the fourth matra of the seventh beat.

Needless to say at this point of the text, that for a mixed jathi nadai bhedam to be considered as such, no less than three double accents are required. Subsequently, the last two starting options could exclusively be used if the whole segment were to have at least five or six double accents (those just explained plus an entire structure of 4+5).

PRACTICE METHOD

Mixed jathi nadai bhedam is a technique that paves the way to the more complex and elaborate concepts of combinations anuloma-pratiloma. In essence, it is not entirely different from nadai bhedam's developmental technique when the gati and nadai remains, but the number of beats change. The difference is that this change is happening continuously.

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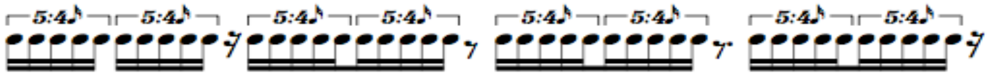
[4] *Where a regular phrase in chatusra goes into a chatusra jathi 5, the latter starting on the third matra of the beat (see page 45).*

1) Before starting the practice of this device, a musician should practice the following elements:

a) The performance of all regular speeds of all gatis (that is, against one beat), but starting on every matra within a beat.



b) The performance of chatusra jathi 3, 5, 6 and 7 starting also on any matra of the beat.

c) The frames of nadai bhedam of 4:3♩, 4:5♩, 4:6♩ and 4:7♩, and all the superimposed nadais.

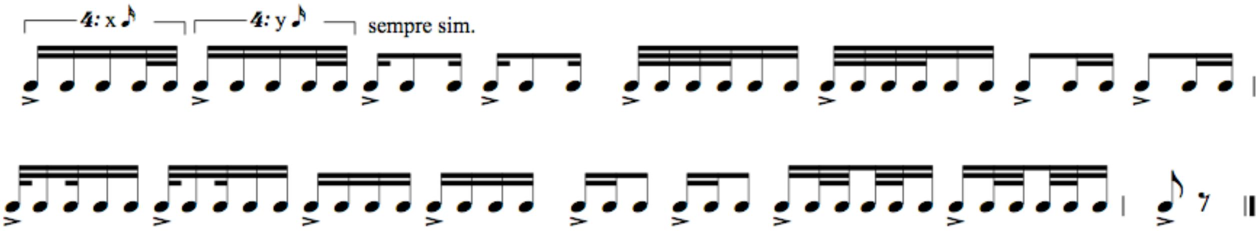
2) Practice the mixed jathi chart, as shown at the beginning of the chapter, to achieve a good and clear picture as to where all the accents fall within the beat. Afterwards, practice solely the accents of the mixed jathi.

3) Start with easier frames, such as 4+6 or 3+5 and progressively incorporate all the mixed jathis. Spend time just working with all matras of the nadai with the alternating accents. This is essential to acquire a good feeling for the real change of proportionality and the sensation of tempo change that this device provides, and also to obtain a good sense as to how to perform every frame/nadai starting anywhere in the beat.

4) With the aid of some device like it was recommended for the practice of nadai bhedam, play all the matras of the nadai in the alternating accents and start phrasing against this backdrop. Feeling the differences in proportionality between the actual real length of, for instance, an ♪ in a 5:3♪ and 5:7♪ in the mixed jathi of 3+7 is crucial.

5) Start combining performing the phrases with and without the aid until the performer feels confident to perform them only with the metronome.

Below one phrase is proposed (same phrase as the transcription shown elsewhere in the chapter). This phrase can be performed with all possible combinations of mixed jathi. 'X' stands for one frame and 'Y' for the other frame. Similar phrases can be constructed on all gatis with all possible mixed jathis and all possible nadais.



Chapter 23

COMBINATIONS ANULOMA-PRATILOMA

This karnatic concept of creating and developing what in the West has come to be named ‘complex irregular groupings’, is possibly the closest to what anyone could think of as ‘new complexity’. As opposed to nadai bhedam, in combinations anuloma-pratiloma the changes occur with complete disregard for giving any feeling of a different tempo or metre. Through this technique, almost any conceivable numerical relationship can be found.

Before going any further it is important to provide a short reminder of anuloma and pratiloma by repeating the chart already included in chapter 9.

Anuloma could be defined as **when the number of matras in a beat is doubled, tripled or quadrupled.**

Pratiloma could be defined as **when the number of matras in a gati is spread throughout 2, 3, 4, 5, 6 or 7 beats.**

CHART OF ANULOMA-PRATILOMA

ANULOMA

	Tisra	Chatusra	Khanda	Misra
4th speed	12	16	20	28
3rd speed	9	12	15	21
2nd speed	6	8	10	14

NEUTRAL or REGULAR

1st SPEED	3	4	5	7

PRATILOMA

2nd speed	3:2	4:2	5:2	7:2
3rd speed	x	4:3	5:3	7:3
4th speed	3:4	x	5:4	7:4
5th speed	3:5	4:5	x	7:5
6th speed	x	4:6	5:6	7:6
7th speed	3:7	4:7	5:7	x

In the introduction to this material in chapter 9, a glimpse of the concept of combinations anuloma-pratiloma was already given. The inclusion of the 2nd speed anuloma within the frame of the 3rd speed pratiloma provided the possibility of using 8:3♩, 10:3♩ and 14:3♩.

There are two ways of creating a combination anuloma-pratiloma:

1) When any of the anuloma speeds is used within the frame provided by any of the pratiloma speeds.

Within the karnatic tradition the previous chart becomes the following expanded chart[1]: every speed of anuloma (including the regular speed) can be used within any pratiloma speed or frame.

Tisra

1)	┌— ***3:2***♩ —┐	┌— ***6:2***♩ —┐	┌— ***9:2***♩ —┐	┌— ***12:2***♩ —┐
2)	┌— ***3:4***♩ —┐	┌— ***6:4***♩ —┐	┌— ***9:4***♩ —┐	┌— ***12:4***♩ —┐
3)	┌— ***3:5***♩ —┐	┌— ***6:5***♩ —┐	┌— ***9:5***♩ —┐	┌— ***12:5***♩ —┐
4)	┌— ***3:7***♩ —┐	┌— ***6:7***♩ —┐	┌— ***9:7***♩ —┐	┌— ***12:7***♩ —┐

Chatusra

1)	┌— ***4:2***♩ —┐	┌— ***8:2***♩ —┐	┌— ***12:2***♩ —┐	┌— ***16:2***♩ —┐
2)	┌— ***4:3***♩ —┐	┌— ***8:3***♩ —┐	┌— ***12:3***♩ —┐	┌— ***16:3***♩ —┐
3)	┌— ***4:5***♩ —┐	┌— ***8:5***♩ —┐	┌— ***12:5***♩ —┐	┌— ***16:5***♩ —┐
4)	┌— ***4:6***♩ —┐	┌— ***8:6***♩ —┐	┌— ***12:6***♩ —┐	┌— ***16:6***♩ —┐
5)	┌— ***4:7***♩ —┐	┌— ***8:7***♩ —┐	┌— ***12:7***♩ —┐	┌— ***16:7***♩ —┐

Khanda

1)	┌— ***5:2***♩ —┐	┌— ***10:2***♩ —┐	┌— ***15:2***♩ —┐	┌— ***20:2***♩ —┐
2)	┌— ***5:3***♩ —┐	┌— ***10:3***♩ —┐	┌— ***15:3***♩ —┐	┌— ***20:3***♩ —┐
3)	┌— ***5:4***♩ —┐	┌— ***10:4***♩ —┐	┌— ***15:4***♩ —┐	┌— ***20:4***♩ —┐
4)	┌— ***5:6***♩ —┐	┌— ***10:6***♩ —┐	┌— ***15:6***♩ —┐	┌— ***20:6***♩ —┐
5)	┌— ***5:7***♩ —┐	┌— ***10:7***♩ —┐	┌— ***15:7***♩ —┐	┌— ***20:7***♩ —┐

Misra

1)	┌— ***7:2***♩ —┐	┌— ***14:2***♩ —┐	┌— ***21:2***♩ —┐	┌— ***28:2***♩ —┐
2)	┌— ***7:3***♩ —┐	┌— ***14:3***♩ —┐	┌— ***21:3***♩ —┐	┌— ***28:3***♩ —┐
3)	┌— ***7:4***♩ —┐	┌— ***14:4***♩ —┐	┌— ***21:4***♩ —┐	┌— ***28:4***♩ —┐
4)	┌— ***7:5***♩ —┐	┌— ***14:5***♩ —┐	┌— ***21:5***♩ —┐	┌— ***28:5***♩ —┐
5)	┌— ***7:6***♩ —┐	┌— ***14:6***♩ —┐	┌— ***21:6***♩ —┐	┌— ***28:6***♩ —┐

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[1] *A western alternative notation is provided later on.*

2) When the frame is expressed in ♪, 𝅘𝅥𝅯 or, eventually, 𝅘𝅥𝅰

Until now, all frames provided in superimposition of gatis have always been expressed in ♩, with the exception of mixed jathi nadai bhedam. Any frame of the new chart of anuloma-pratiloma combinations can be utilised replacing the ♩ by ♪, 𝅘𝅥𝅯 or 𝅘𝅥𝅰, which exponentially broadens the available options. Some combinations will inevitably produce frames that already exist or can be expressed in ♩, but many a time will result in completely new material. In addition, as will be seen later on in the chapter, combinations of all these different frame values can be realised, and produce rather complex displacements within the beat.

NOTATION

Having arrived at this degree of complexity, to use a clear and transparent notation is of the utmost importance. Although the karnatic notation is extremely clear, computer notation programs and western convention in terms of how to notate irregular groupings constitute a major handicap to employing karnatic notation.

Below, notation is presented in the karnatic tradition of the previous chart, and written in parenthesis, one or even two different systems of western notation. As already stated in chapter 9, I do not find any problem with using a western notation with this particular technique, except when the 3rd and 4th anuloma speeds are involved. For these cases, the explanation given in the third and fourth points below present a preferred notation.

There are four different systems to notate the frames, depending on whether the number superimposed on the pratiloma frame is a 1st, 2nd, 3rd or 4th speed anuloma.

1) Regular or 1st speed: most of the time, there is no differentiation between the karnatic and the western way of thinking and notating. The possible differences between the karnatic and western notational systems have either been explained in chapter 9, or are an obvious result of this explanation in the new frames of 4, 5, 6 or 7 beats.

2) 2nd speed: similarly, the explanation provided in chapter 9 should be sufficient to understand the notational adaptations that need to be implemented; all changes follow the same underlying pattern of thought.

3) 3rd speed: further to showing the manner of notating that has already been provided in the chart of nadai bhedam as the notation that has been used more abundantly in western music since 1950s (see the right column of the nadai bhedam chart in chapter 21), the alternative and possibly clearer notation to be used in this context is to borrow the notion of double bracket employed for nadai bhedam: a first bracket using 3:2, 4, 5 or 7 ♩ and a second line with three brackets of the given gati.

For example, in a ***15:4♩*** (karnatic way of expressing a 3rd speed anuloma within a 4th speed pratiloma), two different notations can be used. First the traditionally accepted ***15:16𝅘𝅥𝅯*** which, I would argue makes it very difficult for a performer to find a concrete system that would enable him to perform this irregular grouping. Secondly, and below this notation, the nadai bhedam approach is written; as already explained in the chapter on nadai bhedam, this notation has the advantage of facilitating the performer's task of finding a system that can be used for similar concepts, a clear clue to enable the performer to trace it back to a gati/jathi combination:

⌐——***3:4♩***——¬
⌐***5***¬ ⌐***5***¬ ⌐***5***¬

Indeed, a ***15:4♩*** or ***15:16♪*** is the result of the following steps [2]

a) Tisra 1st speed
b) Tisra jathi 4
c) Isolation of accents to create the frame of 3:4♩
d) Superimposition of khanda on every accent provided by the gati/jathi combination.

The added advantage is that if a performer has already understood and practiced nadai bhedam, using this system will facilitate the task of performing all the frames resulting from the use of superimposing the 3rd speed anuloma over any of the pratiloma speeds.

Hence, the way to understand the different lines for one particular frame is as follows: 1st line, the karnatic convention; 2nd line, the more accepted western notation and 3rd and 4th lines are the two brackets needed for the nadai bhedam notation (which, in my view, better expresses the karnatic concept).

⌐— ***15:4♩*** —¬
(⌐***15:16♪***¬)
(⌐——***3:4♩***——¬)
⌐***5***¬ ⌐***5***¬ ⌐***5***¬

4) 4th speed: everything said about the 3rd speed is equally applicable here. The only difference resides on the fact that the nadai bhedam frame to keep in mind will always be a 4:3, 5, 6 or 7 ♩ with the corresponding gati repeated 4 times.

⌐— ***16:7♩*** —¬
(⌐***16:14♪***¬)
(⌐———***4:7♩***———¬)
⌐***4***¬ ⌐***4***¬ ⌐***4***¬ ⌐***4***¬

Tisra

1)	⌐— ***3:2♩*** —¬	⌐— ***6:2♩*** —¬ (⌐***3:2♪***¬ ⌐***3:2♪***¬)	⌐— ***9:2♩*** —¬ (⌐***9:8♪***¬)	⌐— ***12:2♩*** —¬ (⌐***6***¬ ⌐***6***¬)
2)	⌐— ***3:4♩*** —¬	⌐— ***6:4♩*** —¬ (⌐***3:2♩***¬ ⌐***3:2♩***¬)	⌐— ***9:4♩*** —¬ (⌐***9:8♪***¬)	⌐— ***12:4♩*** —¬ (⌐***3***¬⌐***3***¬⌐***3***¬⌐***3***¬)
3)	⌐— ***3:5♩*** —¬ (⌐***3𝅗𝅥:5♩***¬)	⌐— ***6:5♩*** —¬	⌐— ***9:5♩*** —¬ (⌐***9:10♪***¬) (⌐——***3:5***——¬) ⌐***3***¬ ⌐***3***¬ ⌐***3***¬	⌐— ***12:5♩*** —¬ (⌐***12:10♪***¬) (⌐———***4:5***———¬) ⌐***3***¬ ⌐***3***¬ ⌐***3***¬ ⌐***3***¬

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[2] *A wider explanation of how to practice and master all these groupings will be explained in the section on 'Practice method'*

4)	⌐— 3:7♩ —¬ (⌐3𝅗𝅥:7♩¬)	⌐— 6:7♩ —¬	⌐— 9:7♩ —¬ (⌐——3:7——¬) ⌐3¬ ⌐3¬ ⌐3¬	⌐— 12:7♩ —¬ (⌐12:14♪¬) (⌐———4:7———¬) ⌐3¬ ⌐3¬ ⌐3¬ ⌐3¬

Chatusra

1)	⌐— 4:3♩ —¬	⌐— 8:3♩ —¬ (⌐4:3♪¬ ⌐4:3♪¬)	⌐— 12:3♩ —¬ (⌐4¬ ⌐4¬ ⌐4¬)	⌐— 16:3♩ —¬ (⌐16:12𝅘𝅥𝅯¬) (⌐———4:3———¬) ⌐4¬ ⌐4¬ ⌐4¬ ⌐4¬
2)	⌐— 4:5♩ —¬	⌐— 8:5♩ —¬ (⌐4:5♪¬ ⌐4:5♪¬)	⌐— 12:5♩ —¬ (⌐12:10♪¬) (⌐——3:5——¬) ⌐4¬ ⌐4¬ ⌐4¬	⌐— 16:5♩ —¬ (⌐16:20𝅘𝅥𝅯¬) (⌐———4:5———¬) ⌐4¬ ⌐4¬ ⌐4¬ ⌐4¬
3)	⌐— 4:6♩ —¬ (⌐2:3♩¬ ⌐2:3♩¬)	⌐— 8:6♩ —¬ (⌐4:3♩¬ ⌐4:3♩¬)	⌐— 12:6♩ —¬ (⌐4♪¬⌐4♪¬⌐4♪¬)	⌐— 16:6♩ —¬ (⌐8:6♪¬ ⌐8:6♪¬)
4)	⌐— 4:7♩ —¬ (⌐4𝅗𝅥:7♩¬)	⌐— 8:7♩ —¬ (⌐4:7♪¬ ⌐4:7♪¬)	⌐— 12:7♩ —¬ (⌐12:14♪¬) (⌐——3:7——¬) ⌐4¬ ⌐4¬ ⌐4¬	⌐— 16:7♩ —¬ (⌐16:14♪¬) (⌐———4:7———¬) ⌐4¬ ⌐4¬ ⌐4¬ ⌐4¬

Khanda

1)	⌐— 5:2♩ —¬ (⌐5:4♪¬)	⌐— 10:2♩ —¬ (⌐5¬ ⌐5¬)	⌐— 15:2♩ —¬ (⌐15:16𝅘𝅥𝅰¬) (⌐——3:2——¬) ⌐5¬ ⌐5¬ ⌐5¬	⌐— 20:2♩ —¬ (⌐10:8𝅘𝅥𝅰¬⌐10:8𝅘𝅥𝅰¬)
2)	⌐— 5:3♩ —¬ (⌐5:6♪¬)	⌐— 10:3♩ —¬ (⌐5:6𝅘𝅥𝅯¬ ⌐5:6𝅘𝅥𝅯¬)	⌐— 15:3♩ —¬ (⌐5¬ ⌐5¬ ⌐5¬)	⌐— 20:3♩ —¬ (⌐20:24𝅘𝅥𝅰¬) (⌐———4:3———¬) ⌐5¬ ⌐5¬ ⌐5¬ ⌐5¬
3)	⌐— 5:4♩ —¬	⌐— 10:4♩ —¬ (⌐5:4♪¬ ⌐5:4♪¬)	⌐— 15:4♩ —¬ (⌐15:16𝅘𝅥𝅯¬) (⌐——3:4——¬) ⌐5¬ ⌐5¬ ⌐5¬	⌐— 20:4♩ —¬ (⌐5¬⌐5¬⌐5¬⌐5¬)
4)	⌐— 5:6♩ —¬	⌐— 10:6♩ —¬ (⌐5:6♪¬ ⌐5:6♪¬)	⌐— 15:6♩ —¬ (⌐5:4♪¬⌐5:4♪¬⌐5:4♪¬)	⌐— 20:6♩ —¬ (⌐10:12𝅘𝅥𝅯¬⌐10:12𝅘𝅥𝅯¬) (⌐———4:6———¬) ⌐5¬ ⌐5¬ ⌐5¬ ⌐5¬
5)	⌐— 5:7♩ —¬	⌐— 10:7♩ —¬ (⌐5:7♪¬ ⌐5:7♪¬)	⌐— 15:7♩ —¬ (⌐15:14♪¬) (⌐——3:7——¬) ⌐5¬ ⌐5¬ ⌐5¬	⌐— 20:7♩ —¬ (⌐20:14♪¬) (⌐———4:7———¬) ⌐5¬ ⌐5¬ ⌐5¬ ⌐5¬

Misra

1)	⌐— 7:2♩ —¬ (⌐7:4♪¬)	⌐— 14:2♩ —¬ (⌐7¬ ⌐7¬)	⌐— 21:2♩ —¬ (⌐21:16𝅘𝅥𝅰¬) (⌐——3:2——¬) ⌐7¬ ⌐7¬ ⌐7¬	⌐— 28:2♩ —¬ (⌐14¬ ⌐14¬)
2)	⌐— 7:3♩ —¬ (⌐7:6♪¬)	⌐— 14:3♩ —¬ (⌐7:6𝅘𝅥𝅯¬ ⌐7:6𝅘𝅥𝅯¬)	⌐— 21:3♩ —¬ (⌐7¬ ⌐7¬ ⌐7¬)	⌐— 28:3♩ —¬ (⌐28:24𝅘𝅥𝅰¬) (⌐———4:3———¬) ⌐7¬ ⌐7¬ ⌐7¬ ⌐7¬
3)	⌐— 7:4♩ —¬ (⌐7:8♪¬)	⌐— 14:4♩ —¬ (⌐7:4♪¬ ⌐7:4♪¬)	⌐— 21:4♩ —¬ (⌐21:16♪¬) (⌐——3:4——¬) ⌐7¬ ⌐7¬ ⌐7¬	⌐— 28:4♩ —¬ (⌐7¬⌐7¬⌐7¬⌐7¬)
4)	⌐— 7:5♩ —¬	⌐— 14:5♩ —¬ (⌐7:5♪¬ ⌐7:5♪¬)	⌐— 21:5♩ —¬ (⌐21:20𝅘𝅥𝅯¬) (⌐——3:5——¬) ⌐7¬ ⌐7¬ ⌐7¬	⌐— 28:5♩ —¬ (⌐28:20𝅘𝅥𝅯¬) (⌐———4:5———¬) ⌐7¬ ⌐7¬ ⌐7¬ ⌐7¬
5)	⌐— 7:6♩ —¬	⌐— 14:6♩ —¬ (⌐7:6♪¬ ⌐7:6♪¬)	⌐— 21:6♩ —¬ (⌐7:4♪¬⌐7:4♪¬⌐7:4♪¬)	⌐— 28:6♩ —¬ (⌐14:12𝅘𝅥𝅯¬⌐14:12𝅘𝅥𝅯¬) (⌐———4:6———¬) ⌐7¬ ⌐7¬ ⌐7¬ ⌐7¬

DEVELOPMENTAL TECHNIQUES

With the possibilities given in chapter 9, only two developmental techniques were available. Within the context of combinations anuloma-pratiloma, six options are at one's disposal.

1) Taking just one specific gati, speed and frame

This is actually the first option given in chapter 9, where an example of ***14:3♩*** (written ⌐***7:6𝅘𝅥𝅯***¬⌐***7:6𝅘𝅥𝅯***¬) was shown. This new context presents multiple possibilities, and as mentioned before, any frame can also be expressed in smaller note values**.** Therefore, a sequence could be created using for instance, a ***14:5♪*** (written ⌐***7:5𝅘𝅥𝅯***¬⌐***7:5𝅘𝅥𝅯***¬). The rule would remain (as it will be the case for the other five techniques), that **no change of technique can happen in the middle of a tala**; it would always have to occur on tala sam.

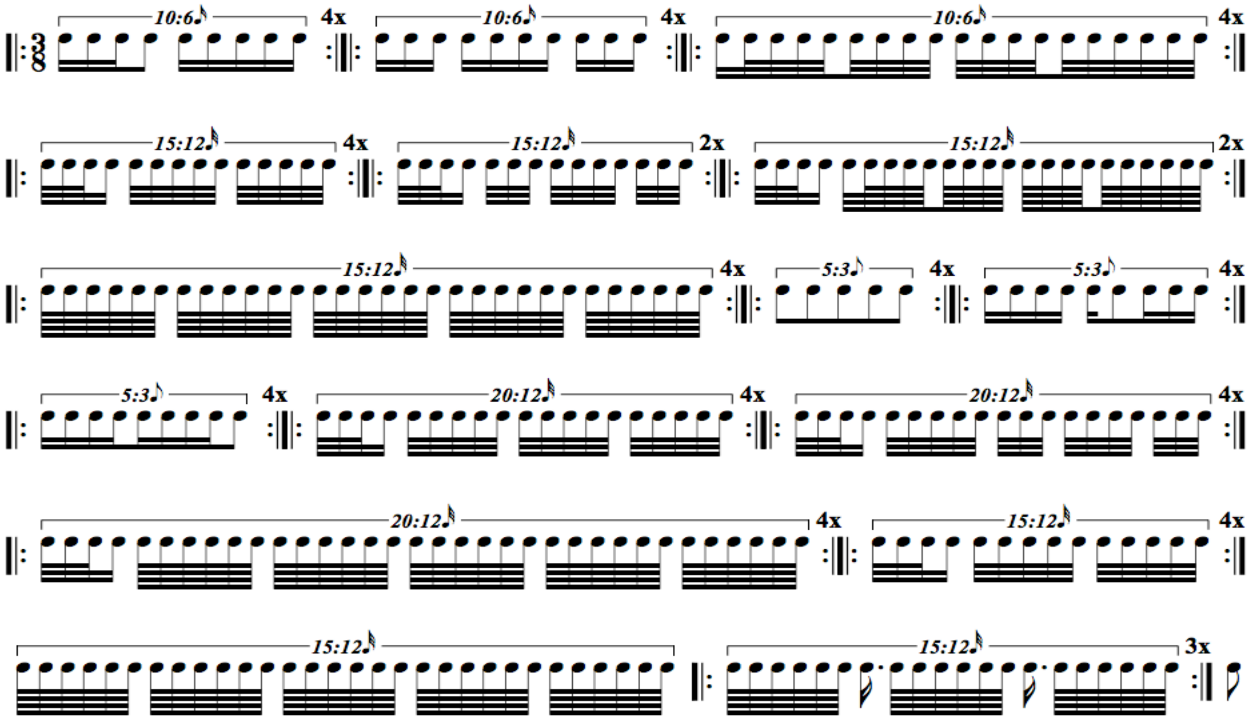
2) Keeping same gati and frame, changing speed

With this option, the musician only needs to keep in mind that the same frame, be it 2, 3, 4, 5, 6 or 7 beats, should be kept throughout the whole passage (as well as the gati), but that the different anuloma speeds that are superimposed on a particular pratiloma frame can be used linearly.

In the example below, the performer uses the following speeds within khanda 3rd speed pratiloma:

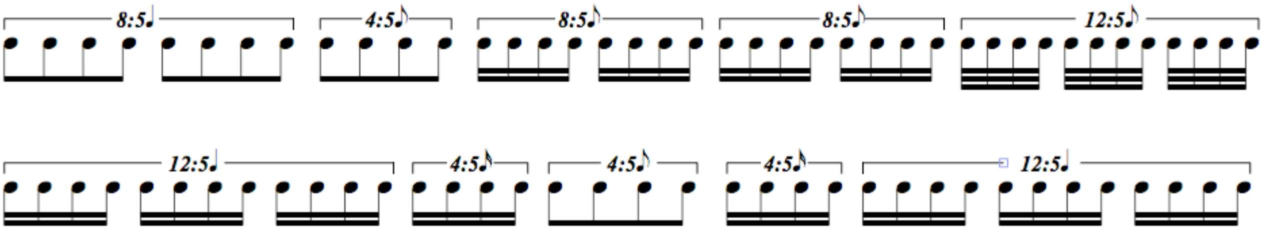
10:3 15:3 5:3 20:3 15:3

Due to the fast tempo, this example is notated in a 3/8 metre[3] *(track 179)*

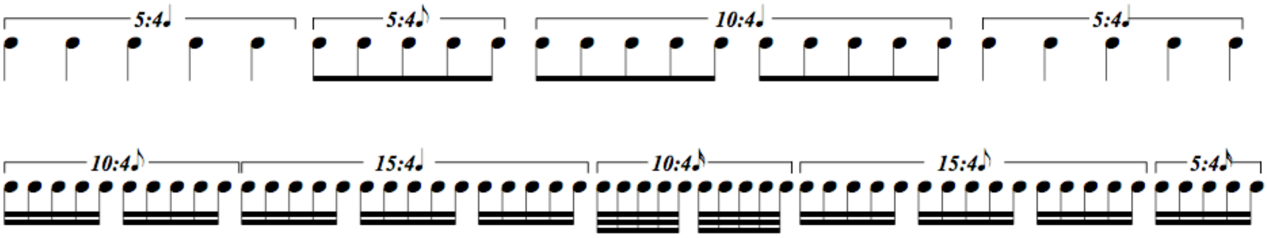

10:6𝅘𝅥𝅮.
4x
10:6𝅘𝅥𝅮.
4x
10:6𝅘𝅥𝅯.
4x
15:12𝅘𝅥𝅯.
4x
15:12𝅘𝅥𝅯.
2x
15:12𝅘𝅥𝅯.
2x
15:12𝅘𝅥𝅯.
4x
5:3𝅘𝅥𝅮.
4x
5:3𝅘𝅥𝅮.
4x
5:3𝅘𝅥𝅮.
4x
20:12𝅘𝅥𝅯.
4x
20:12𝅘𝅥𝅯.
4x
20:12𝅘𝅥𝅯.
4x
15:12𝅘𝅥𝅯.
4x
15:12𝅘𝅥𝅯.
15:12𝅘𝅥𝅯.
3x

In the next four examples (one per gati), the idea of mixing frames of ♩, ♪ and 𝅘𝅥𝅯 is explored, giving as a result some complex displacements of the frames.

a) Chatusra in 5th pratiloma, mixing frames of ♩, ♪ and 𝅘𝅥𝅯 *(track 180)*


8:5♩.
4:5♪.
8:5♪.
8:5♪.
12:5♪.
12:5♩.
4:5𝅘𝅥𝅯.
4:5♪.
4:5𝅘𝅥𝅯.
12:5♩.

b) Khanda in 4th pratiloma, mixing frames of ♩, ♪ and 𝅘𝅥𝅯 *(track 181)*


5:4♩.
5:4♪.
10:4♩.
5:4♩.
10:4♪.
15:4♩.
10:4𝅘𝅥𝅯.
15:4♪.
5:4𝅘𝅥𝅯.

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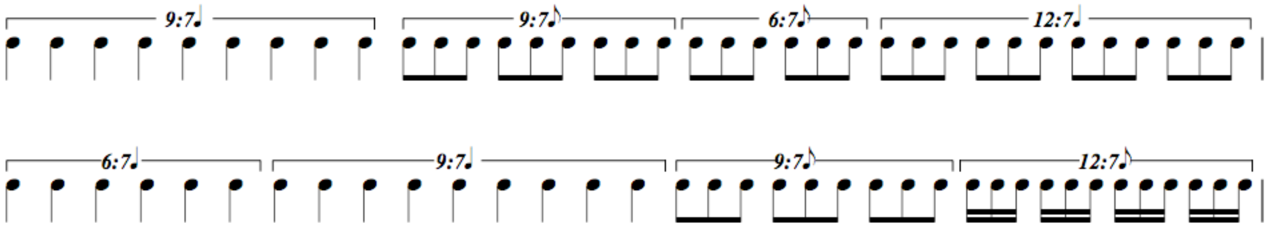
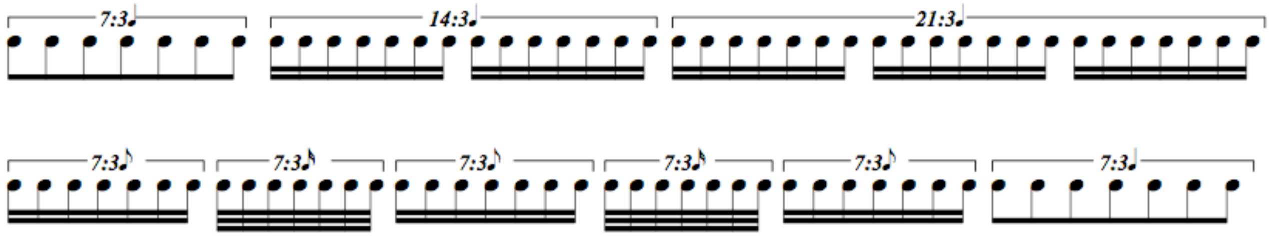
[3] *It should be noted that percussionists tend to double speeds quite regularly; 20 becomes 40, 15 becomes 30 etc. The reader can observe this fact in a few frames of the example.*

c) Tisra in 7th pratiloma, mixing frames of ♩, ♪ *(track 182)*


9:7♩
9:7♪
6:7♪
12:7♩
6:7♩
9:7♩
9:7♪
12:7♪

d) Misra in 3rd pratiloma, mixing frames of ♩, ♪ and 𝅘𝅥𝅯 *(track 183)*


7:3♩
14:3♩
21:3♩
7:3♪
7:3𝅘𝅥𝅯
7:3♪
7:3𝅘𝅥𝅯
7:3♪
7:3♩

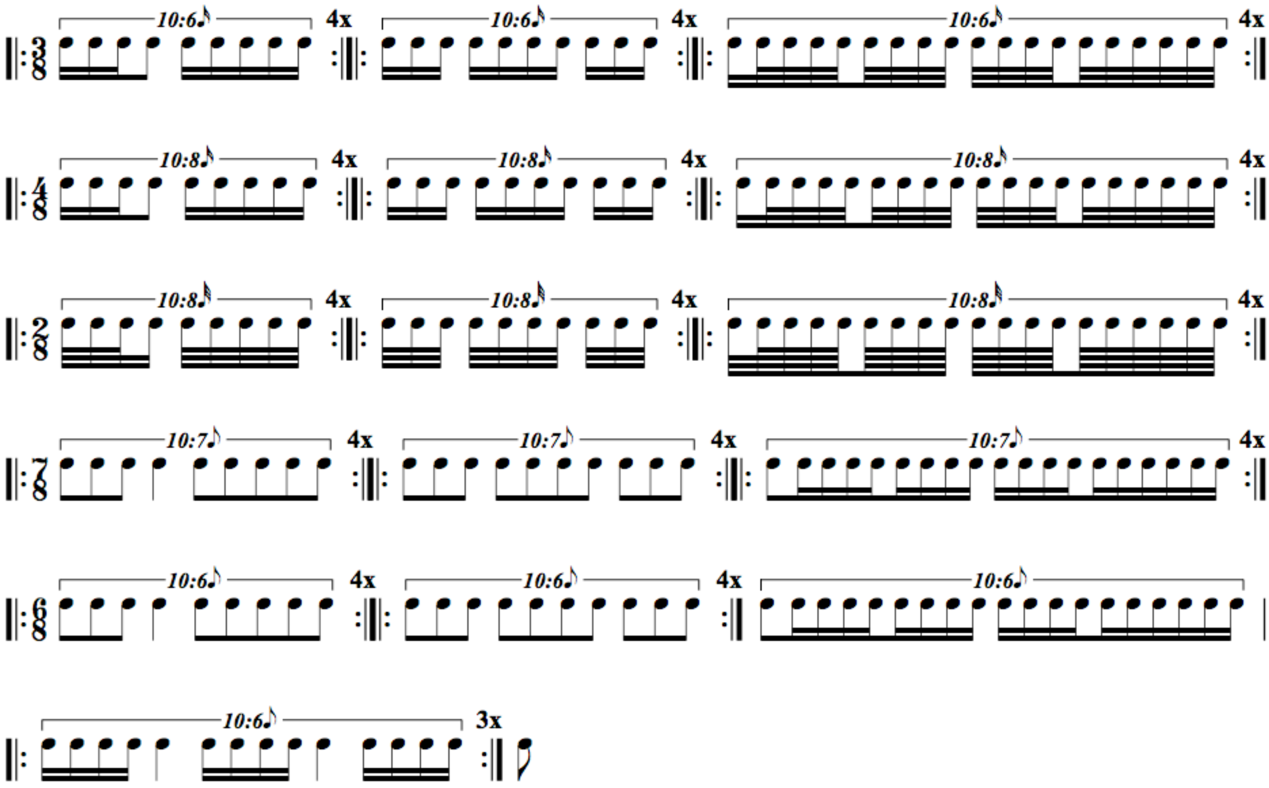
3) Keeping same gati and speed, changing frame

The musician has to stay in the same anuloma speed of a chosen gati, but can freely change the pratiloma frame.

Due to the changes of frames, I opted for using metre changes in the transcription notation, as a way of showing the different frames.

The karnatic thinking behind is

10:3 10:4 10:2 10:7 10:6 *(track 184)*


3/8
4/8
2/8
7/8
6/8
10:6♪
10:8♪
10:8𝅘𝅥𝅯
10:7♪
10:6♪
4x
3x

The following four examples are based on exercises designed to perfect the frames of 5, 6 and 7 ♪ and 𝅘𝅥𝅯, and the displacement of these frames within the beat[4].

a) Tisra 2nd speed in all frames *(track 185)*

⌐— 6:5♪ —¬ ⌐— 6:5𝅘𝅥𝅯 —¬ ⌐— 6:5𝅘𝅥𝅯 —¬ ⌐— 6:7𝅘𝅥𝅯 —¬ ⌐— 6:7♪ —¬ ⌐— 6:7𝅘𝅥𝅯 —¬

⌐— 6:5𝅘𝅥𝅯 —¬ ⌐— 6:5♪ —¬ ⌐— 6:5𝅘𝅥𝅯 —¬ ⌐— 6:7𝅘𝅥𝅯 —¬ ⌐— 6:7𝅘𝅥𝅯 —¬ ⌐— 6:7♪ —¬

⌐— 6:5𝅘𝅥𝅯 —¬ ⌐— 6:7𝅘𝅥𝅯 —¬ ⌐— 6:7♪ —¬ ⌐— 6:5♪ —¬ ⌐— 6:5𝅘𝅥𝅯 —¬ ⌐— 6:7𝅘𝅥𝅯 —¬

b) Chatusra 2nd speed in all frames *(track 186)*

⌐— 8:5♪ —¬ ⌐— 8:5𝅘𝅥𝅯 —¬ ⌐— 8:5𝅘𝅥𝅯 —¬ ⌐— 8:7𝅘𝅥𝅯 —¬ ⌐— 8:7♪ —¬ ⌐— 8:7𝅘𝅥𝅯 —¬

⌐— 8:5𝅘𝅥𝅯 —¬ ⌐— 8:5♪ —¬ ⌐— 8:5𝅘𝅥𝅯 —¬ ⌐— 8:7𝅘𝅥𝅯 —¬ ⌐— 8:7𝅘𝅥𝅯 —¬ ⌐— 8:7♪ —¬

⌐— 8:5𝅘𝅥𝅯 —¬ ⌐— 8:7𝅘𝅥𝅯 —¬ ⌐— 8:7♪ —¬ ⌐— 8:5♪ —¬ ⌐— 8:5𝅘𝅥𝅯 —¬ ⌐— 8:7𝅘𝅥𝅯 —¬

c) Khanda 2nd speed in all frames *(track 187)*

⌐—10:6♪ —¬ ⌐—10:6𝅘𝅥𝅯 —¬ ⌐—10:6𝅘𝅥𝅯 —¬ ⌐—10:7𝅘𝅥𝅯 —¬ ⌐—10:7♪ —¬ ⌐—10:7𝅘𝅥𝅯 —¬

⌐—10:6𝅘𝅥𝅯 —¬ ⌐—10:6♪ —¬ ⌐—10:6𝅘𝅥𝅯 —¬ ⌐—10:7𝅘𝅥𝅯 —¬ ⌐—10:7𝅘𝅥𝅯 —¬ ⌐—10:7♪ —¬

⌐—10:6𝅘𝅥𝅯 —¬ ⌐—10:7𝅘𝅥𝅯 —¬ ⌐—10:6𝅘𝅥𝅯 —¬ ⌐—10:5𝅘𝅥𝅯 —¬ ⌐—10:6♪ —¬ ⌐—10:7♪ —¬

⌐—10:7𝅘𝅥𝅯 —¬ ⌐—10:4𝅘𝅥𝅯 —¬ ⌐—10:6𝅘𝅥𝅯 —¬ ⌐—10:5𝅘𝅥𝅯 —¬

This exercise introduces the notion of using gati bhedam in conjunction with anuloma-pratiloma. Subsequently, the 'missing speed' in all gatis (5:5 in the case of khanda), is actually chatusra using a jathi that would correspond numerically with the gati employed.

In the case of the previous example in khanda, the chosen speed is 10 (2nd anuloma), therefore the ten notes would be ten 𝅘𝅥𝅰 in the frame of five 𝅘𝅥𝅯. This is, nonetheless, a clear chatusra jathi 5.

Hence, this possibility that was explored in the chapter of mixed jathi nadai bhedam is incorporated as well in the framework of combinations anuloma-pratiloma.

c) Misra 3rd speed in all frames *(track 188)*

⌐— 21:6♩ —¬ ⌐— 21:6♪ —¬ ⌐— 21:6♪ —¬ ⌐— 21:5♩ —¬ ⌐— 21:5♩ —¬ ⌐— 21:5♪ —¬ ⌐— 21:5♪ —¬

⌐— 21:6♪ —¬ ⌐— 21:6♩ —¬ ⌐— 21:6♪ —¬ ⌐— 21:5♪ —¬ ⌐— 21:5♩ —¬ ⌐— 21:5♪ —¬ ⌐— 21:6♪ —¬

⌐— 21:5♪ —¬ ⌐— 21:4♩ —¬ ⌐— 21:6♪ —¬ ⌐— 21:5♪ —¬ ⌐— 21:6♩ —¬ ⌐— 21:5♪ —¬

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[4] *Except for the example in misra, where a simple phrase is utilised to make a clear differentiation of the number 21, there is no phrasing in any of the other gatis. Therefore I preferred not to use any notes, just using brackets as karnatic musicians would.*

This example moves on one hand between ***21:6♩*** and ***21:6♪***, which are essentially 7:2♩ and regular misra, and on the other hand ***21:5♩*** and ***21:5♪***, speeds that use 3:5♩ and 3:5♪ as the primary frames over which misra is superimposed.

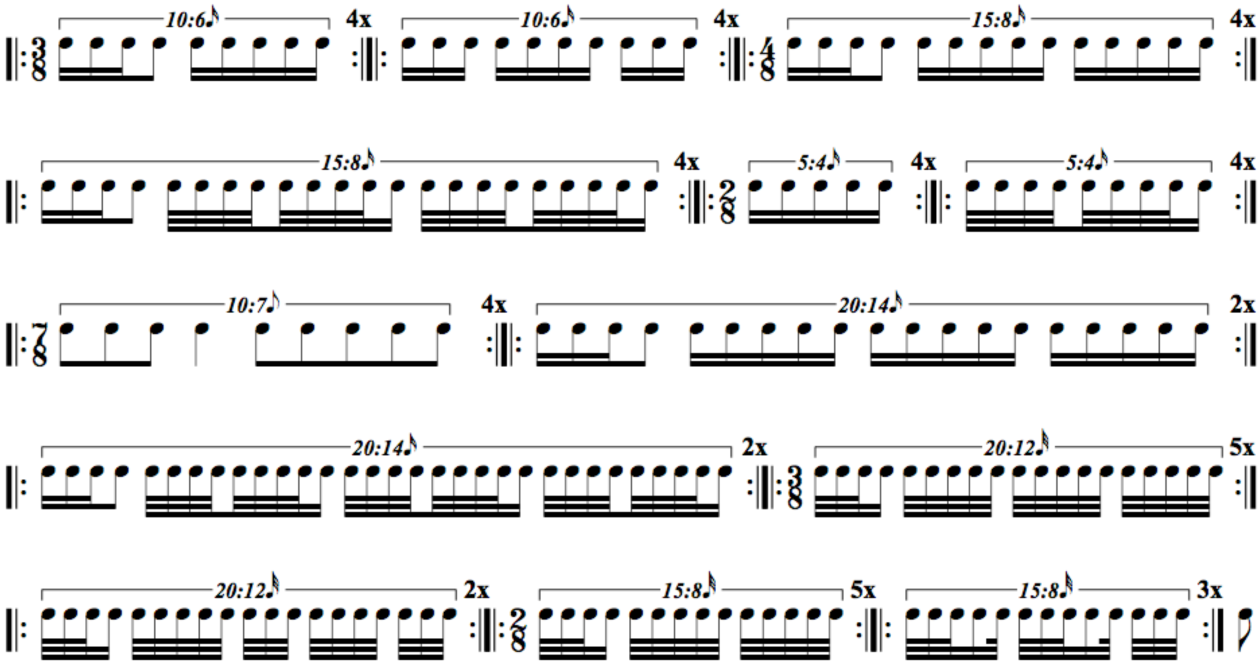
4) Keeping same gati, changing frame and speed

This possibility was actually the second option explained in chapter 9. The degree of difficulty increases due to the fact that only one parameter remains unaltered (thus far, whether in nadai bhedam or combinations anuloma-pratiloma, any change between two musical objects needed to have two common parameters).

Whereas in the first three techniques the use of frames in ♪ and 𝅘𝅥𝅯 is a common occurrence, all frames are expressed in ♩ in this technique. This obeys to the fact that a sequence or phrase can move from any speed and frame to another speed and frame, a fact that greatly multiplies the number of options. The objective pursued in the first three techniques by mixing frames using ♪ and 𝅘𝅥𝅯 is almost automatically achieved in this technique because of the great variety of speeds and frames to choose from. However, I have heard examples where some ♪ or 𝅘𝅥𝅯 frames were used, although this is indeed more rare.

The variety of phrases in this example is greater than in any previous one. Here I have also opted for writing the frame as metre changes.

The karnatic notational thinking for the following example is
10:3 15:4 5:2 20:7 20:3 15:2 *(track 189)*

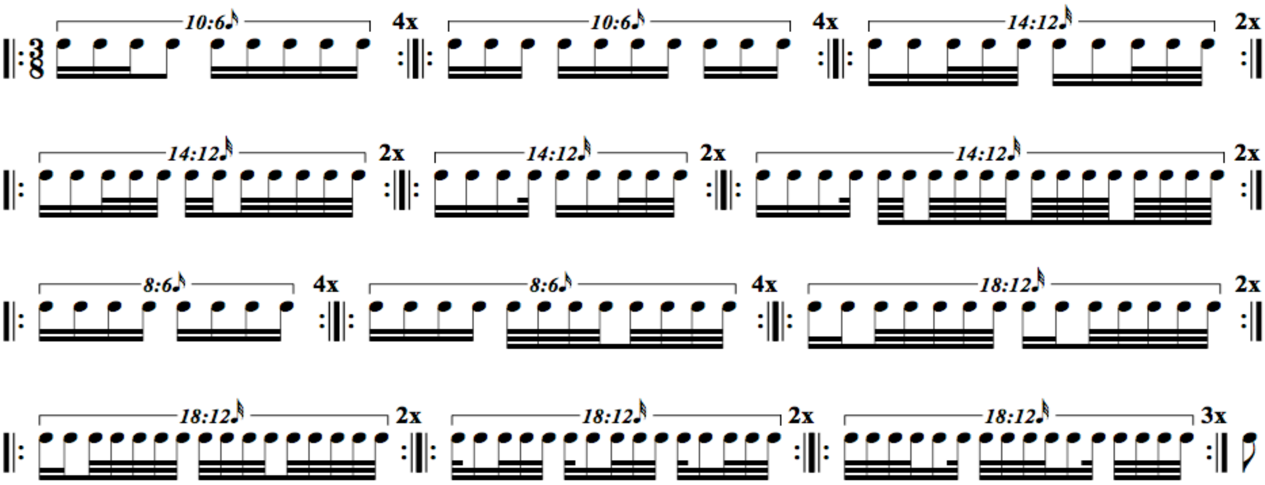


5) Keeping same frame and speed, changing gati

In this technique a common speed of anuloma in all gatis is chosen, along with a common number of beats (always expressed in ♩) while the sequence can change gatis ‘randomly’.

The karnatic frames are

10:3 14:3 8:3 18:3 *(track 190)*



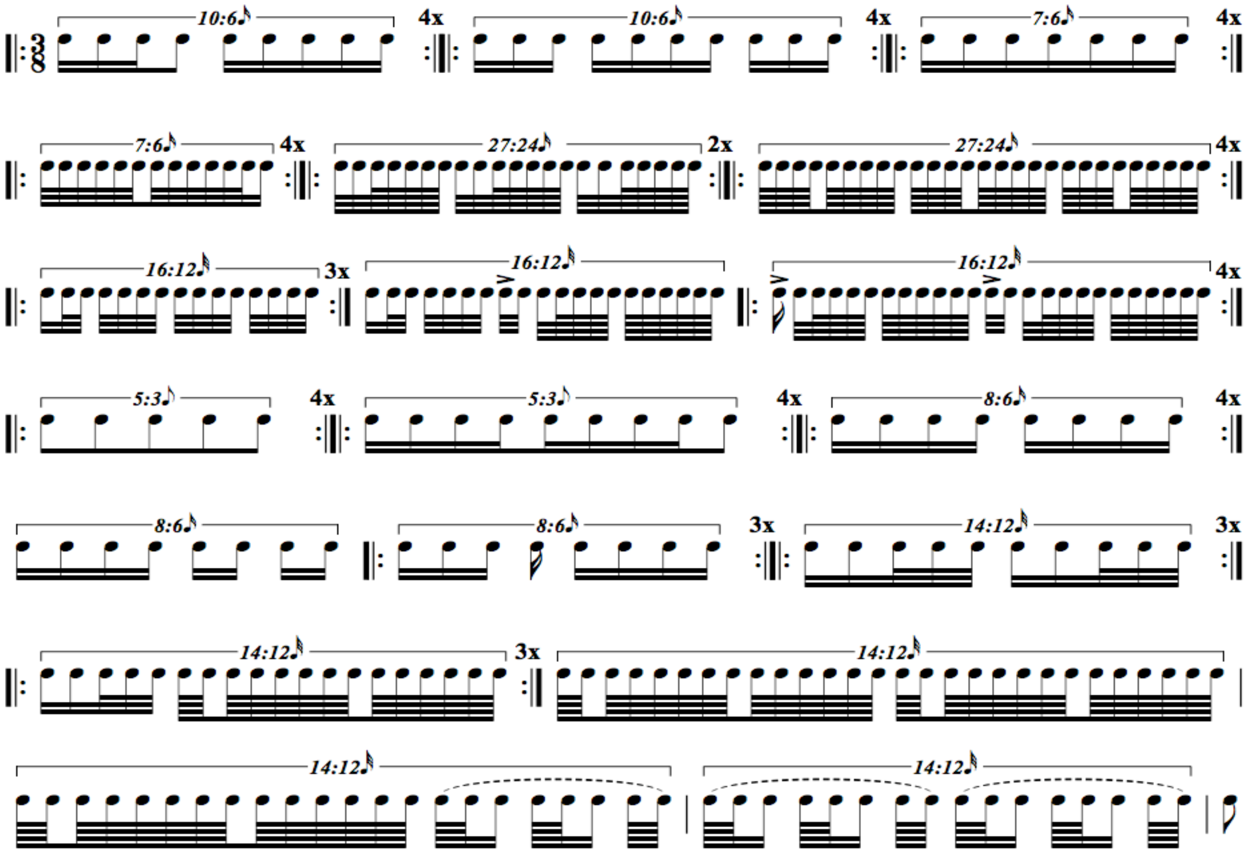
3/8
10:6♪ 4x
10:6♪ 4x
14:12♪ 2x
14:12♪ 2x
14:12♪ 2x
14:12♪ 2x
8:6♪ 4x
8:6♪ 4x
18:12♪ 2x
18:12♪ 2x
18:12♪ 2x
18:12♪ 3x

6) Keeping same frame, changing gati and speed

Of all the possibilities offered by anuloma-pratiloma combinations, this technique is possibly the most complex to perform. The only common denominator is the frame (always expressed in number of beats), whilst any gati and any speed can be chosen to succeed one another.

The first example uses the frame of three beats as a common denominator. The karnatic mind set is:

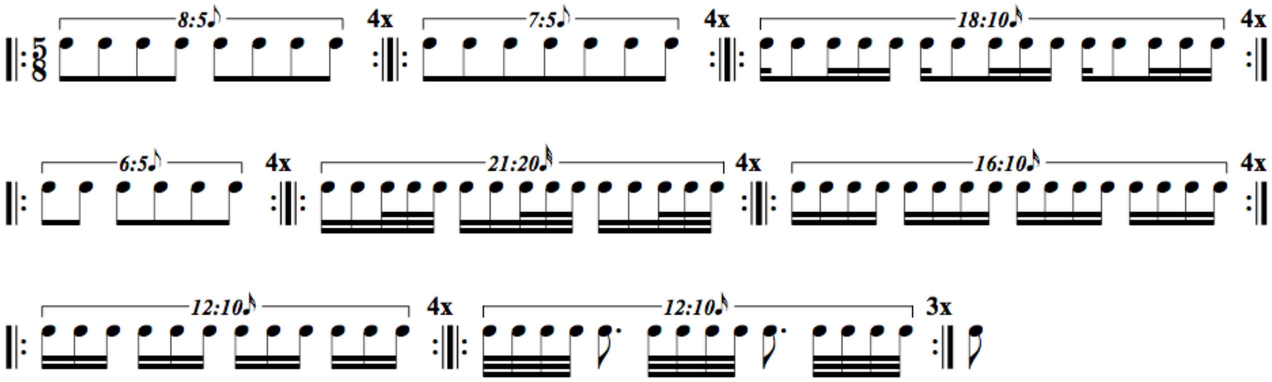
10:3 7:3 27:3 16:3 5:3 8:3 14:3 *(track 191)*



3/8
10:6♪ 4x
10:6♪ 4x
7:6♪ 4x
7:6♪ 4x
27:24♪ 2x
27:24♪ 4x
16:12♪ 3x
16:12♪
16:12♪ 4x
5:3♪ 4x
5:3♪ 4x
8:6♪ 4x
8:6♪
8:6♪ 3x
14:12♪ 3x
14:12♪ 3x
14:12♪
14:12♪
14:12♪

In the second example, the common denominator is a frame of five beats and the karnatic thinking would be

8:5 7:5 18:5 6:5 21:5 16:5 12:5 *(track 192)*

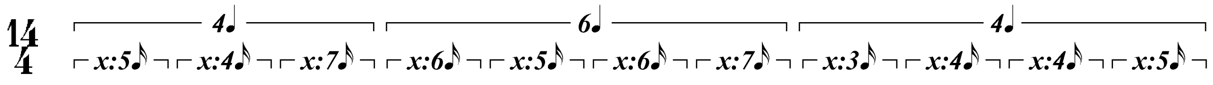


Use of anuloma-pratiloma combinations on jathi bhedam sequences.

As was hinted in the chapter on jathi bhedam to explain the two different approaches to creating phrases, when the chosen option is to have the same number of notes per cell, instead of having 3, 4 or 5 notes per cell with different note values while staying in a particular gati, the cells could use the superimposition of tisra, chatusra or khanda, as long as these gatis would utilise all the matras without any phrasing (since the phrasing is precisely to have 3, 4 or 5 notes per cell).

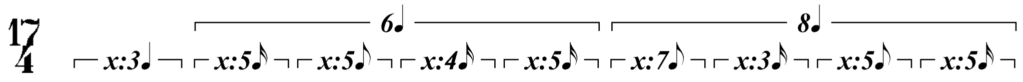
Eventually, the concept of having the same number of notes could be broadened so that tisra 2nd speed or misra could be included in the number of options.

The first example is a jathi bhedam sequence with the numbers 5 4 7 6 5 6 7 3 4 4 5 in chatusra in a tala of 14 beats. The recorded examples are in tisra and chatusra. *(track 193 & 194)*



The second example shows a variation on the way a jathi bhedam sequence has been explained thus far; in this example the sequence starts after three beats and consists of the numbers 5 5 4 5 7 3 5 5. However, the first frame of three beats uses a speed of anuloma-pratiloma as well.

This sequence does not respond to the manner explained in chapter 7 to organise or develop jathi bhedam, because it is purposely created to utilise anuloma-pratiloma over the different frames, as opposed to the previous one, that is a jathi bhedam sequence created as such. Therefore, the possibility of mixing ♩, ♪ or 𝅘𝅥𝅯, as seen in developmental techniques 2 and 3, is combined with the concept of jathi bhedam sequence. The recorded examples are in khanda and misra. *(track 195 & 196)*



COMMON DENOMINATOR CONCEPT

The techniques 5 and 6 are seldom used for reasons that have been seen and explained throughout the text: the change of gati in the middle of a tala does not happen, unless it follows a very specific set of rules. At this point it may be worth reviewing in which techniques gati changes occur outside the change on tala sam, as a means to better understand the 'self-imposed limitations' of karnatic music regarding gati changes.

A change of gati that does not happen on tala sam, occurs exclusively in the following techniques with the specified conditions:

-Tree of gati bhedam: when the gati became jathi (or vice versa) and only on anga sam.

-Development of a sama mukthay with rhythmical sangati: if the mini-mukthay started on a beat and always used a number pertaining to the original sequence for the creation of the pala.

-3-fold mukthay: same phrase repeated in two or three different gatis.

-Mridangam & damaruyatis: in the second part of the yati phrase, provided that the main phrase and length of palas remains unaltered.

-Tirmanas: when the sequence reaches the uttaranga, the number of notes in the phrase can become a gati.

-Compound and related mukthays: as a result of the seed phrase.

-Yatis prastara: on the frame of a samayati, different gatis can be superimposed, always following the rule of systematic increase or decrease characteristic of all yati concepts. In order to use this option, the yati prastara has to have been performed previously, either as an isolated event or as a part of a krama-viloma-krama development.

-Mukthay combinations: while developing the large structure sequence, palas can change gati if the previous gati uses a jathi that links with the new gati (similar concept to that of tree of gati bhedam).

-Poruttam A: similarly, in the overall development of the whole sequence, there are gati changes whilst phrases or numbers are kept unchanged and, ultimately, because for all practical purposes, every target cell is considered a tala sam.

-Mixed gati mohara: following a very concrete set of rules and with a very specific goal. Rhythmical sangatis on the same phrases and taking a phrase through two different gatis are the basic notions behind this.

Hence, it can be concluded that in karnatic music, gati changes **never** occur randomly; and even when this change does not occur on tala sam (as shown in the techniques above) there is always an unifying factor, a common denominator that enables the gati to change inside a tala. This common denominator tends to be either a phrase, a particular jathi or a clear and strong numerical relationship. Somehow, conceptually, the bottom line of any possible gati change is already exposed in the tree of gati bhedam, although in each of the techniques mentioned above, limited small variations and 'exceptions' permit modifications to the notion of only changing gati on tala or anga sam.

This was also seen in nadai bhedam; changes to any parameter tend to occur rarely rather than frequently, and only one parameter at a time. Similarly, in mixed jathi nadai bhedam, although the jathis alternate continuously, the nadai remains the same throughout the sequence.

So far in this chapter, four techniques have been explained in which the speed and/or frame can change, but the common denominator is always that the gati remains the same. Techniques five and six are the very first exception to the rule of not changing gatis anywhere in the tala, permitting the change of gatis whilst keeping the common denominator in the number of beats.

Subsequently, if gati changes occur exclusively if and when there is a clear logic behind a particular technique, and always making use of a common denominator, why should anuloma-pratiloma be an exception? If we analyse the examples above, the conclusion is that if these changes happen because they share the same frame, using the regular speed of gatis would lead to the same notion: they all share the frame of one beat.

Karnatic musicians, especially those of what could be called the 'old school', are quite reluctant to use techniques 5 and 6 precisely because they find that using the argument of keeping the same number of beats as the common denominator is a weak, even feeble argument; most musicians fear that exploring this path could dangerously lead to an 'anything goes' that they tend to associate with the way western culture produces music, be it pop or experimental.

The essence is that it is precisely because of the common denominator concept that karnatic music has produced a pedagogical methodology that enables them to create, and possibly even more importantly, perform music of great complexity with a very high degree of precision without excluding feelings or emotions.

However, younger generations of musicians, following in the wake of great artists like Dr. Balamuralikrishna, Jahnavi Jayaprakash, Karaikkudi Mani or T.S. Seshagopalan, who tentatively started using these techniques 5 and 6 in their compositions or improvisations, are starting to explore the musical possibilities of changing gatis while keeping the same frame throughout the sequence, **provided that these possibilities remain confined to the realm of combinations anuloma-pratiloma development and are never transferred to any other technique or phrasing concept seen so far.** In other words, only in the context of combinations anuloma-pratiloma they are willing to change gatis 'randomly' and provided that this does not affect their tradition and the vast possibilities that the concepts of common denominator and not changing gatis randomly have enabled them to create and elaborate.[5]

A transcription of a short improvisation by N. G. Ravi concludes this section of the chapter. In this piece, utilising the Misra Chapu tala, the emphasis is placed on the division of the cycle in two equal halves of 7 ♪. Over this division, he superimposes 6, 8 or 12 matras, therefore creating two ***6:7♪***, ***8:7♪*** or ***12:7♪*** per cycle, and a second layer of alternatively tisra and khanda is superimposed over the frame. In a few cycles, the percussionist also uses gati and jathi bhedam, including displacement of some figures.

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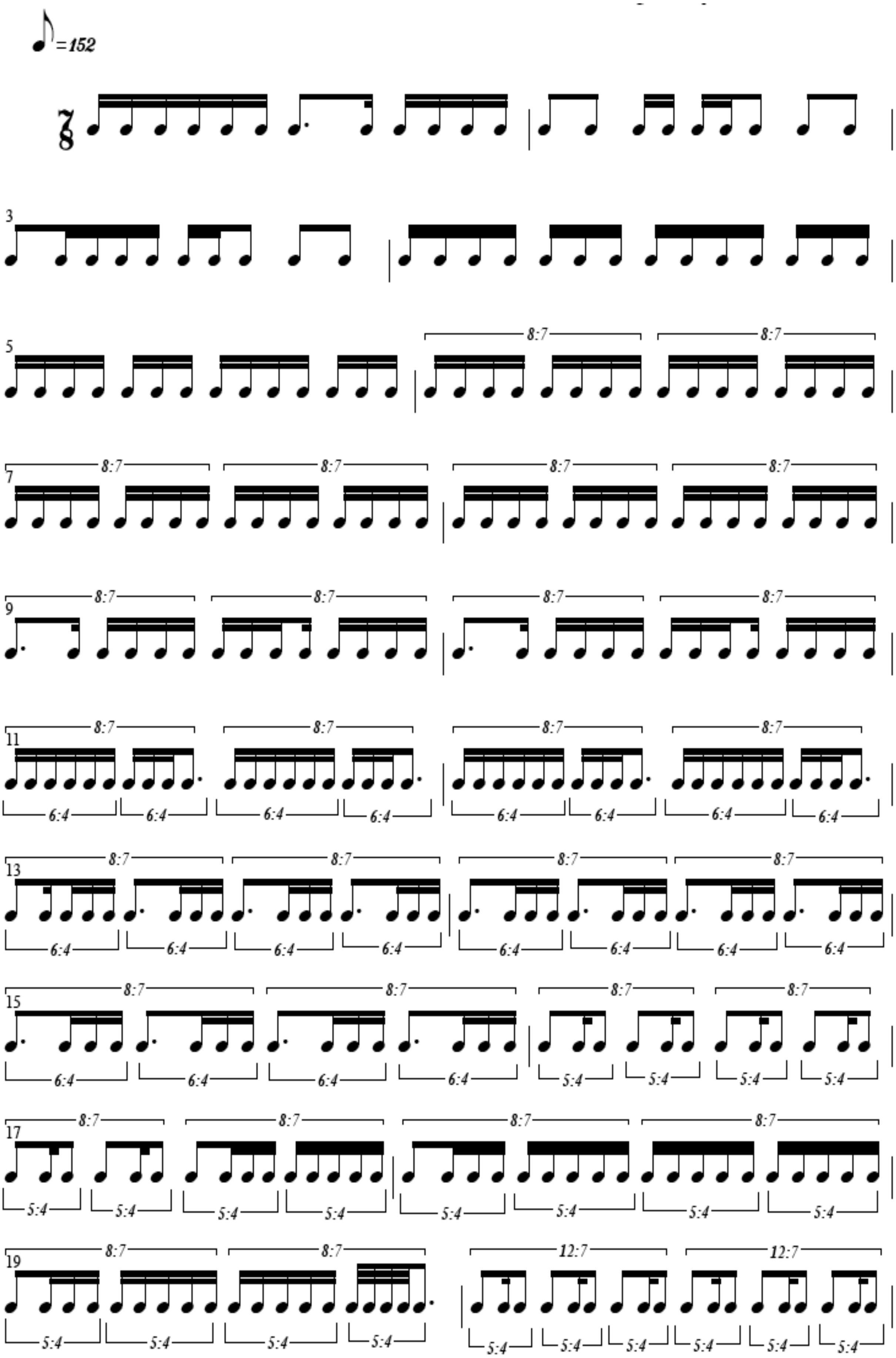
[5] *For reflections on this concept of common denominator, how this affects karnatic music pedagogically and creatively and how it similarly can affect our pedagogic and creative methodology and thinking, please refer to the 'Conclusion' section.*

(track 197)


=152
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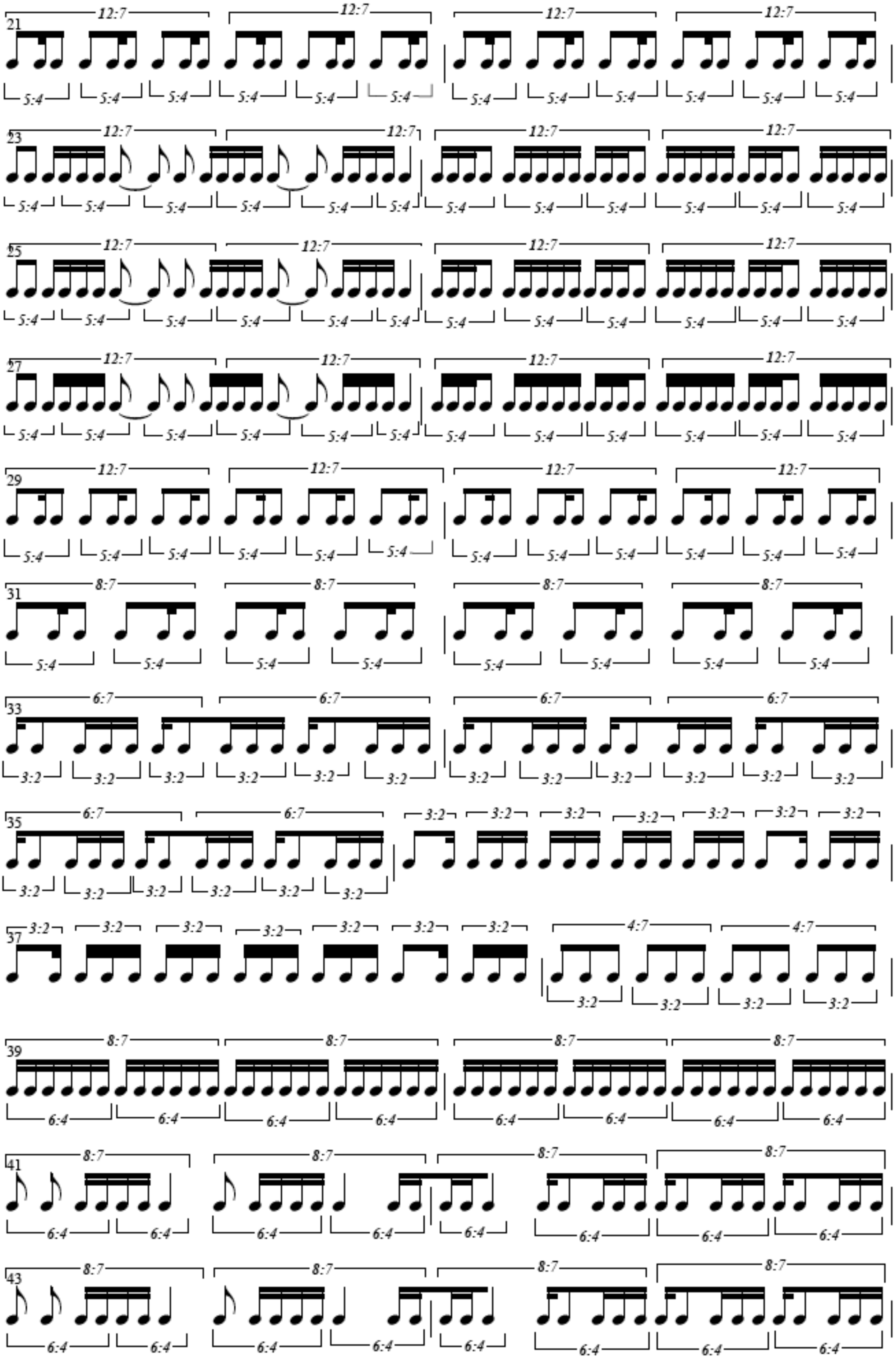
17
19
8:7
6:4
5:4
12:7


21
12:7 12:7 12:7 12:7
5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4
23
12:7 12:7 12:7 12:7
5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4
25
12:7 12:7 12:7 12:7
5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4
27
12:7 12:7 12:7 12:7
5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4
29
12:7 12:7 12:7 12:7
5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4
31
8:7 8:7 8:7 8:7
5:4 5:4 5:4 5:4 5:4 5:4 5:4 5:4
33
6:7 6:7 6:7 6:7
3:2 3:2 3:2 3:2 3:2 3:2 3:2 3:2 3:2 3:2 3:2 3:2
35
6:7 6:7
3:2 3:2 3:2 3:2 3:2 3:2
3:2 3:2 3:2 3:2 3:2 3:2 3:2
37
3:2 3:2 3:2 3:2 3:2 3:2 3:2
4:7 4:7
3:2 3:2 3:2 3:2
39
8:7 8:7 8:7 8:7
6:4 6:4 6:4 6:4 6:4 6:4 6:4 6:4
41
8:7 8:7 8:7 8:7
6:4 6:4 6:4 6:4 6:4 6:4 6:4 6:4
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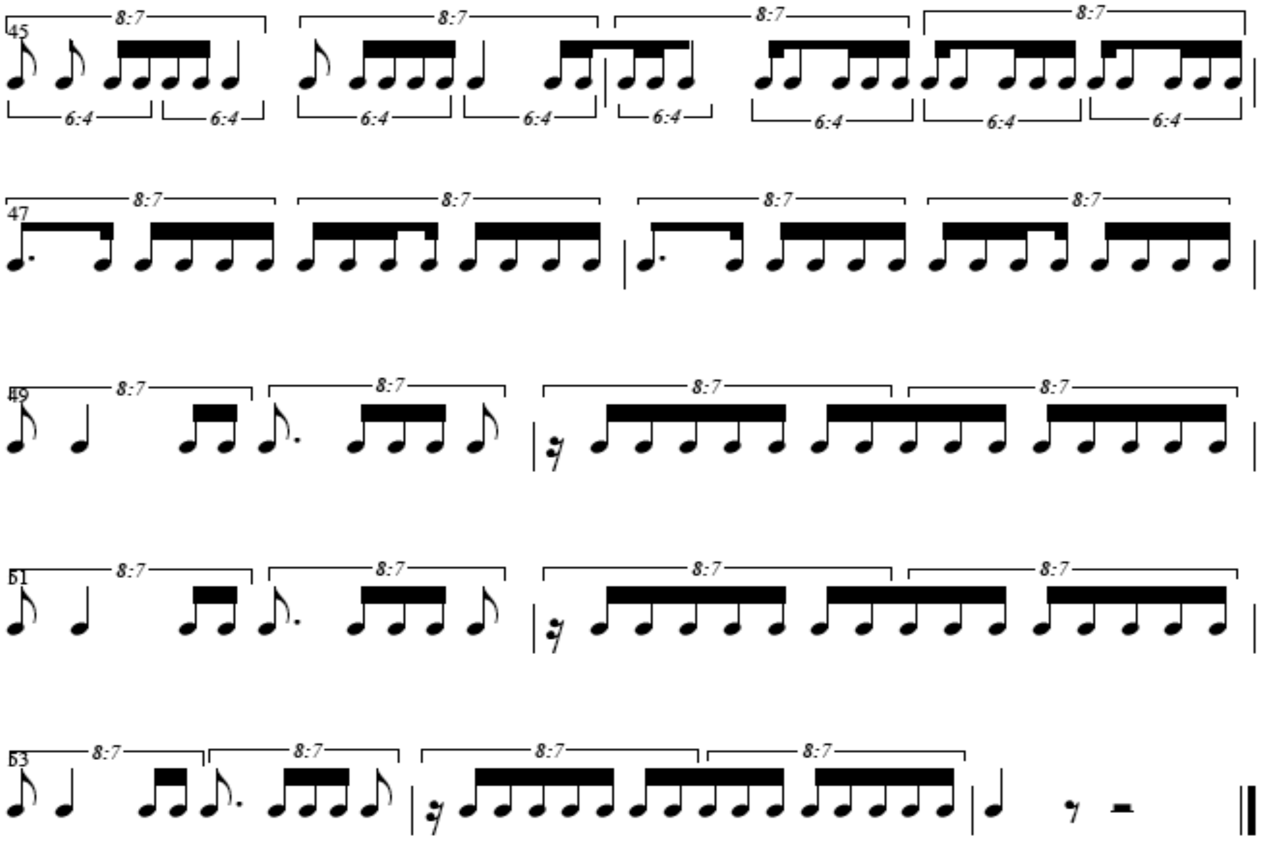

PRACTICE METHOD

Combinations Anuloma-Pratiloma is possibly the most difficult technique to master as a performer, and without a doubt, the one that would require the longest to master. This is due to the following:

-The number of frames of 'irregular groupings' that can be created far exceeds that of any other technique, including nadai bhedam.

-Changes can occur quite rapidly.

-Frequent use of frames in ♩, ♪ and 𝅘𝅥𝅯 with displacements within the beat.

There is a set of three differentiated exercises to practice this concept. The first one addresses the different speeds within the same gati and frame.

The following chart has already appeared at the beginning of the chapter and was followed by a more elaborate one in which, for every karnatic speed, one or two alternative western notational possibilities were provided. For practice purposes I prefer using the karnatic mind set for all the examples in this section[6].

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[6] *The western way of notating has been explained elsewhere in the chapter; memorising the karnatic as well as the western way of notating should help to relate the karnatic concepts and exercises to the western notation when working on contemporary pieces.*

Exercises A

Tisra

1)	┌─ *3:2*♩ ─┐	┌─ *6:2*♩ ─┐	┌─ *9:2*♩ ─┐	┌─ *12:2*♩ ─┐
2)	┌─ *3:4*♩ ─┐	┌─ *6:4*♩ ─┐	┌─ *9:4*♩ ─┐	┌─ *12:4*♩ ─┐
3)	┌─ *3:5*♩ ─┐	┌─ *6:5*♩ ─┐	┌─ *9:5*♩ ─┐	┌─ *12:5*♩ ─┐
4)	┌─ *3:7*♩ ─┐	┌─ *6:7*♩ ─┐	┌─ *9:7*♩ ─┐	┌─ *12:7*♩ ─┐

Chatusra

1)	┌─ *4:2*♩ ─┐	┌─ *8:2*♩ ─┐	┌─ *12:2*♩ ─┐	┌─ *16:2*♩ ─┐
2)	┌─ *4:3*♩ ─┐	┌─ *8:3*♩ ─┐	┌─ *12:3*♩ ─┐	┌─ *16:3*♩ ─┐
3)	┌─ *4:5*♩ ─┐	┌─ *8:5*♩ ─┐	┌─ *12:5*♩ ─┐	┌─ *16:5*♩ ─┐
4)	┌─ *4:6*♩ ─┐	┌─ *8:6*♩ ─┐	┌─ *12:6*♩ ─┐	┌─ *16:6*♩ ─┐
5)	┌─ *4:7*♩ ─┐	┌─ *8:7*♩ ─┐	┌─ *12:7*♩ ─┐	┌─ *16:7*♩ ─┐

Khanda

1)	┌─ *5:2*♩ ─┐	┌─ *10:2*♩ ─┐	┌─ *15:2*♩ ─┐	┌─ *20:2*♩ ─┐
2)	┌─ *5:3*♩ ─┐	┌─ *10:3*♩ ─┐	┌─ *15:3*♩ ─┐	┌─ *20:3*♩ ─┐
3)	┌─ *5:4*♩ ─┐	┌─ *10:4*♩ ─┐	┌─ *15:4*♩ ─┐	┌─ *20:4*♩ ─┐
4)	┌─ *5:6*♩ ─┐	┌─ *10:6*♩ ─┐	┌─ *15:6*♩ ─┐	┌─ *20:6*♩ ─┐
5)	┌─ *5:7*♩ ─┐	┌─ *10:7*♩ ─┐	┌─ *15:7*♩ ─┐	┌─ *20:7*♩ ─┐

Misra

1)	┌─ *7:2*♩ ─┐	┌─ *14:2*♩ ─┐	┌─ *21:2*♩ ─┐	┌─ *28:2*♩ ─┐
2)	┌─ *7:3*♩ ─┐	┌─ *14:3*♩ ─┐	┌─ *21:3*♩ ─┐	┌─ *28:3*♩ ─┐
3)	┌─ *7:4*♩ ─┐	┌─ *14:4*♩ ─┐	┌─ *21:4*♩ ─┐	┌─ *28:4*♩ ─┐
4)	┌─ *7:5*♩ ─┐	┌─ *14:5*♩ ─┐	┌─ *21:5*♩ ─┐	┌─ *28:5*♩ ─┐
5)	┌─ *7:6*♩ ─┐	┌─ *14:6*♩ ─┐	┌─ *21:6*♩ ─┐	┌─ *28:6*♩ ─┐

Providing a practice method for every single speed and gati would probably take too much space and possibly be superfluous. It should suffice to clearly explain one option and the performer should be able to apply the principles to each possibility of the chart.

I have chosen khanda in its 7th speed pratiloma because it is possibly one of the most difficult exercises.

⌐– ***5:7♩*** –¬ ⌐– ***10:7♩*** –¬ ⌐– ***15:7♩*** –¬ ⌐– ***20:7♩*** –¬

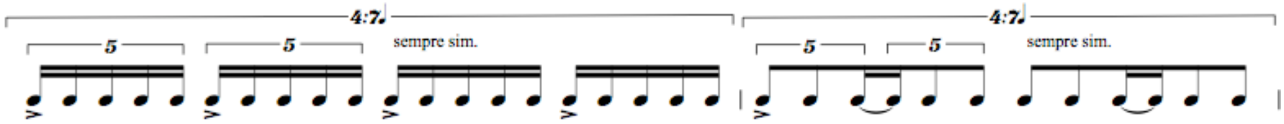
In the first part of anuloma-pratiloma seen in chapter 9, the approach for pratiloma speeds was to have a very clear picture of where the accents of a gati/jathi combination fell within the beat and to isolate the accents. Afterwards, for a 10:3♩ or 14:3♩, every accent of a 5:3♩ or 7:3♩ was doubled (every accent or ♩ became two ♪). Although this thinking is still valid, in the context of combinations anuloma-pratiloma an entirely different approach will possibly speed up the learning process.

1) As explained in the notation section of this chapter, a ***20:7♩*** is actually a frame already seen in nadai bhedam that could be written and felt as ⌐———***4:7♩***———¬
⌐***5***¬ ⌐***5***¬ ⌐***5***¬ ⌐***5***¬

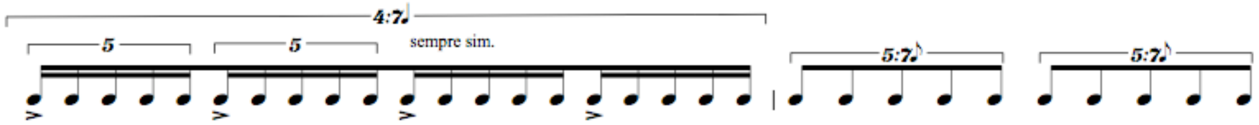
regardless of what sort of phrasing was created for the 20 matras. In order to work out a learning and performing system, borrowing the nadai bhedam feeling and notation provides the musician with an anchor point from where he can approach this 4th speed anuloma within 7th speed pratiloma (and by extension, all 4th speeds anuloma within any pratiloma frame).

Consequently, the 4th speed should be employed as the starting point for any exercise. The 3rd speed should be omitted for now and, subsequently, the 2nd speed should be the next step to practice.

2) In order to perform the 2nd speed (***10:7♩***) one should be feeling the 4th speed and attack every two matras of the ***20:7♩*** *(track 198).*



The line above is the way to feel the ***10:7♩***, as a sort of ramification of the ***20:7♩***, whereas the manner to notate the ***10:7♩*** should be as the line below shows (two times ***5:7♪***).



3) The performer should practice going from the 4th speed to the 2nd speed back and forth to then add the 1st speed; the approach to perform the 1st speed could be, depending on the context, either to follow the same procedure of going from ***20:7♩*** to ***10:7♩***, or to utilise the approach of applying a gati/jathi combination and isolate its accents (in this example, it should be khanda jathi 7).

Therefore, the exercises should follow the next procedure

20:7♩   ***10:7♩***   ***5:7♩*** and, once this direction is mastered, proceed in reverse order ***5:7♩***   ***10:7♩***   ***20:7♩***

4) The last step is to work on the 3rd speed, which departs from the way the previous elements interrelate. As previously explained, the 3rd speed is the fruit of superimposing a gati on the frame provided by a gati/jathi combination based on tisra gati. Hence, ***15:7♩*** is the result of an already shown nadai bhedam frame, namely

┌——***3:7♩***——┐

┌***5***┐┌***5***┐┌***5***┐

One of the exercises proposed for nadai bhedam, the exercise that was a direct result of one of the developmental techniques described in that chapter, was to go from one frame to another by keeping nadai and number of beats (jathi) intact and changing the number of accents (gati). If this step has already been internalised while practicing nadai bhedam, going from ***20:7♩*** to ***15:7♩*** should not represent a major obstacle. The possible problem here is to obtain absolute accuracy and clarity while going from ***15:7♩*** to ***10:7♩*** or vice versa.

The frame ***10:7♩*** was obtained by attacking every two notes of the frame ***20:7♩***. However, with the incorporation of the 3rd speed, that reference point can easily fade and create imprecision in the ***10:7♩***. This is the reason why it is of tremendous importance to practice the previous step (that is, without throwing ***15:7♩*** into the equation) until an independent feeling for the 2nd speed is obtained without having to resort to coming from the 4th speed. Only in this fashion is the incorporation of the 3rd speed into the working process feasible.

5) All four speeds should be practiced going up and down in order. *(track 199)*

20:7♩   ***15:7♩***   ***10:7♩***   ***5:7♩*** should be repeated until the change from the 3rd speed to the 2nd speed is felt with complete accuracy. Afterwards, the order should be reversed.

6) Once both orders have acquired a high level of accuracy, the performer is to change speeds randomly.

Having followed all the steps just described, any performer should be in state of applying these principles to all frames of all gatis in the set of exercises 'A'.

Exercises B

These exercises focus on practicing every anuloma speed in all its possible pratiloma frames. An intensive practice on Exercises A should provide enough understanding to face these exercises. However, a few remarks may facilitate the practice process of these exercises.

a) All 1st speeds should be approached with the system of isolating the accents of gati/jathi combinations.

b) All 2nd speeds should be felt by doubling the number of matras in relation to the 1st speed (although, in some cases, applying the approach of the 1st speed can equally be fruitful).

c) All 3rd speeds are based on the nadai bhedam frame of 3:x, superimposing the relevant gati three times.

d) All 4th speeds are based on the nadai bhedam frame of 4:x, superimposing the relevant gati four times.

Therefore, the difficulty in these exercises resides on the fact that the same gati and speed remains whilst their number of beats change (these exercises bring forth the 3rd developmental technique).

Tisra

1) ┌─ ***3:2♩*** ─┐ ┌─ ***3:4♩*** ─┐ ┌─ ***3:5♩*** ─┐ ┌─ ***3:7♩*** ─┐

2) ┌─ ***6:2♩*** ─┐ ┌─ ***6:4♩*** ─┐ ┌─ ***6:5♩*** ─┐ ┌─ ***6:7♩*** ─┐

3) ┌─ ***9:2♩*** ─┐ ┌─ ***9:4♩*** ─┐ ┌─ ***9:5♩*** ─┐ ┌─ ***9:7♩*** ─┐

4) ┌─ ***12:2♩*** ─┐ ┌─ ***12:4♩*** ─┐ ┌─ ***12:5♩*** ─┐ ┌─ ***12:7♩*** ─┐

Chatusra

1) ┌─ ***4:2♩*** ─┐ ┌─ ***4:3♩*** ─┐ ┌─ ***4:5♩*** ─┐ ┌─ ***4:7♩*** ─┐

2) ┌─ ***8:2♩*** ─┐ ┌─ ***8:3♩*** ─┐ ┌─ ***8:5♩*** ─┐ ┌─ ***8:7♩*** ─┐

3) ┌─ ***12:2♩*** ─┐ ┌─ ***12:3♩*** ─┐ ┌─ ***12:5♩*** ─┐ ┌─ ***12:7♩*** ─┐

4) ┌─ ***16:2♩*** ─┐ ┌─ ***16:3♩*** ─┐ ┌─ ***16:5♩*** ─┐ ┌─ ***16:7♩*** ─┐

Khanda

1) ┌─ ***5:2♩*** ─┐ ┌─ ***5:3♩*** ─┐ ┌─ ***5:4♩*** ─┐ ┌─ ***5:6♩*** ─┐ ┌─ ***5:7♩*** ─┐

2) ┌─ ***10:2♩*** ─┐ ┌─ ***10:3♩*** ─┐ ┌─ ***10:4♩*** ─┐ ┌─ ***10:6♩*** ─┐ ┌─ ***10:7♩*** ─┐

3) ┌─ ***15:2♩*** ─┐ ┌─ ***15:3♩*** ─┐ ┌─ ***15:4♩*** ─┐ ┌─ ***15:6♩*** ─┐ ┌─ ***15:7♩*** ─┐

4) ┌─ ***20:2♩*** ─┐ ┌─ ***20:3♩*** ─┐ ┌─ ***20:4♩*** ─┐ ┌─ ***20:6♩*** ─┐ ┌─ ***20:7♩*** ─┐

Misra

1) ┌─ ***7:2♩*** ─┐ ┌─ ***7:3♩*** ─┐ ┌─ ***7:4♩*** ─┐ ┌─ ***7:5♩*** ─┐ ┌─ ***7:6♩*** ─┐

2) ┌─ ***14:2♩*** ─┐ ┌─ ***14:3♩*** ─┐ ┌─ ***14:4♩*** ─┐ ┌─ ***14:5♩*** ─┐ ┌─ ***14:6♩*** ─┐

3) ┌─ ***21:2♩*** ─┐ ┌─ ***21:3♩*** ─┐ ┌─ ***21:4♩*** ─┐ ┌─ ***21:5♩*** ─┐ ┌─ ***21:6♩*** ─┐

4) ┌─ ***28:2♩*** ─┐ ┌─ ***28:3♩*** ─┐ ┌─ ***28:4♩*** ─┐ ┌─ ***28:5♩*** ─┐ ┌─ ***28:6♩*** ─┐

Exercises C

These exercises are designed to combine frames in ♩, ♪ or 𝅘𝅥𝅯 and the displacements that the permutations of these different frames produce. The exercises are thought of in odd number frames, due to the fact that they are the ones that can effectively produce displacements at the beginning or the end of an irregular grouping within the beat.

The exercises ‘C’ are actually divided into two differentiated set of exercises.

1) The first one is worked out in order to accomplish a double goal:

-Enable the superimposition of any gati on any odd number frame, expressed in 𝅘𝅥𝅯, starting anywhere in the beat.

-Enable the change from an irregular grouping to a pulse in chatusra gati and vice versa.

The procedure to practice the exercise consists of the following elements:

a) Superimpose chatusra, tisra, khanda or misra over the underlined number of the exercises below, which is always expressed in 𝅘𝅥𝅯

b) The rest of numbers should be done performing all matras in regular chatusra, also expressed in 𝅘𝅥𝅯

Therefore, if we take the example 2 + **3** + 3, the first and last digits should be done performing all the matras in regular chatusra. The underlined **3** serves as the frame over which any other gati is superimposed. In the case of 3, chatusra, khanda and misra should be superimposed. *(track 200)*

3 : 1 + **3** **3** + 1 2 + **3** + 3 3 + **3** + 2

Superimpose chatusra, tisra and misra on the underlined number. The rest of numbers should be done in regular chatusra *(track 201)*

5 : **5** + 3 3 + **5** 1 + **5** + 2 2 + **5** + 1

Superimpose chatusra, khanda and tisra on the underlined number. The rest of numbers should be done in regular chatusra *(track 202)*

7 : 7 + 1 1 + 7 2 + 7 + 3 3 + 7 + 2

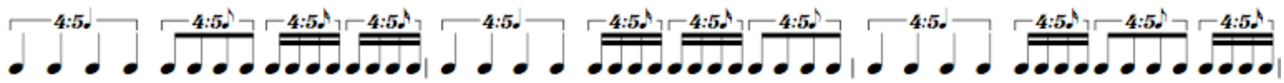
2) The second part of these exercises ‘C’ are similarly structured around odd number frames, but combining frames of ♩, ♪ or 𝅘𝅥𝅯 that share the same number. As a matter of fact, every exercise is a multiple one because the frames in ♩, ♪ or 𝅘𝅥𝅯 exchange their positions so that every frame would start in different places within the beat.

The first approach would then be to practice the three possible permutations while the frame in ♩ is always the beginning frame.

If the exercise on ⌐ ***4:5***♩ ¬ ⌐ ***4:5***♪ ¬ ⌐ ***4:5***𝅘𝅥𝅯 ¬ is taken as an example, the first thing to take into consideration is that the frame in 𝅘𝅥𝅯 needs to be performed twice so that the whole exercise can finish on a beat. In this case, the whole exercise would require ten beats to resolve.

The first three exercises would then be *(track 203)*

-4:5♩ ***4:5***♪ ***4:5***𝅘𝅥𝅯 ***4:5***𝅘𝅥𝅯 ***-4:5***♩ ***4:5***𝅘𝅥𝅯 ***4:5***𝅘𝅥𝅯 ***4:5***♪ ***-4:5***♩ ***4:5***𝅘𝅥𝅯 ***4:5***♪ ***4:5***𝅘𝅥𝅯



If a musician would like to deepen in all the permutations of ♩, ♪ and 𝅘𝅥𝅯, the remaining nine possibilities would be:

♪ ♩ 𝅘𝅥𝅯 𝅘𝅥𝅯

𝅘𝅥𝅯 𝅘𝅥𝅯 ♪ ♩

𝅘𝅥𝅯 ♪ ♩ 𝅘𝅥𝅯

♪ 𝅘𝅥𝅯 𝅘𝅥𝅯 ♩

𝅘𝅥𝅯 𝅘𝅥𝅯 ♩ ♪

𝅘𝅥𝅯 ♪ ♩ 𝅘𝅥𝅯

♪ 𝅘𝅥𝅯 ♩ 𝅘𝅥𝅯

𝅘𝅥𝅯 ♩ 𝅘𝅥𝅯 ♪

𝅘𝅥𝅯 ♩ ♪ 𝅘𝅥𝅯

Every exercise shown below can be practiced exchanging its frames of ♩, ♪ and 𝅘𝅥𝅯 using all the twelve possibilities. However, practicing the first three permutations shown above should be sufficient.

In the chart, the frame in 𝅘𝅥𝅯 is always followed by the reference x2, meaning that this frame has to be realised twice in any permutation, whether played together or separately as shown above.

Tisra

1) ┌─ ***3:5♩*** ─┐ ┌─ ***3:5♪*** ─┐ ┌─ ***3:5𝅘𝅥𝅯*** ─┐ x 2
┌─ ***3:7♩*** ─┐ ┌─ ***3:7♪*** ─┐ ┌─ ***3:7𝅘𝅥𝅯*** ─┐ x 2

2) ┌─ ***6:5♩*** ─┐ ┌─ ***6:5♪*** ─┐ ┌─ ***6:5𝅘𝅥𝅯*** ─┐ x 2
┌─ ***6:7♩*** ─┐ ┌─ ***6:7♪*** ─┐ ┌─ ***6:7𝅘𝅥𝅯*** ─┐ x 2

Chatusra

1) ┌─ ***4:3♩*** ─┐ ┌─ ***4:3♪*** ─┐ ┌─ ***4:3𝅘𝅥𝅯*** ─┐ x 2
┌─ ***4:5♩*** ─┐ ┌─ ***4:5♪*** ─┐ ┌─ ***4:5𝅘𝅥𝅯*** ─┐ x 2
┌─ ***4:7♩*** ─┐ ┌─ ***4:7♪*** ─┐ ┌─ ***4:7𝅘𝅥𝅯*** ─┐ x 2

2) ┌─ ***8:3♩*** ─┐ ┌─ ***8:3♪*** ─┐ ┌─ ***8:3𝅘𝅥𝅯*** ─┐ x 2
┌─ ***8:5♩*** ─┐ ┌─ ***8:5♪*** ─┐ ┌─ ***8:5𝅘𝅥𝅯*** ─┐ x 2
┌─ ***8:7♩*** ─┐ ┌─ ***8:7♪*** ─┐ ┌─ ***8:7𝅘𝅥𝅯*** ─┐ x 2

Khanda

1) ┌─ ***5:3♩*** ─┐ ┌─ ***5:3♪*** ─┐ ┌─ ***5:3𝅘𝅥𝅯*** ─┐ x 2
┌─ ***5:7♩*** ─┐ ┌─ ***5:7♪*** ─┐ ┌─ ***5:7𝅘𝅥𝅯*** ─┐ x 2

2) ┌─ ***10:3♩*** ─┐ ┌─ ***10:3♪*** ─┐ ┌─ ***10:3𝅘𝅥𝅯*** ─┐ x 2 (only in very slow tempi)
┌─ ***10:7♩*** ─┐ ┌─ ***10:7♪*** ─┐ ┌─ ***10:7𝅘𝅥𝅯*** ─┐ x 2

Misra

1) ┌─ ***7:3♩*** ─┐ ┌─ ***7:3♪*** ─┐ ┌─ ***7:3𝅘𝅥𝅯*** ─┐ x 2
┌─ ***7:5♩*** ─┐ ┌─ ***7:5♪*** ─┐ ┌─ ***7:5𝅘𝅥𝅯*** ─┐ x 2

2) ┌─ ***14:5♩*** ─┐ ┌─ ***14:5♪*** ─┐ ┌─ ***14:5𝅘𝅥𝅯*** ─┐ x 2 (only in very slow tempi)

Exercises using developmental techniques as framework

Once the exercises A, B and C have been sufficiently practiced, the student should start combining the concepts of mixing frames of ♩, ♪ or 𝅘𝅥𝅯 through the four main developmental techniques (2nd , 3rd , 4th and 6th) explained in the chapter; practicing phrases derived from these developmental techniques is a method to crystallise the previous exercises into a more concrete format.

Before the musician starts analysing and practicing these exercises, it is relevant to explain the possible sources that can be chosen in order to perform a particular passage; many a times, the performer will have to play a given frame in a completely displaced position within the beat. Depending on the speed and whether the frame is expressed in ♩, ♪ or 𝅘𝅥𝅯, the performer will have to resort to one of the following sources:

a) Nadai Bhedam: any frame expressed in 𝅘𝅥𝅯, can be traced back to a nadai bhedam frame. If, for instance, a ***7:5𝅘𝅥𝅯*** starts on the second matra of the beat, all one needs to do is to 'remember' how this irregular grouping was played within a ⌐———***4:5♩***———¬
⌐7¬⌐7¬⌐7¬⌐7¬

in the second bracket (which starts on the second 𝅘𝅥𝅯 of the beat, following the chatusra jathi 5 structure). If the same ***7:5𝅘𝅥𝅯*** is to be played starting on the second half of the beat, the performer should 'remember' how the third bracket was performed in the same nadai bhedam frame. And, finally, if ***7:5𝅘𝅥𝅯*** is to be played starting on the fourth matra of the beat, should resort to how the last bracket of the nadai bhedam frame was performed.

Therefore, for any 𝅘𝅥𝅯 frame, provided that 1st, 2nd or 4th speeds anuloma are used, the solution is to take the number of the frame (***5𝅘𝅥𝅯*** in this case), and use it as the number of beats of a nadai bhedam frame whilst always utilising four accents. (Subsequently, it will always be a result of using a ***4:3♩***, ***4:5♩***, ***4:6♩*** or ***4:7♩*** frame).

If the 3rd speed is used, then the nadai bhedam frame to be used is ***3:2♩***, ***3:4♩***, ***3:5♩*** or ***3:7♩*** (eventually ***6:4♩***, ***6:5♩*** or ***6:7♩***).

b) Exercises 'C' of anuloma-pratiloma combinations: all the possible starting and ending positions of any possible irregular grouping, whether expressed in ♩, ♪ or 𝅘𝅥𝅯, can also be traced back to any of the possible permutations of these exercises. The performer needs to practice again the pertinent permutation and apply it to the specific point of the exercise (and, in a later stage, on any piece of music).

If, for instance, a 7:5♪ is to be played starting on the second matra of the beat, the musician should resort to practicing the permutation ***7:5𝅘𝅥𝅯*** ***7:5♪*** ***7:5𝅘𝅥𝅯*** since the first frame of ***7:5𝅘𝅥𝅯*** ends on the second matra. Consequently, if the musician has previously internalised this exercise, he should be in a position to perform 7:5♪ starting on the second matra.

c) Practice of even number frames starting in every matra of the beat: all the frames against ***4♪*** or ***6♪*** should be practiced starting on the 2nd, 3rd and 4th matras of the beat. It is of utmost importance that, for instance, a ***5:4♪*** or ***7:6♪*** should be performed with a down beat feeling regardless of the starting point within the beat.

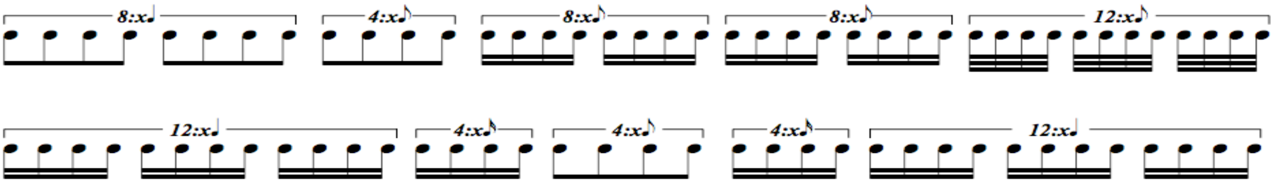
d) Mixed jathi nadai bhedam: displaced frames can also be solved by 'remembering' the displacements of these frames within this concept; frames of 4 or 6 matras were combined with other numbers and, due to the alternating accents, a ***5:4♪*** or ***7:6♪*** was performed starting in every matra of the beat. In fact, this technique can also be applied to any odd or even number frame since all of them were used in all combinations while practicing this device.

Therefore, any musician can resort to any of these four techniques in order to manage any frame starting and finishing anywhere in the beat. All exercises presented below will provide the student with the possibility of analysing all starting points and applying the best technique to perform the sequences with complete accuracy (also, listening to the examples recorded by B. C. Manjunath could greatly help). The examples shown below are to be practiced without any phrasing, only with all the matras of the gati/speed.

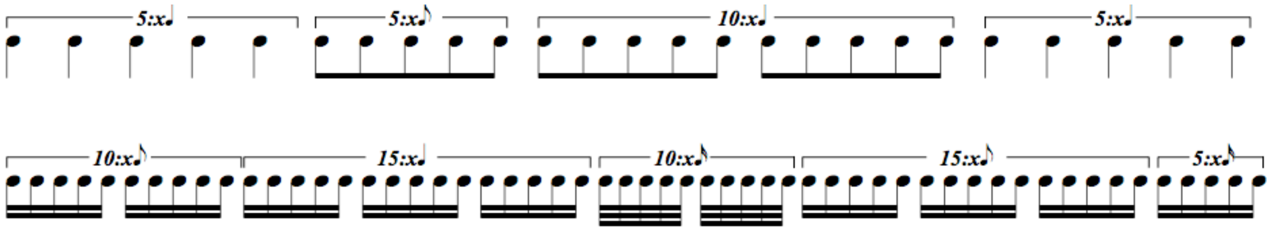
Developmental Technique 2: Same gati and frames, different speeds

In the following exercises, the X on the right side of the bracket is to be replaced by 3, 4, 5, 6 or 7, since every example is to be practiced with all the available pratiloma frames for each gati.

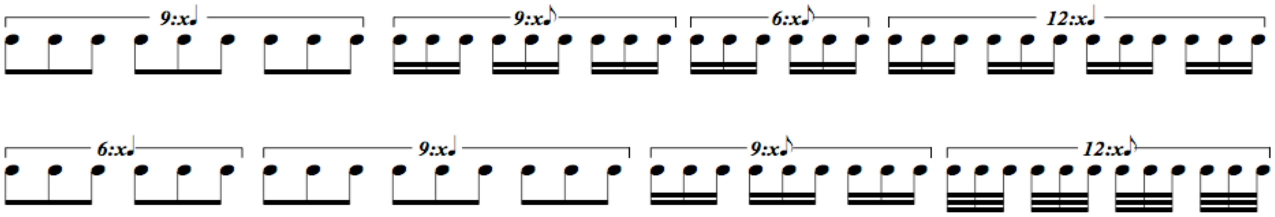
a) Chatusra: should be practiced against 3rd , 5th , 6th and 7th pratiloma frames



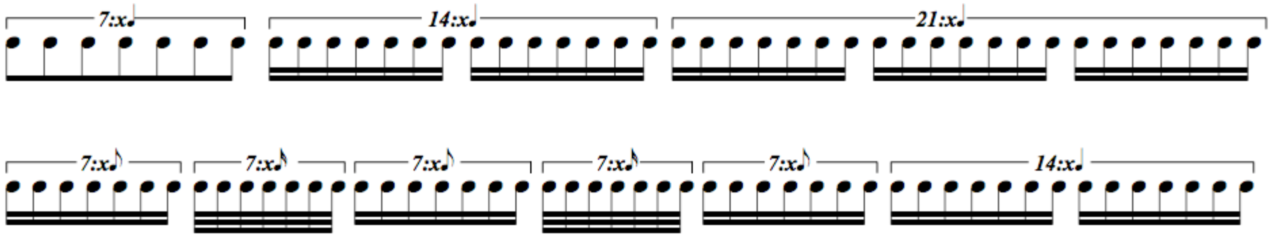
b) Khanda: should be practiced against 3rd , 4th , 6th and 7th pratiloma frames



c) Tisra: should be practiced against 2nd , 4th , 5th and 7th pratiloma frames



d) Misra: should be practiced against 3rd , 4th , 5th and 6th pratiloma frames



Developmental technique 3: Same gati and speed, different frame

Every exercise should be practiced with both speeds written on the left side of the bracket.

a) Tisra

⌐ $\genfrac{}{}{0pt}{}{3}{6}$:5♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{3}{6}$:5𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{3}{6}$:5𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{3}{6}$:7𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{3}{6}$:7♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{3}{6}$:7𝅘𝅥𝅯 ¬

⌐ $\genfrac{}{}{0pt}{}{3}{6}$:5𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{3}{6}$:5♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{3}{6}$:5𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{3}{6}$:7𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{3}{6}$:7𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{3}{6}$:7♪ ¬

⌐ $\genfrac{}{}{0pt}{}{3}{6}$:5𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{3}{6}$:7𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{3}{6}$:7♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{3}{6}$:5♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{3}{6}$:5𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{3}{6}$:7𝅘𝅥𝅯 ¬

b) Chatusra

⌐ $\genfrac{}{}{0pt}{}{4}{8}$:5♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{4}{8}$:5𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{4}{8}$:5𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{4}{8}$:7𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{4}{8}$:7♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{4}{8}$:7𝅘𝅥𝅯 ¬

⌐ $\genfrac{}{}{0pt}{}{4}{8}$:5𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{4}{8}$:5♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{4}{8}$:5𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{4}{8}$:7𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{4}{8}$:7𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{4}{8}$:7♪ ¬

⌐ $\genfrac{}{}{0pt}{}{4}{8}$:5𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{4}{8}$:7𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{4}{8}$:7♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{4}{8}$:5♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{4}{8}$:5𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{4}{8}$:7𝅘𝅥𝅯 ¬

c) Khanda: two different exercises; one with 1st and 2nd speeds and another with 3rd and 4th speeds

⌐ $\genfrac{}{}{0pt}{}{5}{10}$:6♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:6𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:6𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:7𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:7♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:7𝅘𝅥𝅯 ¬

⌐ $\genfrac{}{}{0pt}{}{5}{10}$:6𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:6♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:6𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:7𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:7𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:7♪ ¬

⌐ $\genfrac{}{}{0pt}{}{5}{10}$:6𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:7𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:6𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:5𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:6♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:7♪ ¬

⌐ $\genfrac{}{}{0pt}{}{5}{10}$:7𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:4𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:6𝅘𝅥𝅯 ¬ ⌐ $\genfrac{}{}{0pt}{}{5}{10}$:5𝅘𝅥𝅯 ¬

⌐ $\genfrac{}{}{0pt}{}{15}{20}$:6♩ ¬ ⌐ $\genfrac{}{}{0pt}{}{15}{20}$:6♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{15}{20}$:6♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{15}{20}$:7♩ ¬ ⌐ $\genfrac{}{}{0pt}{}{15}{20}$:7♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{15}{20}$:7♪ ¬

⌐ $\genfrac{}{}{0pt}{}{15}{20}$:6♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{15}{20}$:6♩ ¬ ⌐ $\genfrac{}{}{0pt}{}{15}{20}$:6♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{15}{20}$:7♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{15}{20}$:7♩ ¬ ⌐ $\genfrac{}{}{0pt}{}{15}{20}$:7♪ ¬

⌐ $\genfrac{}{}{0pt}{}{15}{20}$:6♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{15}{20}$:7♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{15}{20}$:7♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{15}{20}$:4♩ ¬ ⌐ $\genfrac{}{}{0pt}{}{15}{20}$:4♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{15}{20}$:6♪ ¬ ⌐ $\genfrac{}{}{0pt}{}{15}{20}$:7♩ ¬

d) Misra: two different exercises; one with 1st and 2nd speeds and another with 3rd and 4th speeds

┌─ $\genfrac{}{}{0pt}{}{7}{14}$:5♪ ─┐ ┌─ $\genfrac{}{}{0pt}{}{7}{14}$:5𝅘𝅥𝅯 ─┐ ┌─ $\genfrac{}{}{0pt}{}{7}{14}$:5𝅘𝅥𝅯 ─┐ ┌─ $\genfrac{}{}{0pt}{}{7}{14}$:6𝅘𝅥𝅯 ─┐ ┌─ $\genfrac{}{}{0pt}{}{7}{14}$:6♪ ─┐ ┌─ $\genfrac{}{}{0pt}{}{7}{14}$:6𝅘𝅥𝅯 ─┐

┌─ $\genfrac{}{}{0pt}{}{7}{14}$:5𝅘𝅥𝅯 ─┐ ┌─ $\genfrac{}{}{0pt}{}{7}{14}$:5♪ ─┐ ┌─ $\genfrac{}{}{0pt}{}{7}{14}$:5𝅘𝅥𝅯 ─┐ ┌─ $\genfrac{}{}{0pt}{}{7}{14}$:6𝅘𝅥𝅯 ─┐ ┌─ $\genfrac{}{}{0pt}{}{7}{14}$:6𝅘𝅥𝅯 ─┐ ┌─ $\genfrac{}{}{0pt}{}{7}{14}$:6♪ ─┐

┌─ $\genfrac{}{}{0pt}{}{7}{14}$:5𝅘𝅥𝅯 ─┐ ┌─ $\genfrac{}{}{0pt}{}{7}{14}$:6𝅘𝅥𝅯 ─┐ ┌─ $\genfrac{}{}{0pt}{}{7}{14}$:5𝅘𝅥𝅯 ─┐ ┌─ $\genfrac{}{}{0pt}{}{7}{14}$:4𝅘𝅥𝅯 ─┐ ┌─ $\genfrac{}{}{0pt}{}{7}{14}$:5♪ ─┐ ┌─ $\genfrac{}{}{0pt}{}{7}{14}$:6♪ ─┐ ┌─ $\genfrac{}{}{0pt}{}{7}{14}$:5♪ ─┐

┌─ $\genfrac{}{}{0pt}{}{21}{28}$:6♩ ─┐ ┌─ $\genfrac{}{}{0pt}{}{21}{28}$:6♪ ─┐ ┌─ $\genfrac{}{}{0pt}{}{21}{28}$:6♪ ─┐ ┌─ $\genfrac{}{}{0pt}{}{21}{28}$:5♩ ─┐ ┌─ $\genfrac{}{}{0pt}{}{21}{28}$:5♩ ─┐ ┌─ $\genfrac{}{}{0pt}{}{21}{28}$:5♪ ─┐ ┌─ $\genfrac{}{}{0pt}{}{21}{28}$:5♪ ─┐

┌─ $\genfrac{}{}{0pt}{}{21}{28}$:6♪ ─┐ ┌─ $\genfrac{}{}{0pt}{}{21}{28}$:6♩ ─┐ ┌─ $\genfrac{}{}{0pt}{}{21}{28}$:6♪ ─┐ ┌─ $\genfrac{}{}{0pt}{}{21}{28}$:5♪ ─┐ ┌─ $\genfrac{}{}{0pt}{}{21}{28}$:5♩ ─┐ ┌─ $\genfrac{}{}{0pt}{}{21}{28}$:5♪ ─┐ ┌─ $\genfrac{}{}{0pt}{}{21}{28}$:6♪ ─┐

┌─ $\genfrac{}{}{0pt}{}{21}{28}$:5♪ ─┐ ┌─ $\genfrac{}{}{0pt}{}{21}{28}$:4♩ ─┐ ┌─ $\genfrac{}{}{0pt}{}{21}{28}$:6♪ ─┐ ┌─ $\genfrac{}{}{0pt}{}{21}{28}$:5♪ ─┐ ┌─ $\genfrac{}{}{0pt}{}{21}{28}$:6♩ ─┐ ┌─ $\genfrac{}{}{0pt}{}{21}{28}$:5♪ ─┐

Developmental Technique 4: Same gati, different speeds and frames

a) Tisra with all speeds & frames

┌─ *3:4*♩ ─┐ ┌─ *9:2*♩ ─┐ ┌─ *3:5*♩ ─┐ ┌─ *9:4*♩ ─┐ ┌─ *6:2*♩ ─┐ ┌─ *9:5*♩ ─┐

┌─ *6:3*♩ ─┐ ┌─ *12:5*♩ ─┐ ┌─ *6:4*♩ ─┐ ┌─ *6:7*♩ ─┐ ┌─ *9:5*♩ ─┐ ┌─ *12:7*♩ ─┐

┌─ *6:4*♩ ─┐ ┌─ *9:2*♩ ─┐ ┌─ *12:3*♩ ─┐ ┌─ *12:5*♩ ─┐ ┌─ *6:4*♩ ─┐ ┌─ *9:7*♩ ─┐

b) Chatusra with all speeds & frames

┌─ *8:2*♩ ─┐ ┌─ *8:5*♩ ─┐ ┌─ *8:3*♩ ─┐ ┌─ *8:4*♩ ─┐ ┌─ *12:7*♩ ─┐ ┌─ *16:6*♩ ─┐ ┌─ *8:5*♩ ─┐

┌─ *12:4*♩ ─┐ ┌─ *12:5*♩ ─┐ ┌─ *8:6*♩ ─┐ ┌─ *16:5*♩ ─┐ ┌─ *8:7*♩ ─┐ ┌─ *12:6*♩ ─┐

┌─ *16:7*♩ ─┐ ┌─ *12:7*♩ ─┐ ┌─ *8:3*♩ ─┐ ┌─ *12:5*♩ ─┐ ┌─ *4:7*♩ ─┐ ┌─ *4:3*♩ ─┐ ┌─ *8:7*♩ ─┐

c) Khanda with all speeds & frames

┌─ *10:3*♩ ─┐ ┌─ *15:4*♩ ─┐ ┌─ *5:7*♩ ─┐ ┌─ *15:5*♩ ─┐ ┌─ *20:6*♩ ─┐ ┌─ *20:7*♩ ─┐

┌─ *15:6*♩ ─┐ ┌─ *10:4*♩ ─┐ ┌─ *5:3*♩ ─┐ ┌─ *15:2*♩ ─┐ ┌─ *5:4*♩ ─┐ ┌─ *20:5*♩ ─┐

┌─ *5:6*♩ ─┐ ┌─ *20:3*♩ ─┐ ┌─ *10:7*♩ ─┐ ┌─ *10:6*♩ ─┐ ┌─ *15:4*♩ ─┐ ┌─ *10:3*♩ ─┐

┌─ *5:2*♩ ─┐ ┌─ *20:7*♩ ─┐ ┌─ *15:3*♩ ─┐ ┌─ *5:6*♩ ─┐

d) Misra with all speeds & frames

┌─ *7:3*♩ ─┐ ┌─ *14:2*♩ ─┐ ┌─ *21:7*♩ ─┐ ┌─ *28:6*♩ ─┐ ┌─ *14:5*♩ ─┐ ┌─ *7:2*♩ ─┐ ┌─ *21:5*♩ ─┐

┌─ *28:6*♩ ─┐ ┌─ *21:4*♩ ─┐ ┌─ *14:3*♩ ─┐ ┌─ *28:5*♩ ─┐ ┌─ *7:4*♩ ─┐ ┌─ *21:6*♩ ─┐ ┌─ *28:6*♩ ─┐

┌─ *28:3*♩ ─┐ ┌─ *21:4*♩ ─┐ ┌─ *7:6*♩ ─┐ ┌─ *21:5*♩ ─┐ ┌─ *14:6*♩ ─┐ ┌─ *7:5*♩ ─┐

Developmental Technique 6: Same frame, different gatis and speeds

a) All gatis & speeds against 3 beats

┌─ 4:3♩─┐ ┌─ 15:3♩ ─┐ ┌─ 28:3♩ ─┐┌─ 5:3♩ ─┐ ┌─ 8:3♩ ─┐ ┌─ 9:3♩ ─┐

┌─ 10:3♩ ─┐ ┌─ 14:3♩ ─┐ ┌─ 7:3♩ ─┐ ┌─ 16:3♩ ─┐ ┌─ 20:3♩ ─┐ ┌─ 21:3♩ ─┐

┌─ 28:3♩ ─┐ ┌─ 10:3♩ ─┐ ┌─ 4:3♩ ─┐ ┌─ 14:3♩ ─┐ ┌─ 15:3♩─┐ ┌─ 16:3♩ ─┐

b) All gatis & speeds against 4 beats

┌─ 3:4♩ ─┐ ┌─ 10:4♩ ─┐ ┌─ 21:4♩ ─┐┌─ 7:4♩ ─┐ ┌─ 12:4♩ ─┐ ┌─ 15:4♩ ─┐

┌─ 9:4♩ ─┐ ┌─ 14:4♩ ─┐ ┌─ 5:4♩─┐ ┌─ 28:4♩ ─┐ ┌─ 15:4♩ ─┐ ┌─ 6:4♩─┐

┌─ 21:4♩ ─┐ ┌─ 10:4♩ ─┐ ┌─ 7:4♩─┐ ┌─ 9:4♩ ─┐ ┌─ 5:4♩ ─┐ ┌─ 8:4♩ ─┐┌─ 9:4♩─┐ ┌─ 21:4♩ ─┐

c) All gatis & speeds against 5 beats

┌─7:5♩ ─┐ ┌─15:5♩─┐ ┌─8:5♩─┐ ┌─12:5♩─┐ ┌─21:5♩─┐ ┌─16:5♩─┐

┌─15:5♩─┐ ┌─4:5♩─┐ ┌─9:5♩─┐ ┌─28:5♩─┐ ┌─6:5♩─┐ ┌─20:5♩ ─┐

┌─3:5♩─┐ ┌─21:5♩─┐ ┌─14:5♩─┐ ┌─9:5♩─┐ ┌─7:5♩─┐ ┌─12:5♩─┐

┌─21:5♩─┐ ┌─16:5♩─┐ ┌─7:5♩─┐ ┌─6:5♩─┐

d) All gatis & speeds against 6 beats

┌─ 4:6♩─┐ ┌─ 15:6♩ ─┐ ┌─ 28:6♩ ─┐┌─ 5:6♩ ─┐ ┌─ 8:6♩ ─┐ ┌─ 9:6♩ ─┐

┌─ 10:6♩ ─┐ ┌─ 14:6♩ ─┐ ┌─ 7:6♩ ─┐ ┌─ 16:6♩ ─┐ ┌─ 20:6♩ ─┐ ┌─ 21:6♩─┐

┌─ 28:6♩ ─┐ ┌─ 10:6♩ ─┐ ┌─ 4:6♩ ─┐ ┌─ 14:6♩ ─┐ ┌─ 15:6♩─┐ ┌─ 16:6♩ ─┐

e) All gatis & speeds against 7 beats

┌─ 6:7♩ ─┐ ┌─ 15:7♩ ─┐ ┌─ 21:7♩ ─┐ ┌─ 20:7♩ ─┐ ┌─ 4:7♩ ─┐ ┌─ 9:7♩─┐ ┌─ 16:7♩ ─┐

┌─ 5:7♩ ─┐ ┌─ 12:7♩ ─┐ ┌─ 14 7♩ ─┐ ┌─ 10:7♩ ─┐ ┌─ 3:7♩ ─┐ ┌─ 15:7♩ ─┐ ┌─ 8:7♩ ─┐

┌─ 20:7♩ ─┐ ┌─ 6:7♩─┐ ┌─ 16:7♩ ─┐ ┌─ 5:7♩─┐ ┌─ 12:7♩ ─┐ ┌─ 10:7♩─┐

Chapter 24

SYSTEMATIC GATI ON TIRMANAS

A tirmana is a phrase based on keeping the same distance between notes and decreasing this separation systematically. These distances can be turned into frames over which anuloma-pratiloma, in various forms, can be superimposed.

In this context, the difference in construction between the purvanga and uttaranga sections of a tirmana sequence allows for different approaches as to which developmental technique and gati can be chosen to superimpose over the frames.

If one of the tirmanas analysed in chapter 14 is taken as a first example, three different possibilities can be imposed on it. The tirmana is set to two cycles of a tala of 9 beats (72 matras). *(track 204)*

Purvanga

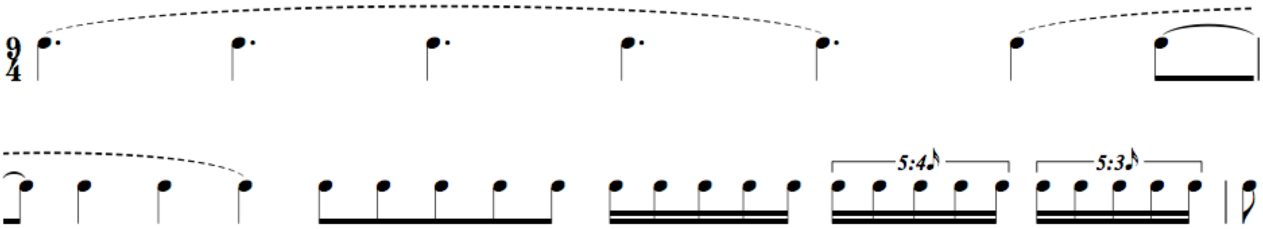
-5 notes x 6 matras of separation= 30 matras

-5 notes x 4 matras of separation= 20 matras

-5 notes x 2 matras of separation= 10 matras

Uttaranga

-5 notes x 1 matra of separation	=5 matras
-5:4𝅘𝅥𝅮	=4 matras
-5:3𝅘𝅥𝅮	=3 matras



1) The superimposition occurs only in the purvanga section

If this option is taken, the number of the superimposed gati must be the same as the number of notes of the phrase, so that when the uttaranga section is reached, the same gati is preserved. Consequently, the third developmental technique of anuloma-pratiloma combinations is the one to be used (keeping the same gati and speed, changing the frame).

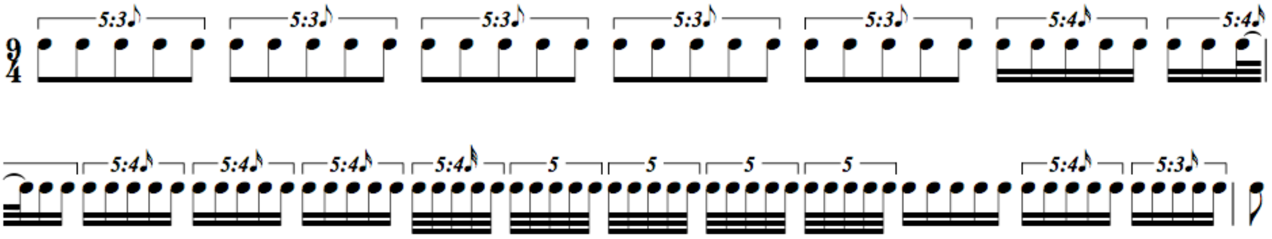
Therefore, if the number of notes of the tirmana phrase is five, the gati to choose is khanda. In the example below it can be observed how khanda has been superimposed five times (the original number of notes) over the first three steps of the tirmana, the purvanga section:

-Five times as a 5:3𝅘𝅥𝅮. (5 notes x 6 matras of separation)

-Five times as a 5:4𝅘𝅥𝅯. (5 notes x 4 matras of separation)

-Five times as a 5:4𝅘𝅥𝅰. (5 notes x 2 matras of separation)

This sequence is followed by the uttaranga that remains as in the original tirmana. *(track 205)*



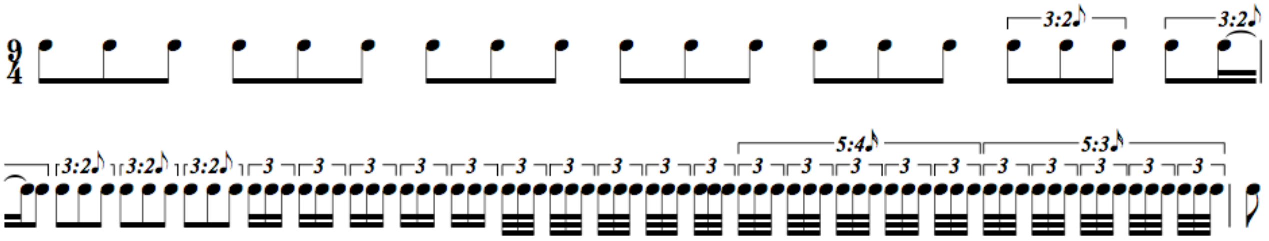
2) The superimposition occurs throughout the whole tirmana

This choice is, for obvious reasons, the most active and difficult to perform. Consequently, a slow gati is generally preferred.

In the following example, tisra 1st speed has been chosen.

Although the first five frames can be seen as groupings of three 𝅘𝅥𝅮, in reality they conform to the possibility of using gati bhedam as one more speed of anuloma-pratiloma.

Afterwards, every step takes tisra over the frame provided by the separation of matras in the original tirmana. Once the uttaranga is arrived at, every matra of the 5 notes x 1 matra of separation takes a triplet of 𝅘𝅥𝅯 and the last two steps, 5:4𝅘𝅥𝅯. and 5:3𝅘𝅥𝅮., take triplets of 𝅘𝅥𝅰 on every matra. *(track 206)*



3) The superimposition occurs only in the purvanga section, but the gati changes

This option is the only time in karnatic music where the **gati and frame change simultaneously**: as long as the gati change follows a concrete system, a gati change can occur whilst the frame is also changing.

The system is conceptually similar to a decreasing yati, in the sense that the number of the gatis will always decrease by the same number of matras. Consequently, a random choice of gatis is never applied to a tirmana sequence.

The decrease in the example below is the same as the decrease in the number of matras of separation of the tirmana phrase (two matras). This does not necessarily have to be the case, as long as

-The decrease of gati or speed of gati responds to a clear system, always using the same number of matras

-The number of notes in the first step of the uttaranga responds either to the pattern established by the previous gati changes, or is the same number as the last step of the purvanga.

A few examples are provided to illustrate the two different possibilities.

a) -11:6♪ -8:4♪ -5:2♪

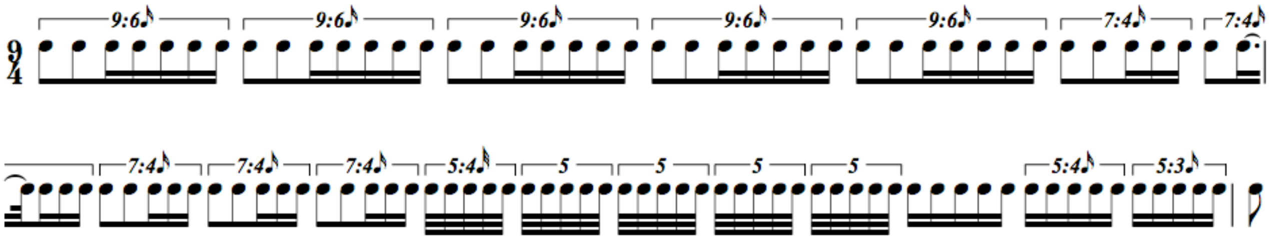
In this example, the number of matras decreased in every gati is three, and the last step uses the same gati as the number of notes of the first step of the uttaranga.

b) -11:6♪ -9:4♪ -7:2♪

In the previous example, the number of matras decreased per gati change is two. The last step is misra, which leads into the uttaranga section that uses the number five, thus responding to the pattern of decreasing the gati by two on every frame.

The recorded example responds to the first option *(track 207)*

-9:6♪ -7:4♪ -5:2♪



Three more examples are presented in a tirmana of tala 10. Each one of them responds to one of the three techniques just explained, although the last one offers a slight variation.

The tirmana is set to two cycles of tala 10 (80 matras), with the following structure *(track 208)*

Purvanga

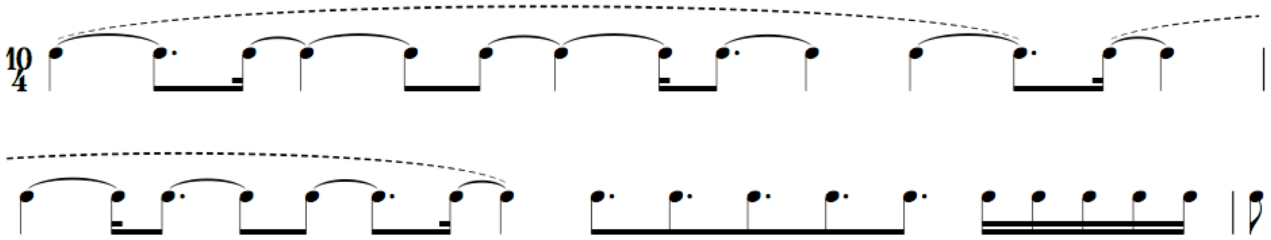
-5 notes x 7 matras of separation= 35 matras

-5 notes x 5 matras of separation= 25 matras

-5 notes x 3 matras of separation= 15 matras

Uttaranga

-5 notes x 1 matra of separation =5 matras



1) The superimposition occurs only in the purvanga section

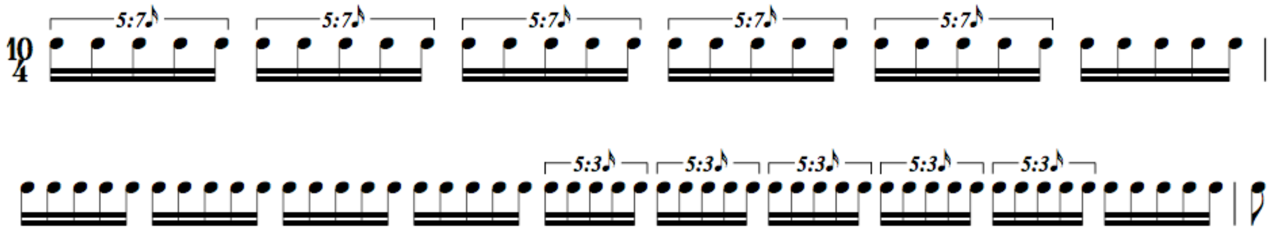
Since the number of notes in this tirmana is once again five, the chosen gati needs to be khanda.

-Five times as a 5:7♪ (5 notes x 7 matras of separation)

-Five times as a 5:5♪ (5 notes x 5 matras of separation -using gati bhedam-)

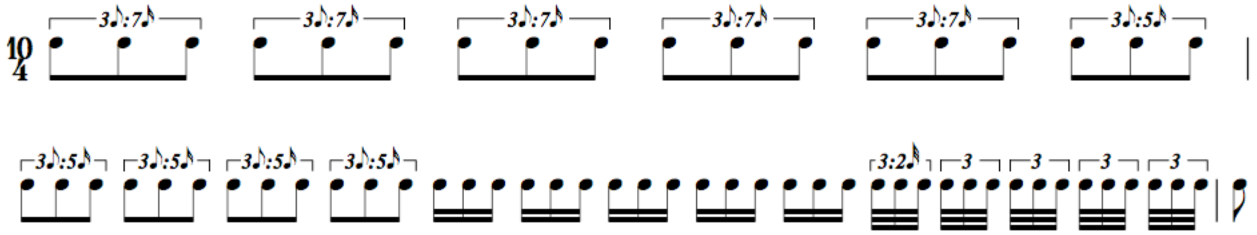
-Five times as a 5:3♪ (5 notes x 3 matras of separation)

This sequence is followed by the uttaranga that remains as the original. *(track 209)*



2) The superimposition occurs throughout the whole tirmana

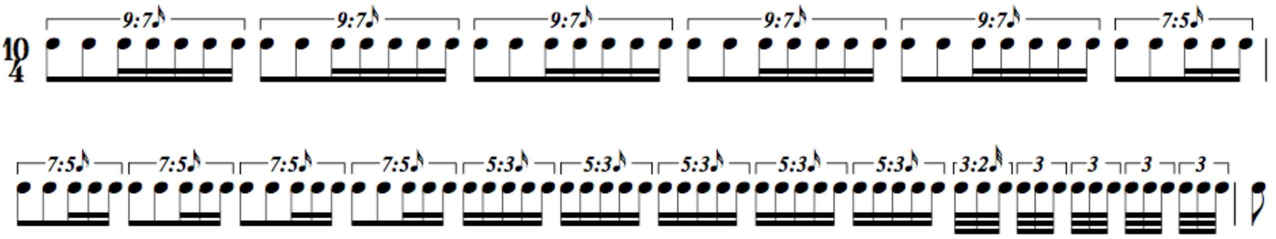
The choice of tisra is taken again for this possibility, in order for the last step to be performed with relative ease. The third step of the purvanga uses gati bhedam (chatusra jathi 3). *(track 210)*



3) The superimposition occurs *throughout the whole tirmana*, but the gati changes

This is the variation on the third technique referred to above. All the steps of the tirmana, including the step of the uttaranga, respond to the systematic decrease of matras in the gati change. This possibly occurs because the uttaranga is relatively slow and has only one step. *(track 211)*

-9:7♪ -7:5♪ -5:3♪ -3:1♪


10
4
9:7
9:7
9:7
9:7
9:7
7:5
7:5
7:5
7:5
7:5
5:3
5:3
5:3
5:3
5:3
3:2
3
3
3
3

I think it is important to reiterate that this change of gati and frame occurs exclusively in this context and when utilising this particular technique. Karnatic musicians will never extrapolate this possibility to any other context for the reasons explained in previous chapters regarding gati changes.

Chapter 25

PORUTTAM B

The concept of Poruttam was already explained in chapter 19. The differences between what I have coined poruttam 'A' and 'B' lie in the following:

-All the theme fragments and the spaces created by deleting parts of the theme are spread throughout one cycle, as opposed to four in poruttam 'A'.

-Rather than employing and developing specific techniques, a short and single cell is developed per cycle by subjecting it to compression and expansion using combinations anuloma-pratiloma and gati bhedam principles exclusively; no phrasing modification is used on the cell at all.

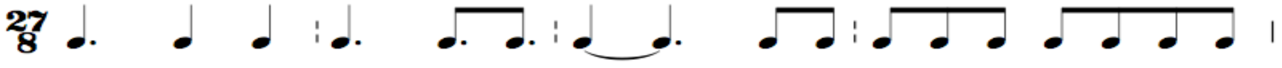
-A sequence of poruttam 'B' needs to last for at least 3 cycles. However, the chosen cells are not developed throughout the sequence: solely in the particular cycle where the cell is used does a development take place, disregarding any relationship with any previous or subsequent cells.

-The number of notes chosen for the theme fragments tends to be shorter than in poruttam 'A': two or three notes are usually sufficient.

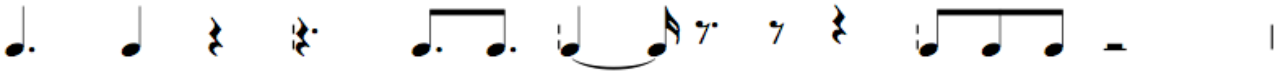
Poruttam 'B' ultimately consists of **short passages of highly intricate and complex material** due to the exclusive use of anuloma-pratiloma and the almost continuous displacement of irregular groupings within the beat.

A 6-cycles example will suffice to illustrate this technique. This example is set to a tala of 27 beats, written 27/8 with an inner subdivision of 7 6 7 7[1].

The original theme is

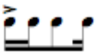


and the fragmentation and subsequent empty spaces created through deletion of notes of the theme are



It can be observed that, every theme fragment indeed uses only two or three notes, and the last note of the second fragment is shortened by 5 matras.

The duration of the spaces is of 10, 9 and 8 matras respectively (somehow following a yati phrase notion). These durations, as well as the position of the theme fragments within the tala, must remain unaltered; calculations must always fit into the aforementioned durations.

1) The first cycle uses a cell of 5 matras, , subjected to the following development

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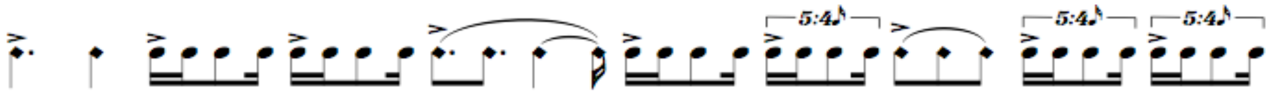
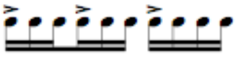
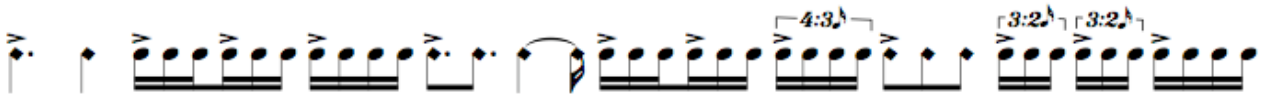
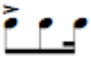
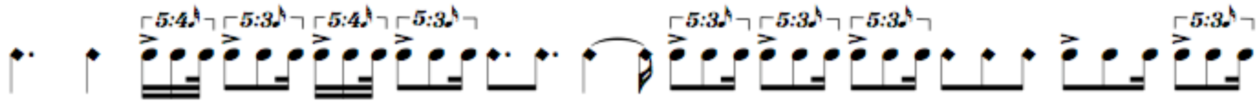
[1] *This sort of tala will be explained in chapter 27.*

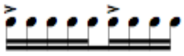


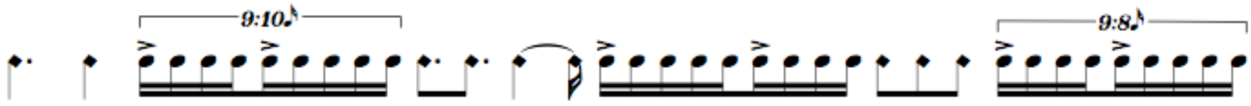
2) The second cycle uses a cell of 10 matras  that is actually split in 6+4 for developmental purposes

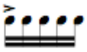


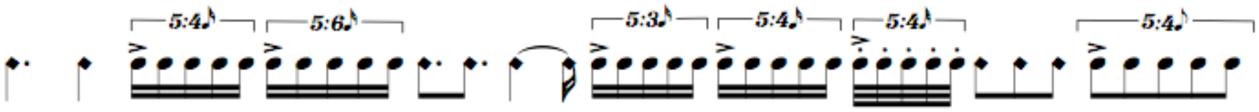
3) The third cycle uses a cell of 5 matras again , that leads to the following passage

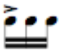

5:4
5:3
5:4
5:3
5:3
5:3
5:3
5:3

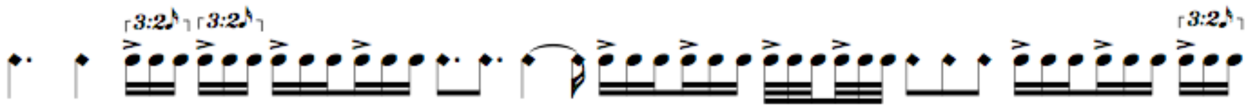
4) The fourth cycle uses a cell of 9 matras  used against 10 and 8 matras in first and third spaces.



5) The fifth cycle once again uses a cell of 5 matras , subjected to different anuloma speeds.

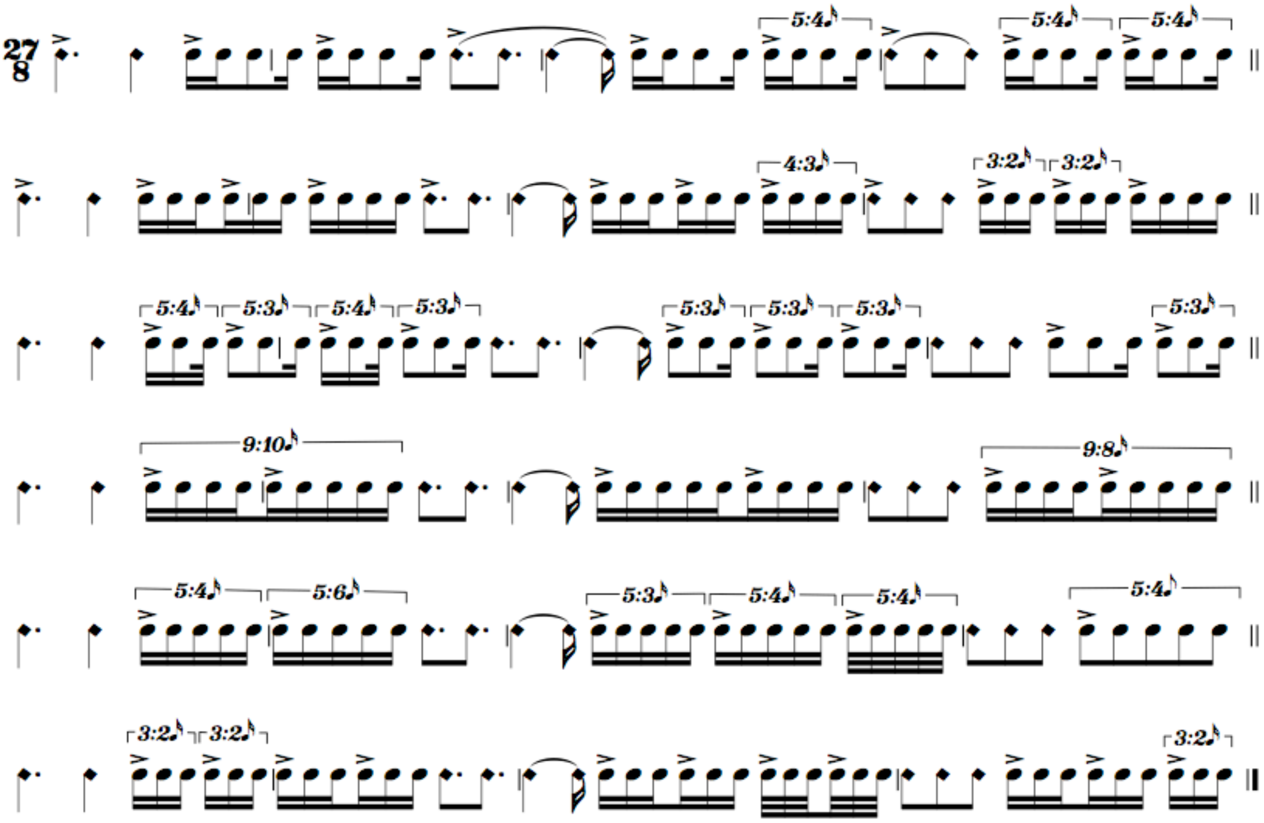

5:4
5:6
5:3
5:4
5:4
5:4

6) And finally, the last cycle uses a short cell of 3 matras  on which the performer employs rather simple yet imaginative anuloma modifications.



It is interesting to observe, that although a cell of 5 matras has been chosen three times, all of them have been developed using entirely different anuloma-pratiloma material as well as different atmospheres and degrees of activity.

The entire sequence is thus as follows *(track 212)*


27
8
5:4
5:4
5:4
4:3
3:2
3:2
5:4
5:3
5:4
5:3
5:3
5:3
5:3
5:3
9:10
9:8
5:4
5:6
5:3
5:4
5:4
5:4
3:2
3:2
3:2

D) Recent developments

In the last section, the most recent developments in karnatic music are described. Although utilised by only a minority of musicians, they are nonetheless concepts that are likely to become main stream in karnatic music in a few decades.

Karnatic music is continuously expanding the possibilities of the 'tradition'. For them, any new development is simply another way of looking at or deepening on what has already existed for many centuries. To talk about 'experimental' or 'traditional' music to karnatic musicians does not mean anything, since everything is just an enhancement of the possibilities laid down ages before.

The concepts of these three chapters are also likely to be of great interest to western musicians, since they explore new gatis, an immense variety of new talas and ways to construct them, and lastly, how to use gati changes more frequently.

Chapter 26

GATIS 9, 11 & 13

Gati 9 or sankirna, has been referred to several times throughout the text. Although used rather sparingly, it has been in existence for at least 200 years.

Gatis 11 and 13 are much more recent. Some percussionists started using them in their solos in the 1980s and, since then, other musicians have also started to incorporate them in their music. As opposed to what many people may think, these three gatis are far from being complex - I would daresay that they can even 'groove' more than tisra or khanda, and all of them can be used as nadais in any frame.

SANKIRNA

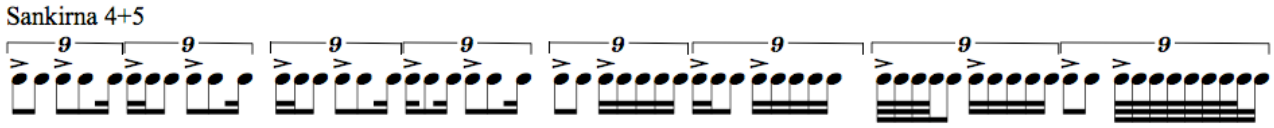
There are two main reasons why sankirna is not to be used as the fifth gati:

-Phrasing in this gati must always be constructed with an internal division of 4+5 or 5+4. Any other inner division is discarded[1]. Also, except when a long passage in this gati is performed, techniques of the nature of gati bhedam, jathi bhedam, (most) mukthays, yati phrases etc, are never applied.

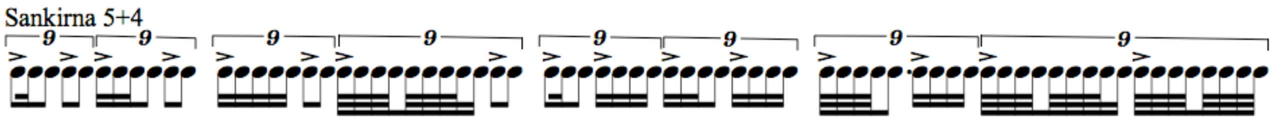
-9 is also the 3rd speed anuloma of tisra, thus number 9 is used as 3x3 in other contexts; when used in the context of tisra, any technique seen thus far can be utilised.

Consequently, it can be inferred that sankirna is essentially utilised as a gati that develops exclusively through phrasing, and eventually, some sama mukthays. Only where it is employed for more than a few cycles, can some simple and short structures of gati or jathi bhedam be found.

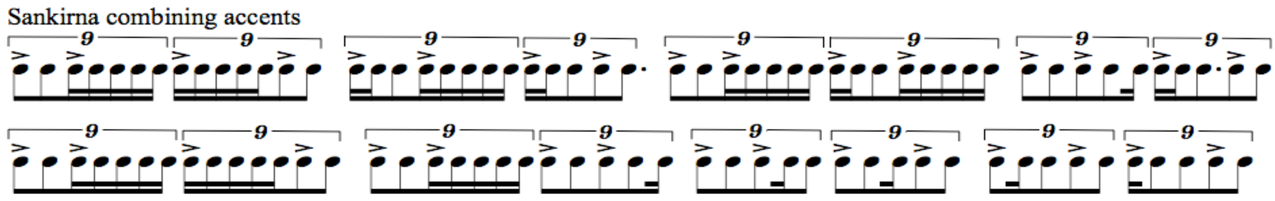
The first example presents a phrase exclusively using the inner division 4+5 *(track 213)*[2]



The second example presents a phrase exclusively using the inner division 5+4 *(track 214)*



The third example presents a phrase using a combination of both possibilities of inner division: this is the most common way to develop sankirna. *(track 215)*



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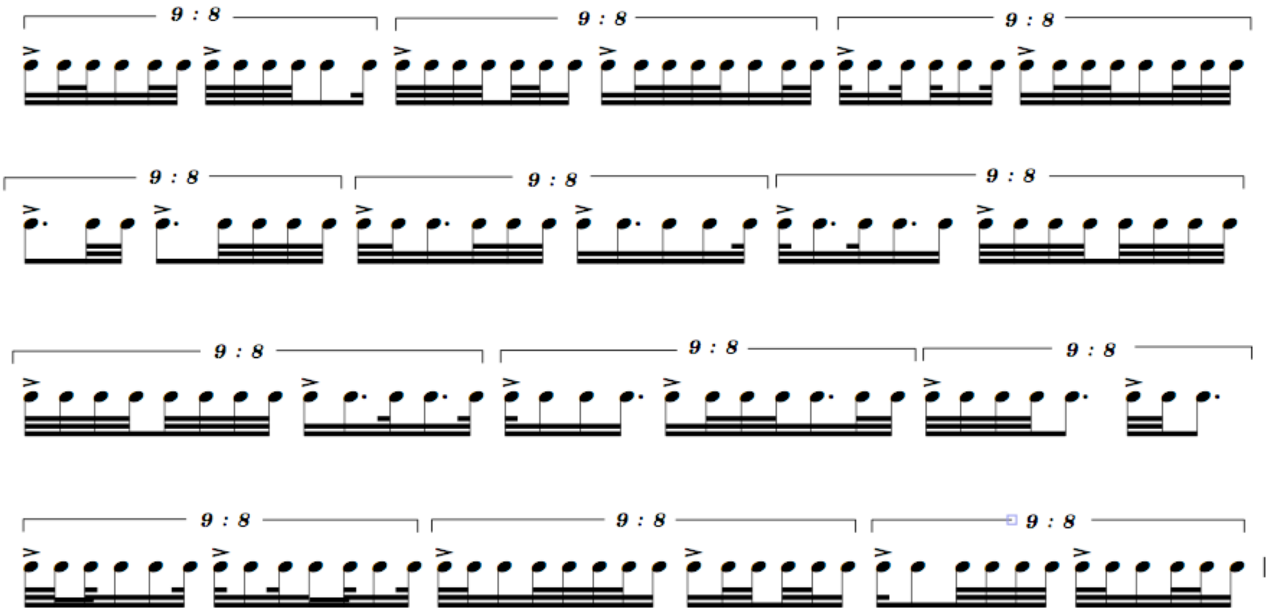
[1] *As opposed to tisra, chatusra, khanda and misra that have no internal division and where all techniques seen so far can be used.*

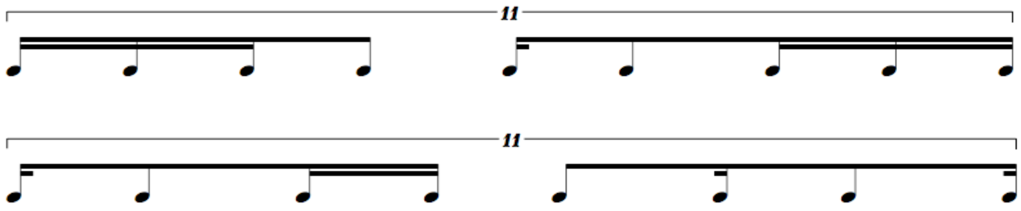
[2] *I preferred using ♪ as the fastest note instead of 𝅘𝅥𝅯 to avoid too many 64th notes.*

Lastly, a fourth and more intricate example is presented; on this occasion the phrase is performed against two beats. It can be observed that the 3rd and 4th lines are an exact mirror of the first two lines. *(track 216)*



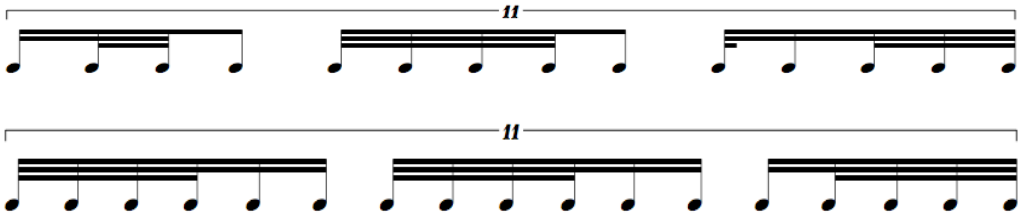
GATI 11

Until now, this gati has not been given a name. It could be called *Ekadesha*, meaning eleven in Sanskrit. However, no musician describes this gati as such: rather it is simply referred to as Gati 11. This gati also uses an inner division of 5+6 or 6+5 *(tracks 217 & 218)*[3]



However, as opposed to sankirna, these divisions are utilised solely in the learning process of the gati. In reality, gati 11 does not share any of the problems of sankirna, and consequently, any inner division for phrasing purposes, or any technique seen so far, can be utilised.

The following examples use an inner division of 4+4+3 *(tracks 219 & 220)*



The last example features more phrasing possibilities, intricate ♪ as well as rests and tie-overs.

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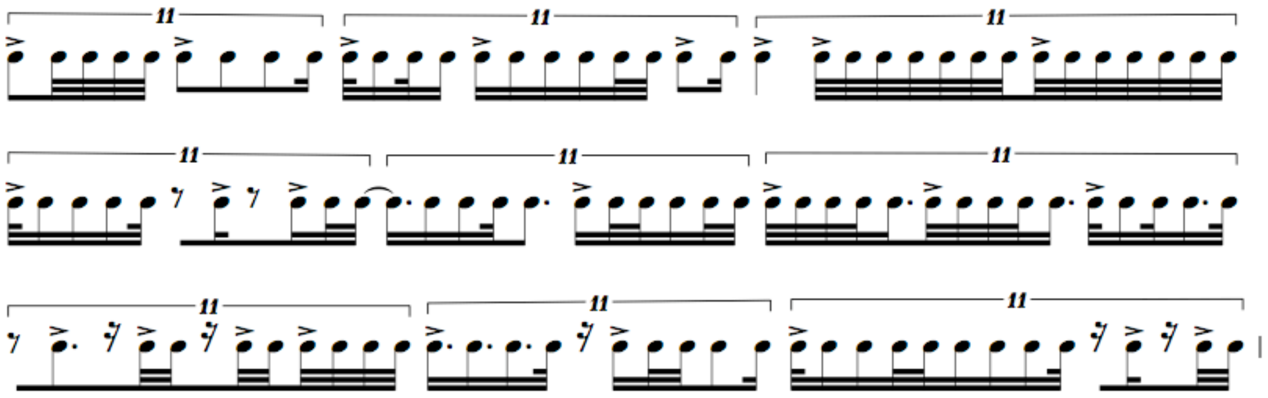
[3] *All recorded examples in gatis 11 and 13, except for the more elaborate and longer phrases, are performed against 2, 3 and 4 beats.*

(track 221)

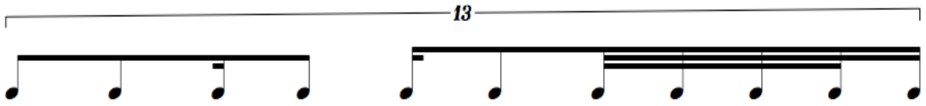


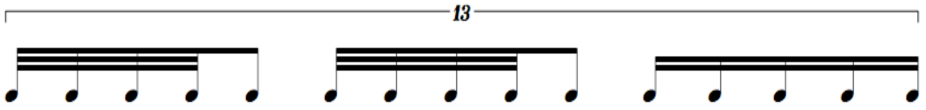
GATI 13

As with gati 11, gati 13 has no name as of yet; *trayodasha* means 13 in Sanskrit.

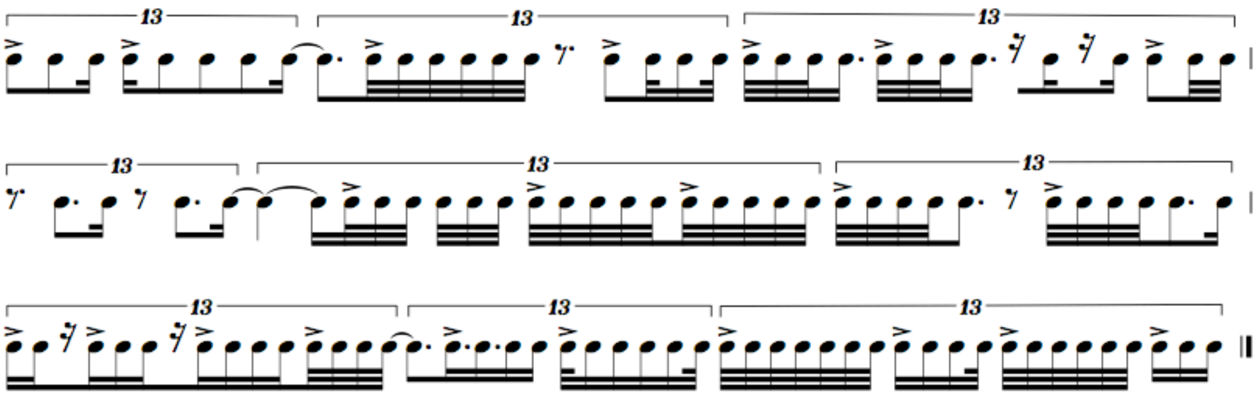
In a similar way to gati 11, the initial step to devise this gati is to utilise the inner division 6+7 or 7+6, although complete freedom of inner division as well as the use of all techniques seen so far are a common feature while developing this gati.

The first example is a simple phrase around the inner division 7+6, whilst the second presents three accents (4+4+5) *(tracks 222 & 223)*





To complete this chapter, a more intricate phrase in gati 13 is presented. *(track 224)*



PRACTICE METHOD

1) Practice all the matras in sankirna with an inner division of 4+5 or 5+4, gati 11 with 5+6 or 6+5 and gati 13 with 6+7 or 7+6. In sankirna use the frames of 1, 2 and 4 beats and in gatis 11 & 13 the frames of 2, 3 and 4 beats. Use the examples presented in the chapter as starting point to elaborate one's own phrases.

2) Make sequences in all gatis combining the two possible inner divisions and all frames.

3) Construct simple phrases on all gatis emphasising the accents of the inner divisions.

4) Work with different inner divisions in gatis 11 & 13 and construct phrases around them.

5) In a gradual manner, start introducing rests and tie-overs in all gatis and frames following the procedure of phrasing with gatis of chapter 2.

Chapter 27

TALA PRASTARA

Tala prastara means the construction or creation of new talas. As was seen in the first chapter, the concept and construction of talas in karnatic music is not merely a question of how many beats exist in a metre: many more parameters define the elaboration of a tala.

In this chapter, the developments of the last century will be presented, as well as the different ways used to create new talas, and lastly how the material seen so far is used in the new talas.

SHADANGA TALAS

This tala system is the old system that was employed for many centuries before Purandaradasa elaborated and implemented the suladi tala system around the XVI century. Since the 1960s, however, it is the system that has inspired musicians to produce more 'experimental' music[1]. Simultaneously, its 're-birth' has been largely responsible for the deep and huge development of the concept of combinations anuloma-pratiloma, a concept that was studied and practiced by musicians but seldom performed or used creatively (except essentially for the elements seen in chapter 9).

CONCISE HISTORICAL PERSPECTIVE

Conducting comprehensive research into the history and use of this type of talas before the XVI century would be quite complicated, due to the extreme difficulty of obtaining any information. It would furthermore be of exclusively historical or ethnomusicological value, since the manner in which shadanga talas have been utilised over the last fifty years is completely different to the way they were used until the XVI century. The former can constitute a very interesting way of organising talas (or the concept of cycle as a whole) within a western framework. However, this line of research would take us away from the main focus and purpose of this text. Therefore, just a few essential and well-known points will be considered here.

Shadanga talas were constructed upon the existence and combination of six angas (*shad* means six in Sanskrit). However, as opposed to the highly regulated suladi system, there were no restrictions as to the order, position or amount of angas that could be used to construct a tala.

The names of the three other angas were ***Guru, Pluta*** and ***Kakapada***.

A very important characteristic was the fact that there were two different ways of counting and calculating the number of beats in the tala: **Aksharakala (**or **kala)** and **Matra** methods. Every kriya ('conducting' pattern) could also vary from region to region.

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[1] *To use a western term that somehow does not fit with the Indian way of thinking since, for them, everything is a result of the possibilities offered by the 'tradition'.*

The kala system was used for slow tempo pieces and, due to its construction, featured 'fractional' (as karnatic musicians say) or 'incomplete' beats[2]. The matra system was used to play long cycles in faster tempi.

Although I approached quite a number of South Indian academics and musicians, regrettably no one seems to really know how the different angas were conducted. The only element that appears to be clear is that in the matra system, the guru, pluta and kakapada angas were rendered with movements of the hand towards and around the head. However, no one seems to really know how the angas in the kala system were reckoned. The finger-count of the laghu anga was created by Purandaradasa for the suladi system. It appears that the way of reckoning with hand movements towards and around the head was very unclear due to the length of the angas and for the simple reason that musicians often had to perform in temples and other venues where the light was rather dim.

The number of talas (108) seems to have more of a religious-numerological significance than a musical or organisational one: in India, the number 108 has namely a strong religious significance, crystallised for example in the fact that every major deity (Krishna, Vishnu, Ganesha etc) always has 108 different names and/or attributes.

The number of beats for every anga was as follows:

Name of Anga	**Kala system**	**Matra system**
Anudrutam	¼	1
Drutam	½	2
Laghu	1	4
Guru	2	8
Pluta	3	12
Kakapada	4	16

Before explaining the possible causes of dissolution of this tala system, and more importantly, its current usage, the chart of shadanga talas will first be presented as taught in Universities in South India. The duration of the Laghu in the first three talas is of 5 matras or 1+ ¼ kala. In the other 105 talas it is of 4 matras or 1 kala. Once again, no one seems to know the reason behind this difference in the first three talas.

NAME	ANGAS	KALAS	MATRAS
1) Chachchatputa	G G L P	8+ ¼	33
2) Chachaputa	G G L G	6+ ½	26
3) Shatpitaputrika	P L G G L P	12+ ½	50
4) Sampadveshtaka	P G G G P	12	48
5) Udghatta	G G G	6	24
6) Adi	L	1	4
7) Darpana	D D G	3	12
8) Charchari	D D A L D D A L D D A L D D A L D D A L D D A L D D A L D D A L D D A L	18	72

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[2] *Beats that would be shorter or longer than 4 matras in chatusra. As the reader can see in the chart below, they could be thought of as western metres of 1/16, 1/8 or 3/16.*

9) Shimhalila	L D D D L	3+ ½	14
10) Kandarpa	D D L G G	6	24
11) Simhavikrama	G G G L P L G L	16	64
12) Sriranga	L L G L P	8	32
13) Ratilila	L G G L	6	24
14) Ranga	D D D D G	4	16
15) Parikrama	L L L G G	7	28
16) Pratyanga	G G G L L	8	32
17) Gajalila	L L L L A	4+ ¼	17
18) Tribhinna	L G P	6	24
19) Viravikrama	L D D G	4	16
20) Hamsalila	L L A	2+ ¼	9
21) Varnabhinna	D D L G	4	16
22) Rangadyotana	G G G L P	10	40
23) Rajachudamani	D D L L L D D L G	8	32
24) Raja	G P D D G L P	12	48
25) Simhavikridita	L L P G L G P L P	17	68
26) Vanamali	D D D D L D D G	6	24
27) Chatusra varna	G G L D D G	8	32
28) Traysra varna	L D D L L G	6	24
29) Misra varna	D D D D A D D D D A D D D D A	6+ ¾	27
30) Rangrapadipa	G G L G P	10	40
31) Hamsanada	L L P D D G	8	32
32) Simbanada	L G G L G	8	32
33) Malikamoda	L L D D D D	4	16
34) Sarabhalila	L L D D D L L	5+ ½	22
35) Rangabharana	G G L L P	9	36
36) Turangalila	D D L	2	8
37) Simhanandana	G G L P L G D D G G L P L P G L L K G G L L G	32	128
38) Jayasri	G G L L G	8	32
39) Vijayananda	L L G G G	8	32
40) Prati	L D D	2	8
41) Duitiya	D L D	2	8
42) Makaranda	D D L L L G	6	24
43) Kirti	GL P G L P	12	48
44) Vijaya	G G G L G	9	36
45) Jayamangala	L G P L G P	12	48
46) Rajavidyadhara	L G D D	4	16
47) Matya	L LG L L L L	8	32
48) Jaya	L G L L D D	6	24
49) Kudukka	D D L L	3	12
50) Nissaruka	L G G	5	20
51) Krida	D D A	1+ ¼	5
52) Tribhangi	L G L G	6	24
53) Kokilapriya	G L P	6	24
54) Srikirti	G G L L	6	24
55) Bindumali	G D D D D G	6	24
56) Sama	L L D D A	3+ ¼	13
57) Nandana	L D D P	5	20
58) Udikshana	L L G	4	16
59) Mattika	G D P	5+ ½	22
60) Dhenkika	G L G	5	20
61) Varnamattika	D D L D D	3	12

62) Abhinandana	L LD D G	5	20
63) Antarakrida	D D D A	1+ ¾	7
64) Malla	L L L L D D A	5+ ¼	21
65) Dipaka	D D L L G G	7	28
66) Ananga	L P L L G	8	32
67) Vishama	D D D D A D D D D A	4+ ½	18
68) Nandi	L D D L L G	6	24
69) Mukunda	L D D L G	5	20
70) Kanduka	L L L L G	6	24
71) Eka	D	½	2
72) Ata	L D D L	3	12
73) Purna kankala	D D D D G L	5	20
74) Khanda kankala	D D G G	5	20
75) Sama kankala	G G L	5	20
76) Vishama kankala	L G G	5	20
77) Chatus	G D D D	3+ ½	14
78) Dombuli	L A L A	2+ ½	10
79) Abhanga	L P	4	16
80) Raya vankola	G L G D D	6	24
81) Laghu sekhara	L A	1+ ¼	5
82) Pratapa sekhara	P D D A	4+ ¼	17
83) Jagajhampa	G D D D A	3+ ¾	15
84) Chaturmuka	L G L P	7	28
85) Jhampa	D D A L	2+ ½	9
86) Pratimaya	L L G G L L	8	32
87) Garugi	D D D D D A	3+ ¾	15
88) Vasanta	L L L G G G	9	36
89) Lalita	D D LG	4	16
90) Rati	L G	3	12
91) Karana yati	D D D D	2	8
92) Yati	G L L L	5	20
93) Shat	D D D D D D	3	12
94) Varhana	D D L P	5	20
95) Varna yati	L L P P	8	32
96) Rajanarayana	D D L G L G	7	28
97) Madana	D D P	4	16
98) Karika	D D D D A	2+ ¼	9
99) Parvati lochana	D D L D D G G L L L L G L L	15	60
100) Srinandana	G L L P	7	28
101) Lila	D L P	4+ ½	18
102) Vilokita	L G D D P	7	28
103) Lalitapriya	L L G L L	6	24
104) Jhallaka	G L L	4	16
105) Janaka	L L L L G G L L G	12	48
106) Lakshmisa	D D L L P	6	24
107) Ragavarhana	D D A D P	4+ ¾	19
108) Utsava	P L	4	16

To illustrate how to count in the shadanga system, two talas will be explained:

59) Mattika	G D P	5+ ½	22

In the kala system, guru is 2 beats long, drutam is ½ beat long and pluta is 3 beats long; adding up the three angas, the result will be of 5+ ½ beats. Simply by multiplying by four, the number of beats in the matra system is obtained (22 beats).

107) Ragavarhana	D D A D P	4+ ¾	19

In the kala system, a drutam is ½ beat long (there are three of them in this tala), the anudrutam is ¼ beat long and the pluta is 3 beats. Adding up, the 4+ ¾ is achieved. Similarly, multiplied by four, the 19 beats of the matra system is arrived at.

Musical developments that contributed to the disappearance of shadanga talas

As explained above, every method had a sort of 'function' in terms of tempo. However, as the result of a possibly slow process occurring over a long time span, on many occasions these functions were interchanged. Additionally, if talas of 48, 60 or, the longest, 128 beats, were used in slow tempo, the feeling of cycle would most likely disappear. On the other hand, if pieces of 2+ ½ or 4+ ¾ beats were performed in fast tempi, angas as anchor points for the music would simply vanish.

The concept of jati laghu, the cornerstone of the suladi system construction, made its appearance at some point between the X-XI centuries. It expanded from the length of 1 beat (kala method) or 4 beats (matra method) to the following:

Laghu	Kala	Matra
Tisra	¾	3
Chatusra	1	4
Khanda	1+ ¼	5
Misra	1+ ¾	7
Sankirna	2+ ¼	9

Except for the first three talas, that already had a laghu of 1+ ¼ or 5 beats, every tala of the chart that used a laghu could choose amongst the added possibilities to replace the 4 matras or 1 kala. There were 84 talas with laghu; if multiplied by the five options, the chart expanded to 420 talas, plus the first 3 talas with no jati laghu and 21 talas with no laghu. Adding up, the original chart of 108 talas expanded into a chart of 444 talas in each method of reckoning, which for all practical purposes produced 888 talas.

Although quite a number of talas shared the same number of beats, the inner construction differed from one to another. For instance, the following talas always produced 5 beats in the kala system and 20 in the matra system. However, their inner construction differed, having one and two laghus respectively.

60) Dhenkika	G L G	5	20
62) Abhinandana	L L D D G	5	20

The different talas that the use of jati laghu could create would have been:

Dhendika:

Tisra laghu	4+ ¾	19
Chatusra laghu	5	20
Khanda laghu	5+ ¼	21

Misra laghu	5+ ¾	23
Sankirna laghu	6+ ¼	25

Abhinandana

Tisra laghu	4+ ½	18
Chatusra laghu	5	20
Khanda laghu	5+ ½	22
Misra laghu	6+ ½	26
Sankirna laghu	7+ ½	30

Consequently, the more than probable religious factor behind the creation of a chart with 108 possibilities was superseded at some point by musical needs and the jati laghu concept was born[3].

Shoshadanga tala system

The appearance of the jati laghu at some point, gave way to a more far-reaching system of sixteen angas. In reality, it was not the case that karnatic music went from a six angas system to another system with sixteen angas, where all of them could be freely combined. It was simply an expansion of the jati laghu concept applied to drutam, guru and pluta as well. Therefore, the chart of 108 talas served as a starting point, and the length of every anga was susceptible to being replaced by another anga of the same name but with a different suffix and duration.

Name	**Kala**	**Matra**
Anudrutam	¼	1
Drutam	½	2
Drutam Virama	¾	3
Laghu	1	4
Laghu virama	1+ ¼	5
Laghudrutam	1+ ½	6
Laghudrutam virama	1+ ¾	7
Guru	2	8
Guru virama	2+ ¼	9
Gurudrutam	2+ ½	10
Gurudrutam virama	2+ ¾	11
Pluta	3	12
Pluta virama	3+ ¼	13
Plutadrutam	3+ ½	14
Plutadrutam virama	3+ ¾	15
Kakapada	4	16

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[3] *It actually is quite surprising to realise that one of the elements that contributed to the dissolution of the shadanga talas became one of the cornerstones in the construction and thought behind the creation of the suladi system.*

One does not need to make many calculations to realise the enormous amount of talas that could (and were) created with this system; for every laghu, guru and pluta, the musician could choose from four different options plus two for the drutam.

One example is given to illustrate all the possibilities within one tala[4]

96) Rajanarayana	D D L G L G	7	28

-If Drutam virama is applied and laghu and guru remain as in the original, then the length will be of

	DV DV L G L G	7+ ½	30
-Laghu virama	D D LV G LV G	7+ ½	30
-Laghudrutam	D D LD G LD G	8	32
-Laghudrutam virama	D D LDV G LDV G	8+ ½	34
-Guru virama	D D L GV L GV	7+ ½	30
-Gurudrutam	D D L GD L GD	8	32
-Gurudrutam virama	D D L GDV L GDV	8+ ½	34

It can be observed that when only one of the angas is replaced, the same number of beats is obtained. But Drutam virama could also be combined with any of the three added laghus and/or guru options, which results in 21 different combinations. Added to the previous seven options, this tala can give birth to 28 different talas with each counting method, thus for all practical purposes 56.

With the aforementioned problem of lack of clarity while reckoning the talas and the almost 'exuberant' number of new talas that could be created upon a single tala, together with the poor communication infrastructure of India in the centuries XI-XV, the seed of limitless creativity that the jati laghu and the shoshadanga system gave to the 'container' of karnatic music (the tala system), became simultaneously the seed of its own destruction: there were no agreements as to how to conduct all the new talas, some talas became popular in some regions while being completely ignored in others. Consequently, every region or centre would eventually have created completely different talas, and it seems likely that karnatic music fractured into many different styles. Fortunately or unfortunately (we will never know), someone with the reputation that Purandaradasa seemed to have enjoyed during his lifetime, decided that something needed to be regulated and compromises made: he reorganised the whole system into a much simpler and easier to transmit system – that of the suladi talas. Possibly the biggest loss was the complete disappearance of the talas with 'fractional' or 'incomplete' beats.

A residual of this shoshadanga tala system is the chart of Janaka talas, which seems to be more of an academic issue that a practical system utilised in South India. Jati laghu is not applied to this chart, although Drutam Virama is used as a seventh anga, since it is used together with the regular drutam in a number of talas.

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[4] *It may be convenient to remind the reader that as in the suladi system, once the duration of an anga had been chosen, this remained unaltered for all the angas of the same name.*

JANAKA TALAS CHART

Name	Angas	Kalas	Matras
1) Kanakaangi	A D G L	3+ ¾	15
2) Rathnaangi	G A L DV L	5	20
3) Ganamurthi	L A A L DV G A	5+ ½	22
4) Vanaspathi	L A A G A L DV	5+ ½	22
5) Maanavathi	L DV A L A L DV	5	20
6) Dhanarupi	G A L D	3+ ¾	15
7) Senaavathi	G DV D L A L DV	6+ ¼	25
8) Hanumathodi	G A A L D P D L	8+ ½	34
9) Dhenuka	P A A D	4	16
10) Natakapriya	D D D L D	3	12
11) Kokilapriya	G A D L D	5+ ¼	21
12) Rupaavathi	L DV L A L DV	4+ ¾	19
13) Gayakapriya	L A D D L D	3+ ¾	15
14) Vagulabharanam	L A D D L A DV G DV	7	28
15) Mayamalavagoula	L DV L DV A L A L DV A	7+ ¾	31
16) Chakravaham	L DV L L D L DV	6	24
17) Suryakantham	G DV D G P	8+ ¼	33
18) Haatakambari	G D D G L DV	6+ ¾	27
19) Jankaradhwani	P DV DV DV P D A	9	36
20) Natabhairavi	A DV L DV L A	4+ ¾	19
21) Keeravani	DV DV L D L D	4+ ½	18
22) Karaharapriya	DV DV G A DV L D	6	24
23) Gowrimanohari	L DV L L D G G A DV	9+ ¼	37
24) Varunapriya	L A DV L D L D	5	20
25) Maararanjani	L DV G G A	7	28
26) Charukesi	G DV L A L D	5+ ½	22
27) Sarasaangi	G DV P D L	7+ ¼	29
28) Harikamboji	G A DV G P G A	10+ ¼	41
29) Sankarabharanam	G DV DV G DV D L L A DV G DV	12+ ½	50
30) Nagaanandhini	D L A L D G A A	5+ ¾	23
31) Yagapriya	DV L L D	3+ ¼	13
32) Ragavardhini	L L L A G D A	6	24
33) Gangeyabhushani	G D L DV D L D L DV L D	9+ ½	38
34) Vagadheeshwari	L D L G DV G D DV	8+ ½	34
35) Soolini	L DV L A	3	12
36) ChalaNaata	L DV L D D	3+ ¾	15
37) Salagam	G A L G A	5+ ½	22
38) Jalaarnavam	G A L A G G D	8	32
39) Jaalavarali	G DV L L A L A	6+ ¼	25
40) Navaneetham	A L A D L DV	3+ ¾	15
41) Paavani	DV L A A	2+ ¼	9
42) Raghupriya	DV L A L D	3+ ½	14
43) Kavaambothi	L G DV P G A	9	36
44) Bhavapriya	L A L A L D	4	16
45) Subhapanthuvarali	L D L A L DV L DV L A L A	8+ ¾	35
46) Shadvithamaargini	G D L A G D L DV L D L D	11	44

47) Swarnaangi	G L D P D L	8	32
48) Divyamani	G A L D L D L D	6+ ¾	27
49) Davalaambari	G A L A L DV L DV	7	28
50) Naamanarayani	D L D D L D L D	5+ ½	22
51) Kaamavartha	DV L D L A P A	6+ ¾	27
52) Raamapriya	L L D L D	4	16
53) Gamanapriya	L L D A L D	4+ ¼	17
54) Viswambari	L A P DV L DV	6+ ¾	27
55) Syamalangi	G L D L DV L	6+ ¼	25
56) Shanmukhapriya	P L D DV L D	6+ ¾	27
57) Simhendramadhyama	G K L D G DV L D G DV G DV	16+ ¼	69
58) Hemaavathi	P L D L A L DV	7+ ½	30
59) Dharmavathi	P L D L A L DV	7+ ½	30
60) Neethimathi	D L DV L D L DV	5+ ½	22
61) Kaanthamani	G G L D L D	7	28
62) Rishabhapriya	DV L DV L A L D	5+ ¼	21
63) Lathaangi	L P A L	5+ ¼	21
64) Vachaspathi	L D L DV G A L DV	7+ ¼	29
65) Mecha Kalyani	G A L DV D L D L D	7+ ½	30
66) Chithraambari	L DV P DV L DV	7+ ¼	29
67) Sucharithra	G L DV DV G A	6+ ¾	27
68) Jyothiswarupini	K A L DV P L D L D	12	48
69) Dathuvardhani	G DV L DV L A P A	9	36
70) Naasikhabhushani	D G DV L D L DV L D	8	32
71) Kosalam	G A G G A	6+ ½	26
72) Rasikapriya	DV G DV L D	5	20

CURRENT USE OF SHADANGA TALAS: MUKHY SYSTEM

Although several attempts were made over the last five centuries to re-establish the shadanga talas, it was not until the 1960s that this system, with numerous and far-reaching variations on the original, saw another dawn within the karnatic music system.

Dr. Balamuralikrishna (1930), one of the most prestigious karnatic singers and composers of the XX century, was largely responsible for the 're-birth' of this system. Unlike any previous attempt that simply tried to go back in time and re-introduce the shadanga tala system as it originally was, this time a 'best of both worlds' approach was taken and fructified in a new fashion by which new talas could be created (*Tala Prastara*) by using certain premises of both suladi and shadanga talas.

Balamuralikrishna's main and more 'revolutionary' contribution was the invention of what he coined the ***mukhy*** system. He felt that karnatic music needed to recuperate some of the structural possibilities that the shadanga talas could offer, namely, the use of incomplete beats (using the kala method), and longer talas that could be performed with a more 'chapu tala' feel and tempo (using the matra method). What interested Balamuralikrishna of the shadanga talas was thus the multitude of talas that the original chart of shadanga talas and the application of jati laghu and shoshadanga system on this chart could generate. However, he was aware that trying to reintroduce a reckoning system that was confusing and vague, together with angas that were not used anymore would possibly lead to nothing concrete and practical.

He therefore concluded that, since all musicians were familiarised with the kriya ('conducting' pattern) of all suladi talas, this kriya should somehow remain, while simultaneously making variations to it in a systematic fashion in order to accommodate the shadanga talas. Consequently, and **purposely ignoring the inner construction of the shadanga talas**, he took **exclusively the resulting number of beats of a particular tala** and distributed them using the kriya of a suladi tala but adding or subtracting beats to certain points of the tala: this is one of the principles of the mukhy system.

The very first step towards the implementation of the mukhy system was to add beats to the tala and anga sams of a suladi tala in a systematic manner. He coined the following terms:

-Trimukhy: 3 beats on every sam
-Panchamukhy: 5 beats on every sam
-Saptamukhy: 7 beats on every sam
-Navamukhy: 9 beats on every sam

The rest of beats in the tala would have either 2 or 4 beats.

The 3-step procedure he decided to use to translate the shadanga tala into a new tala was as follows:

1) Choose a shadanga tala

Ragavarhana	D D A D P	4+ ¾	19

2) Ignore the construction of D D A D P and work exclusively with the 4+ ¾ or the 19 beats.

3) Choose a kriya of any suladi tala and figure out how to distribute the number of beats. For reasons that will become clearer later on, Dr. Balamuralikrishna and most followers favoured the use of the matra system over the kala system.

If the 19 beats of the tala Ragavarhana is chosen, different manners and suladi tala kriyas could be applied. Here are a few examples using the trimukhy (3 beats per sam).

a) The pattern of Adi tala (L4 D D). If 3 beats are applied to every sam (there are three in this tala), the number 19 is reached. Therefore, the pattern for this 'shadanga' tala would be *(track 225)*

3 2 2 2 | 3 2 | 3 2

b) The pattern of Tisra Matya (L3 D L3). It has the same number of beats as the previous example. However, the distribution of beats and the choice of pattern of the suladi tala will have a tremendous effect on many techniques. Once again, 3 beats are applied to every sam and the result is *(track 226)*

3 2 2 | 3 2 | 3 2 2

c) The pattern of Khanda Eka (L5). If 4 beats are used for every finger-count of the laghu and 3 beats for the tala sam, the result will be 19 beats[5]. *(track 227)*

3 4 4 4 4

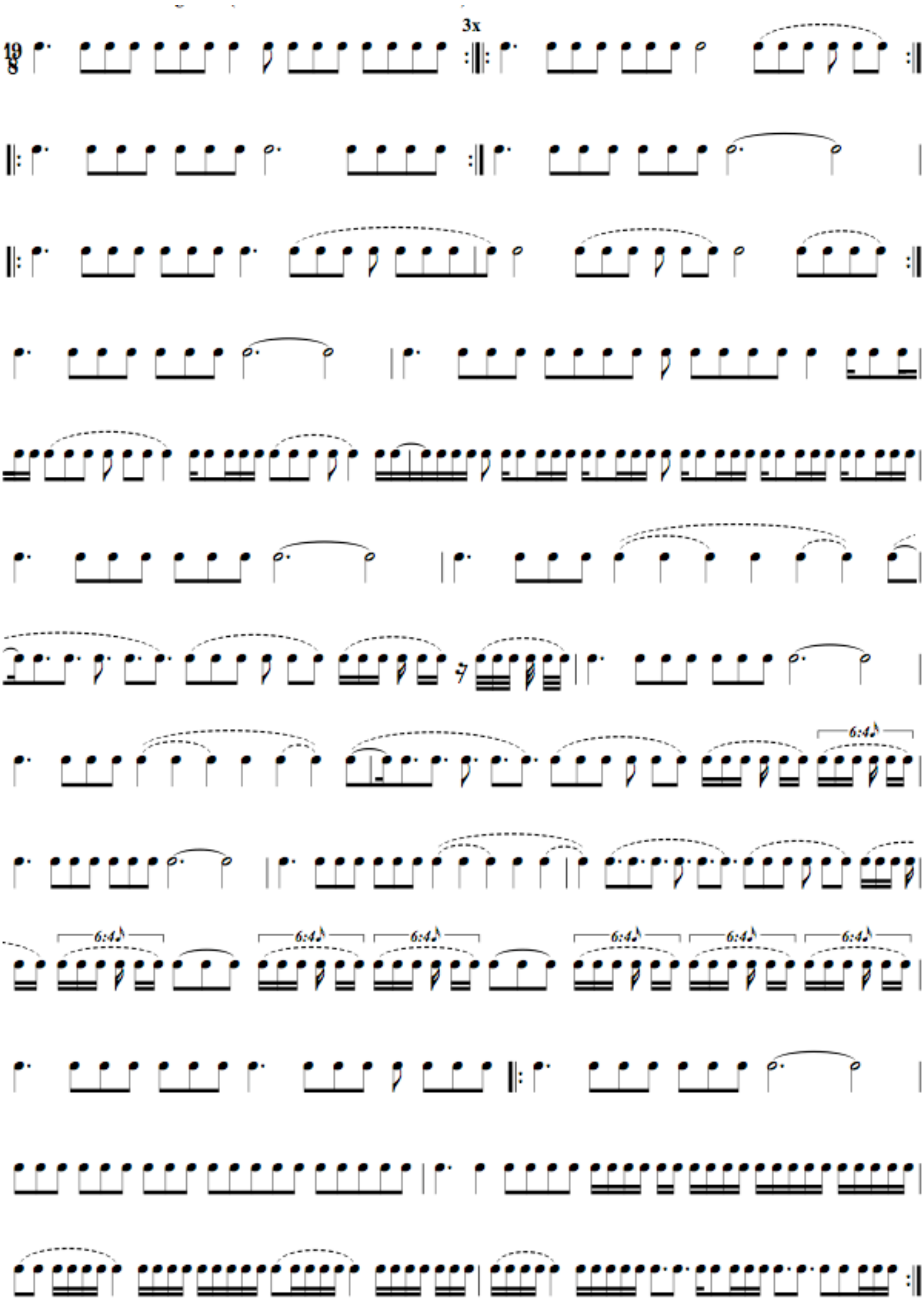
---

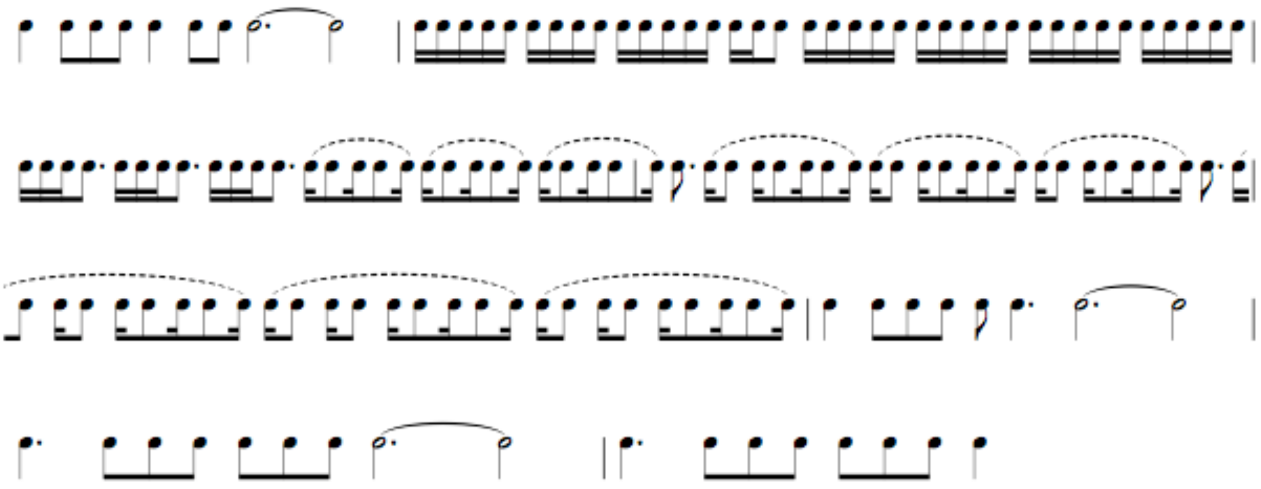
[5] *In order to use any of the other mukhys, a larger tala would be required. There is no other suladi tala that could provide 19 beats by using pancha, sapta or navamukhy on each sam of the tala.*

The following example is the transcription of a rehearsal of a piece in this tala in its matra form (19 beats or 19/8 in western notation), composed by Jahnavi Jayaprakash and B.C Manjunath. The chosen pattern to conduct the piece is the first one shown above, using Adi tala (L4 D D) with the resulting inner division of 3 2 2 2 | 3 2 | 3 2.

Besides the phrasing around the tala construction, different phrasing with crossing accents in a sort of short sequence of jathi or gati bhedam can be heard, next to yati mukthays of the A and C types along with a 6-note tirmana. This simply shows that most of the techniques seen in the text so far can and are used in this context as well. Combinations anuloma-pratiloma and moharas need a separate explanation. The use of the former in particular experienced a formidable increase due to the characteristics of the mukhy system and the concept of re-grouping the inner construction of the tala, which will be explained later on in the chapter.

(track 228)


3x
6:4♪
6:4♪
6:4♪
6:4♪
6:4♪
6:4♪
6:4♪



Kala method with the mukhy system

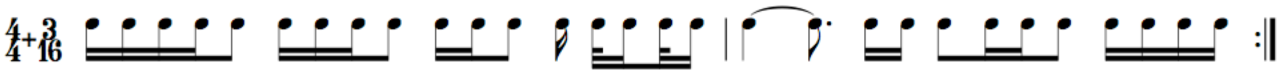
The kriya process that has been used is the following:

-Talas with an x number of beats + ¼ : if, for instance, a tala of 5+ ¼ is used, the choice will be of any suladi tala of 5 beats (the inner division is of no importance in this context). Each of the first 4 beats is counted as a 4/16 and the last beat becomes a 5/16. The 'extra' ¼ of the original shadanga tala becomes a 5/16 by adding the 𝅘𝅥𝅯 to the previous beat.

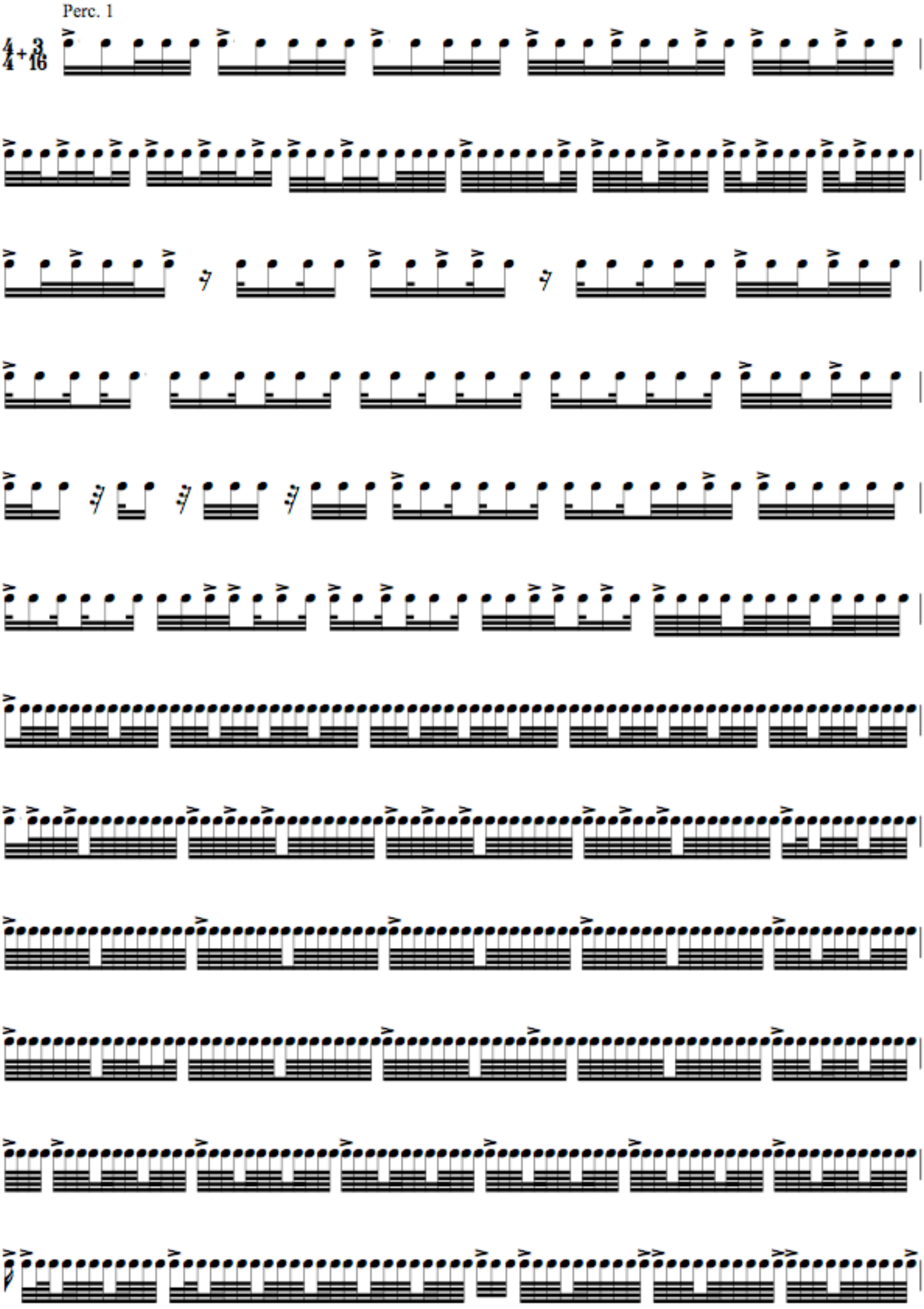
-Talas with an x number of beats + ½ : if the tala 7+ ½ is taken into account, any suladi tala of 7 beats would be chosen and conducted as a 6/4 followed by a 3/8. Once again, the 'extra' ½ is added to the previous beat to create another metre.

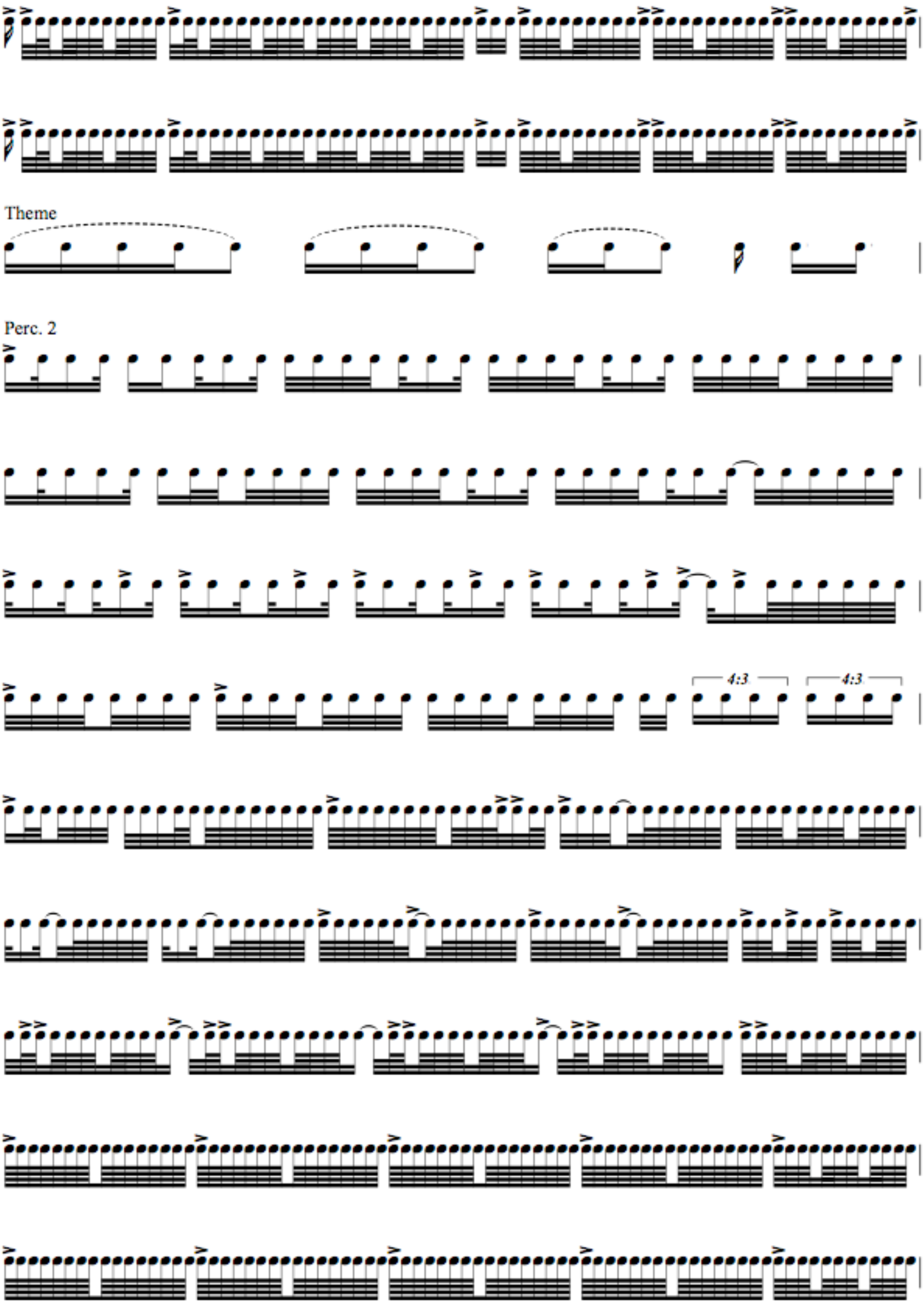
-Talas with an x number of beats + ¾ : for the tala of 4+ ¾ shown above, any suladi tala of 5 beats would be chosen. It will be conducted as a 4/4 followed by a 3/16. Consequently, the last 'beat' (finger count in this context) will always be shortened by one 𝅘𝅥𝅯.

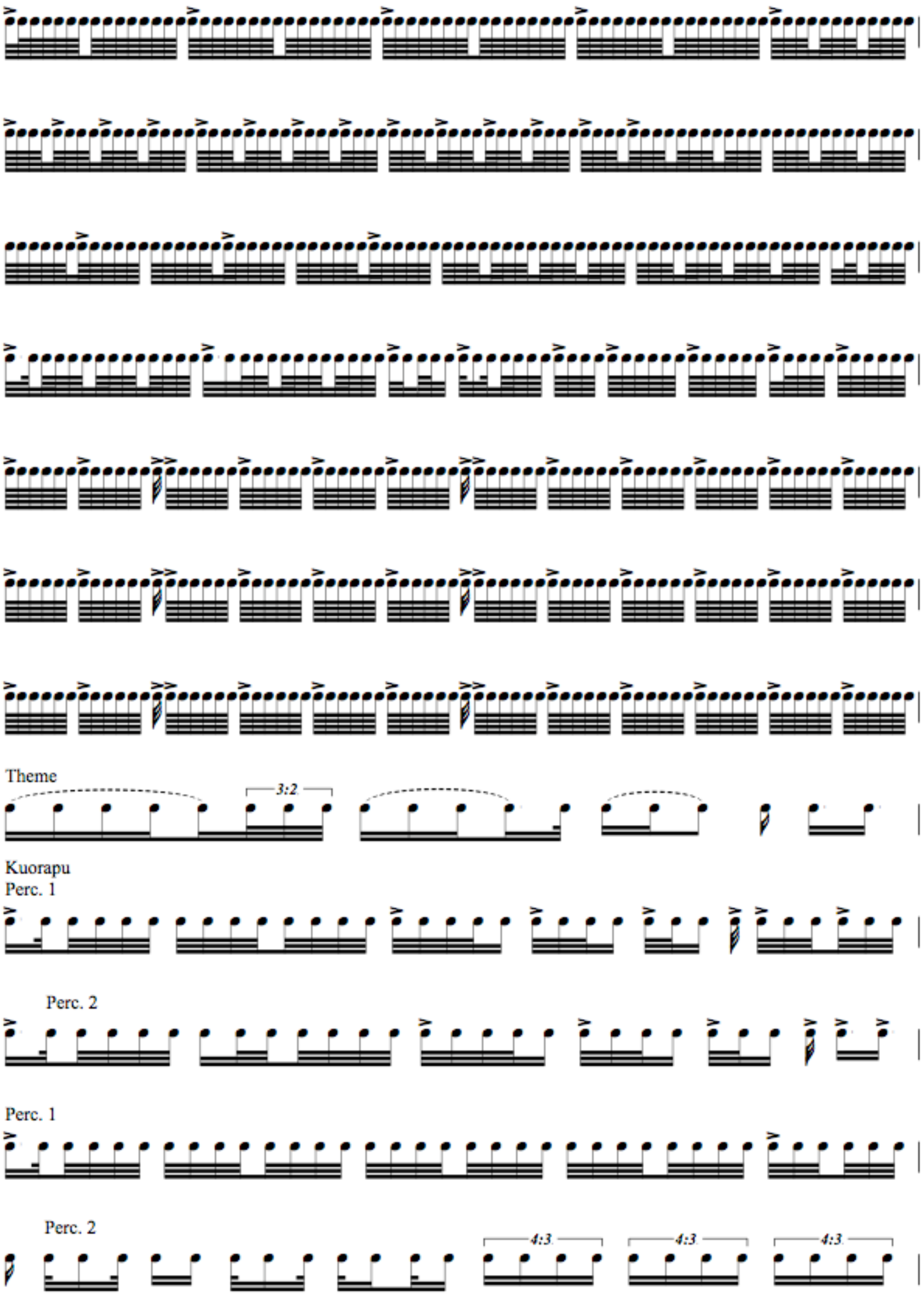
The following examples are the transcriptions of the theme and the percussion duo of a piece by L. Shankar in this last tala of 4+ ¾ . *(track 229)*

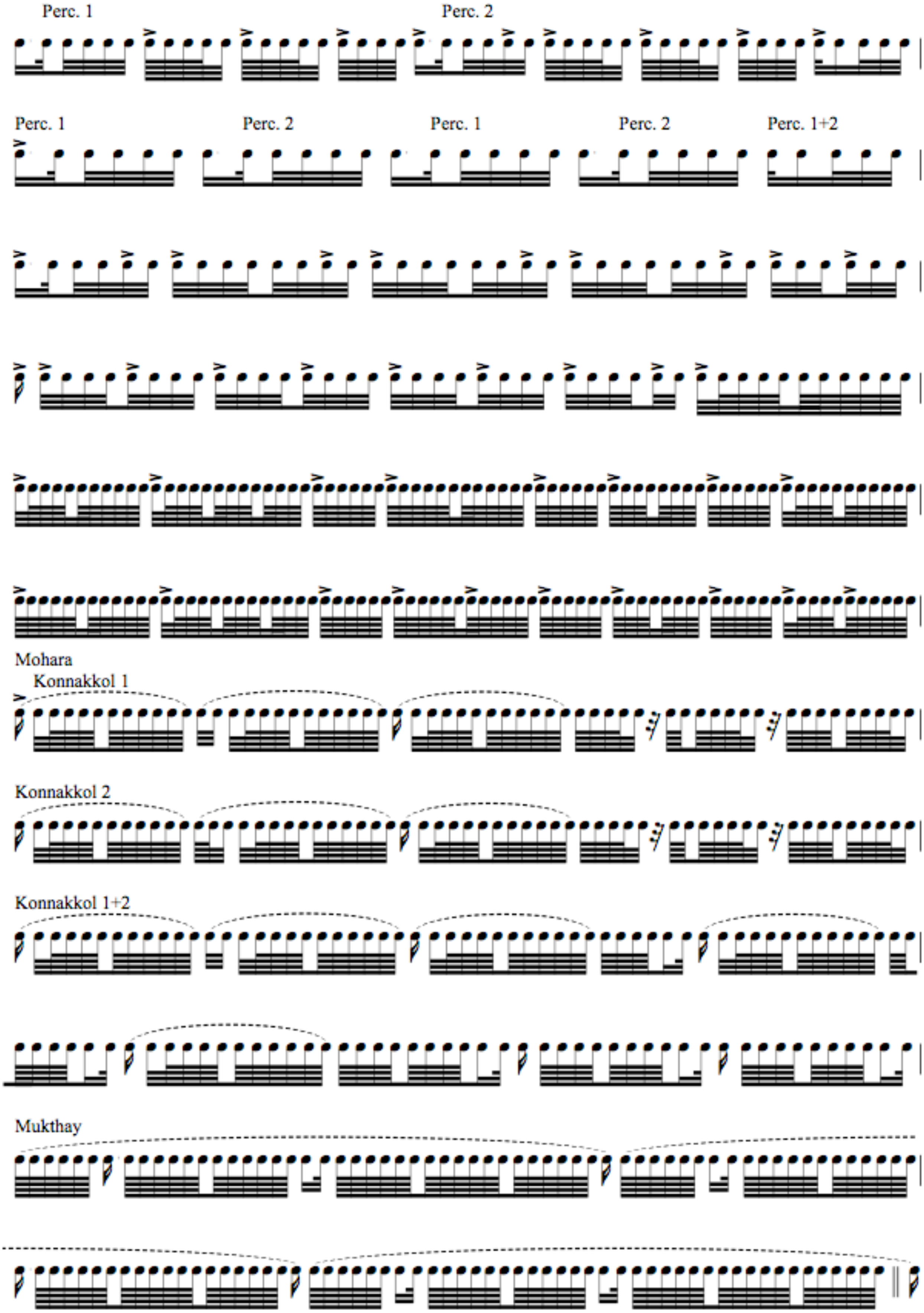


(track 230)


Perc. 1
4/4+3/16


Theme
Perc. 2
4:3
4:3


Theme
3:2
Kuorapu
Perc. 1
Perc. 2
Perc. 1
Perc. 2
4:3
4:3
4:3


Perc. 1
Perc. 2
Perc. 1
Perc. 2
Perc. 1
Perc. 2
Perc. 1+2
Mohara
Konnakkol 1
Konnakkol 2
Konnakkol 1+2
Mukthay

Further developments of the mukhy system

After the initial period already described, Dr. Balamuralikrishna and many other musicians started to go beyond the self-imposed restriction of using the tri, pancha, sapta and navamukhy exclusively on every sam of the tala. New paths of tala prastara started to take shape as long as a logic and coherence in the choice of number of beats for every sam or finger-count were scrupulously observed. Different numbers started to be used in different parts of the tala, or different angas were treated differently.

Another important step was that often the constructed tala would have nothing to do with the shadanga tala chart anyway, nor any of the possible ways of enhancing it (namely, the jati laghu and shoshadanga system). Today, this phenomenon is in fact becoming more the common practice.

Essentially, to summarise, the 'return' of the shadanga talas provoked an important change in many aspects of karnatic music - the possibility of having many more and intricate talas and the development of the use of combinations anuloma-pratiloma being the most important. At this point, musicians create talas without consulting the chart of shadanga talas; with the aid of the jati laghu and shoshadanga system, possibly any conceivable number could be found. However, musicians tend to create talas with one of the following two objectives in mind[6]:

1) A concrete number of beats, in which case they would proceed to distribute them as explained thus far, but without necessarily looking for an 'academic justification' as to how the number of beats were obtained or chosen by taking the shadanga tala as starting point.

2) A concrete construction mixing a different number of mukhy beats and treating each anga with a self-constructed set of rules.

Therefore, the great success of Dr. Balamuralikrishna was indeed to keep the suladi tala kriya patterns as the starting point to implement his invention: the mukhy system. Liberated of the initial self-imposed restrictions, has enabled musicians to create new talas without having to justify them as being the result of a shadanga tala or a tala created with the aid of any of its developments (jati laghu or shoshadanga system).

For the option 1) described above, the tala of 27/8 that has already been shown in the chapters of yati prastara and poruttam 'B' is a good example.

Although a tala of 27 beats exists in the shadanga tala chart (tala 39, misra varna) the composer of this piece just wanted to have this number in order to re-create, with a shortened beat, a very well-know composition in misra chapu (7/8) whose theme is four cycles long. Other aims were the creation of a tala subdivision that would enable him to experiment with two types of moharas that can be constructed within this system, and ultimately, interesting frame possibilities for anuloma-pratiloma.

The suladi tala chosen for kriya purposes was Tisra Dhruva (L3 D L3 L3). A trimukhy is applied to every sam whilst every finger-count of the laghus take 2 beats each. The sole innovation here is that the number of beats assigned to the second 'beat' of the drutam is also 3 beats long, therefore differentiating the drutam from the laghu construction. The subdivision is thus *(track 231)*

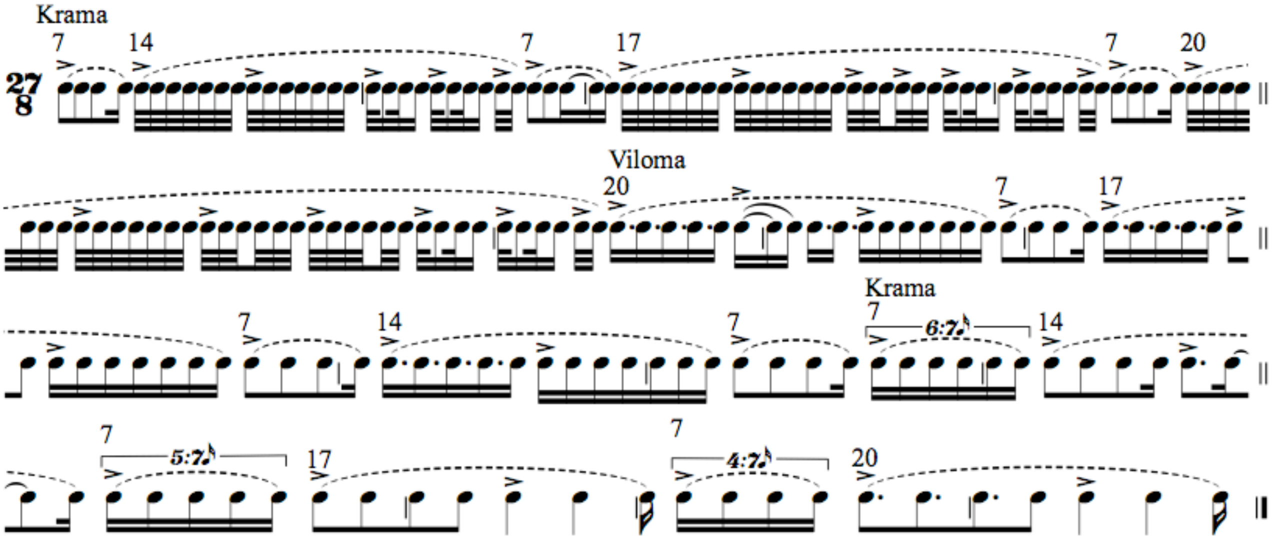
---

[6] *I reiterate the importance that karnatic musicians give to keep a clear logic and coherence in the thought behind the construction.*

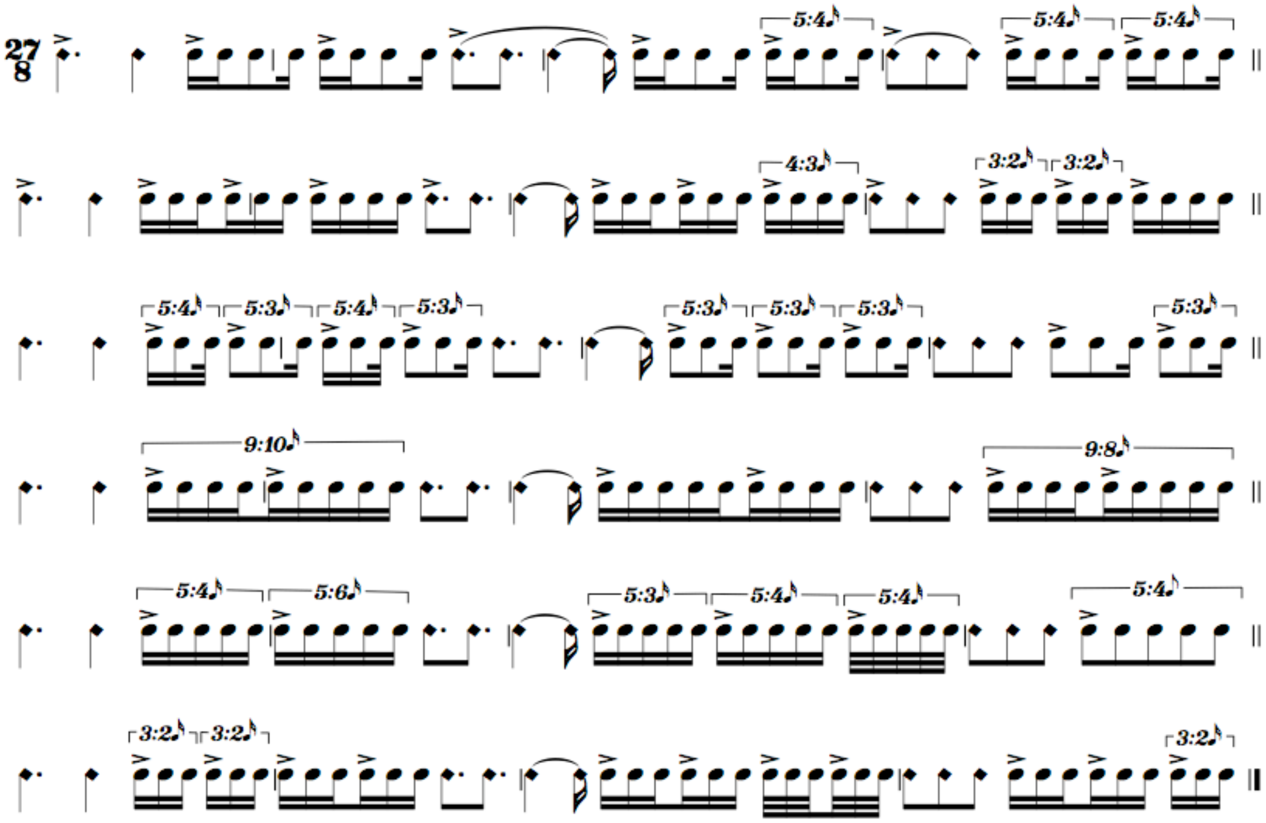
3 2 2 | 3 3 | 3 2 2 | 3 2 2

In order to put both examples within the context of the chapter, I find it appropriate to present them again:

Yati prastara *(track 129)*


Krama
7
14
7
17
7
20
27/8
Viloma
20
7
17
7
14
7
Krama
7
6:7
14
7
5:7
17
7
4:7
20

Poruttam B *(track 212)*


27/8
5:4
5:4
5:4
4:3
3:2
3:2
5:4
5:3
5:4
5:3
5:3
5:3
5:3
5:3
9:10
9:8
5:4
5:6
5:3
5:4
5:4
5:4
3:2
3:2
3:2

The second option (a concrete construction mixing different numbers of 'mukhy beats') is becoming more of a 'trend' nowadays: the goal is not so much how many beats the tala will have, but how to organise the number of beats provided by the mukhy system within a particular suladi tala structure, and how to treat every type of anga differently, while keeping a coherence in its construction.

An example for this second option is the pallavi and subsequent development with rhythmical sangatis in a tala of 44/16. The composer was interested in exploring all the possible mukhy numbers in one anga and keeping 4 beats per finger-count in the other angas.

The choice of suladi tala kriya was Khanda Triputa (L5 D D). On every 'beat' of the L5 all the available numbers were used, in an increased order as follows
3 4 5 7 9

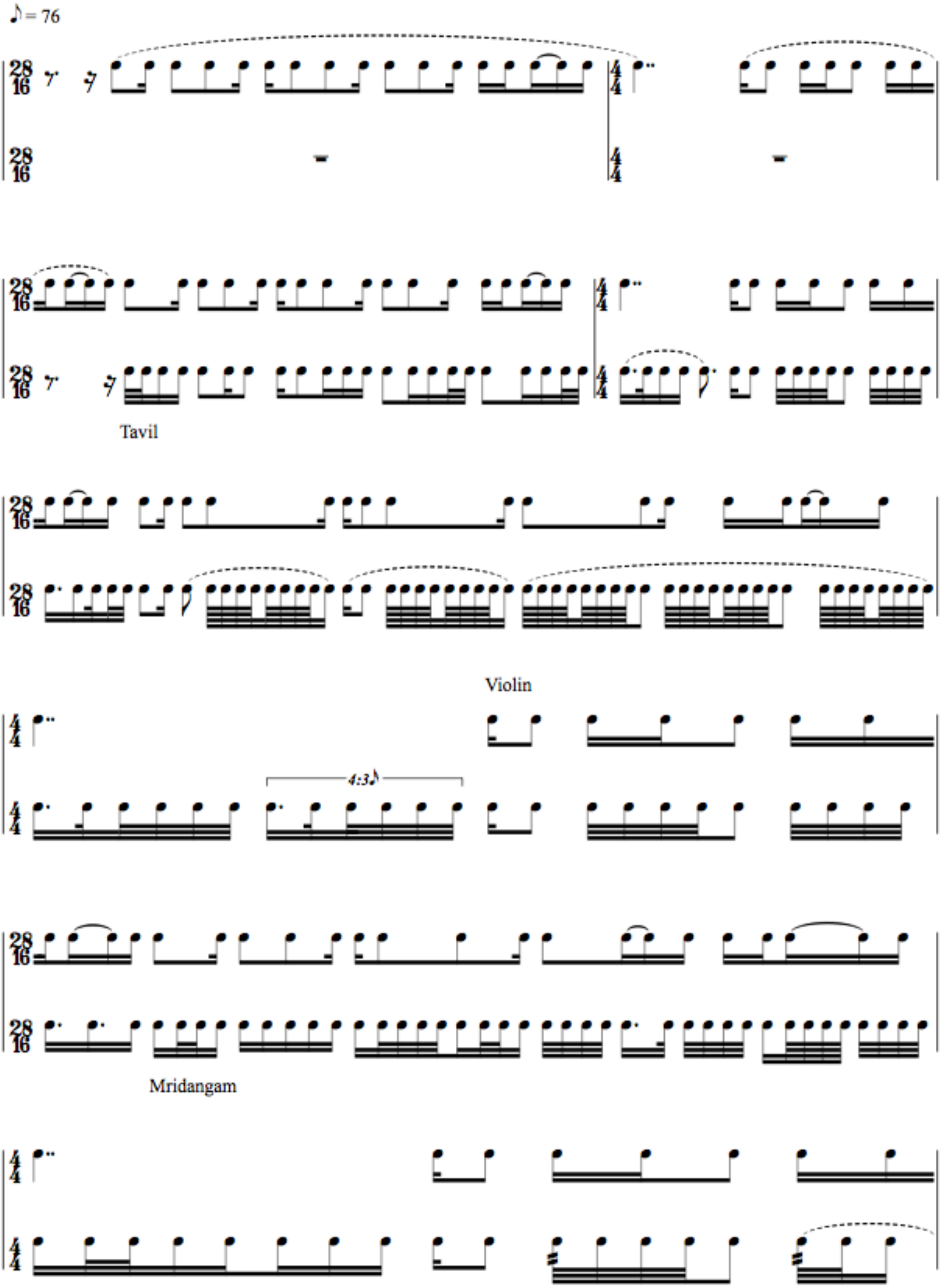
whereas in every 'beat' of each drutam, the number 4 remained. Therefore the tala has the following inner division *(track 232)*

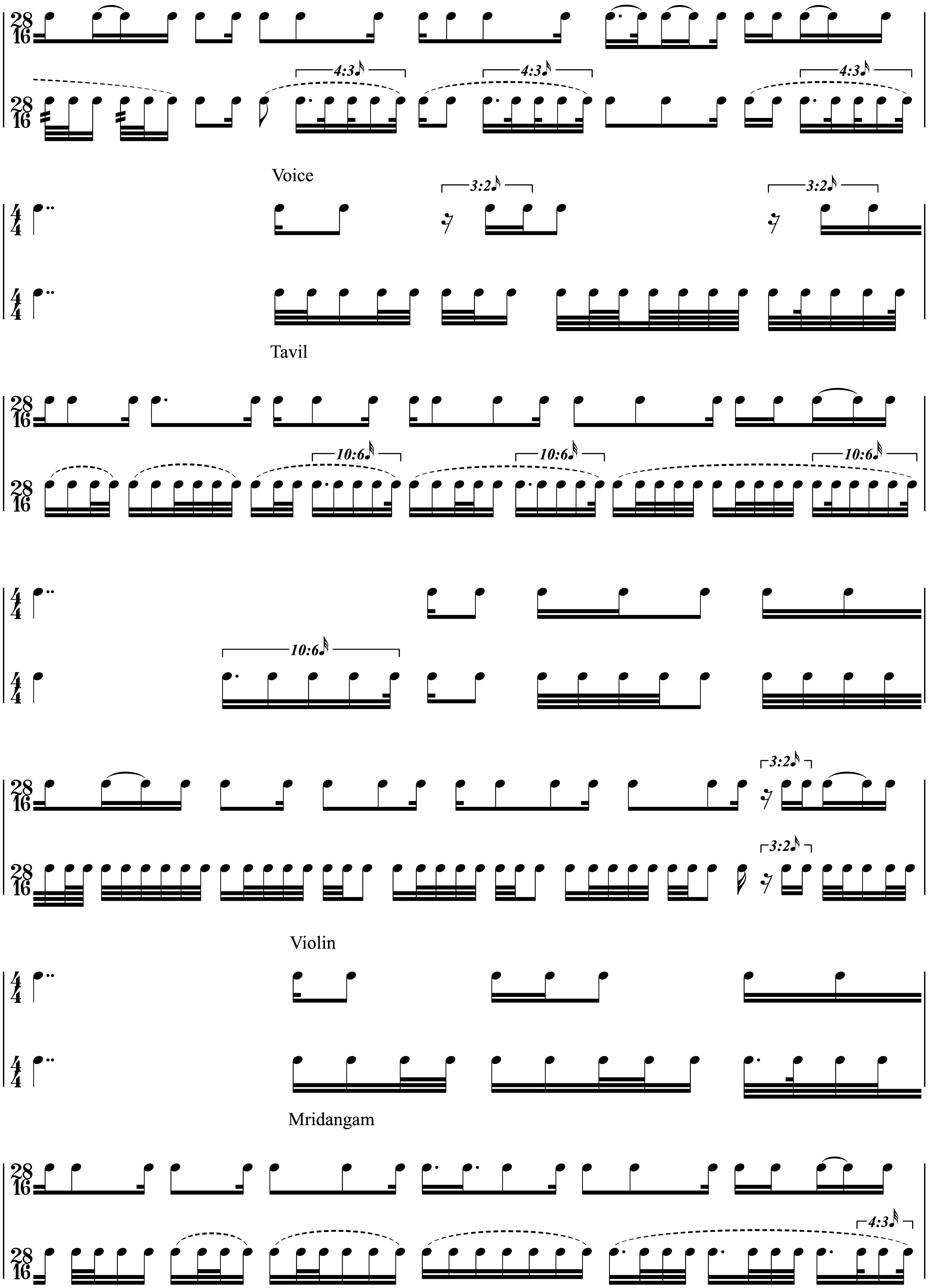
3 4 5 7 9 | 4 4 4 4

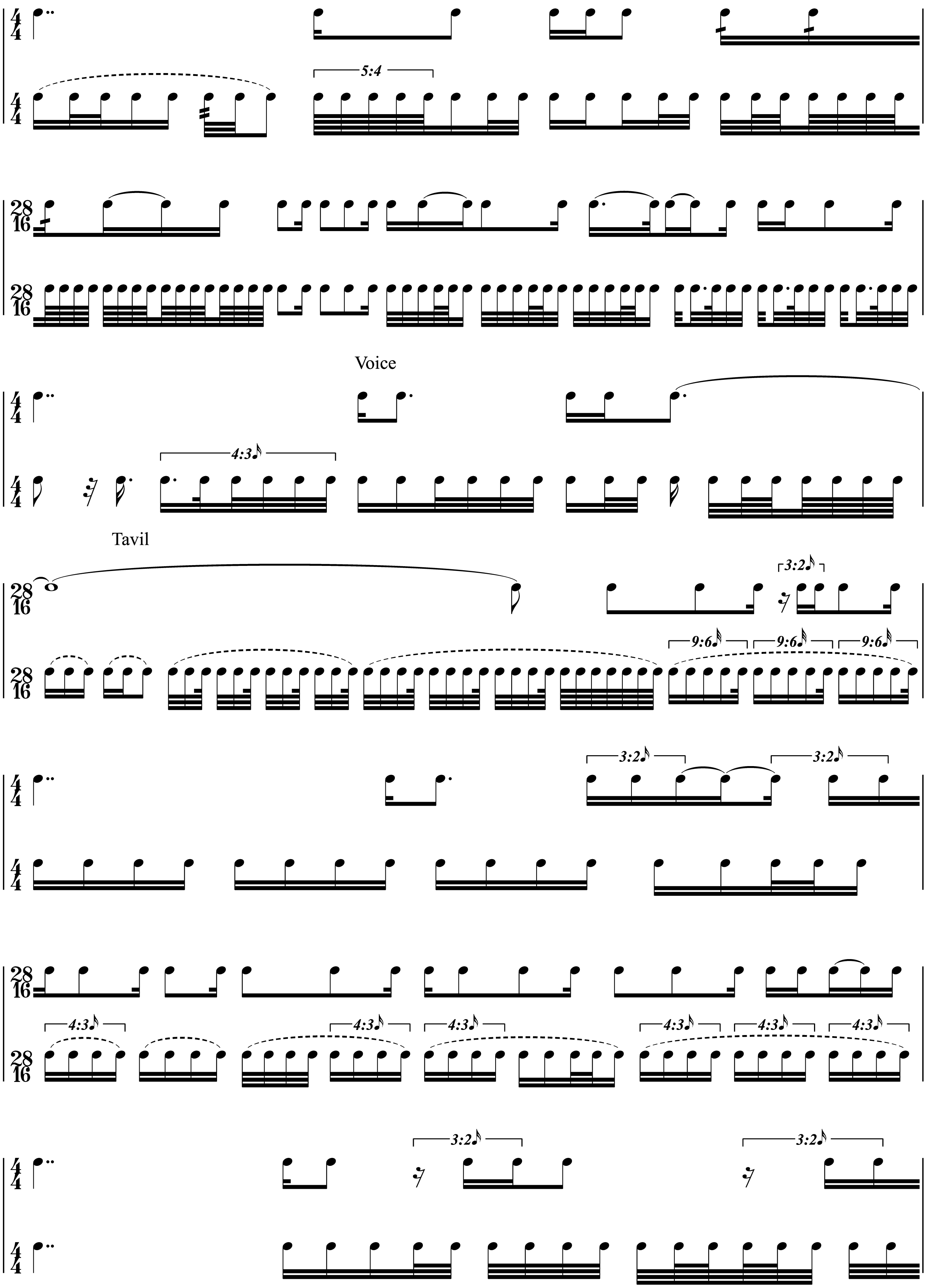
The composition is by A.R.A.K Sharma. The transcription of a long percussion duo with A.R.A.K. Sharma and B.C. Manjunath in the same tala is presented in chapter 28.

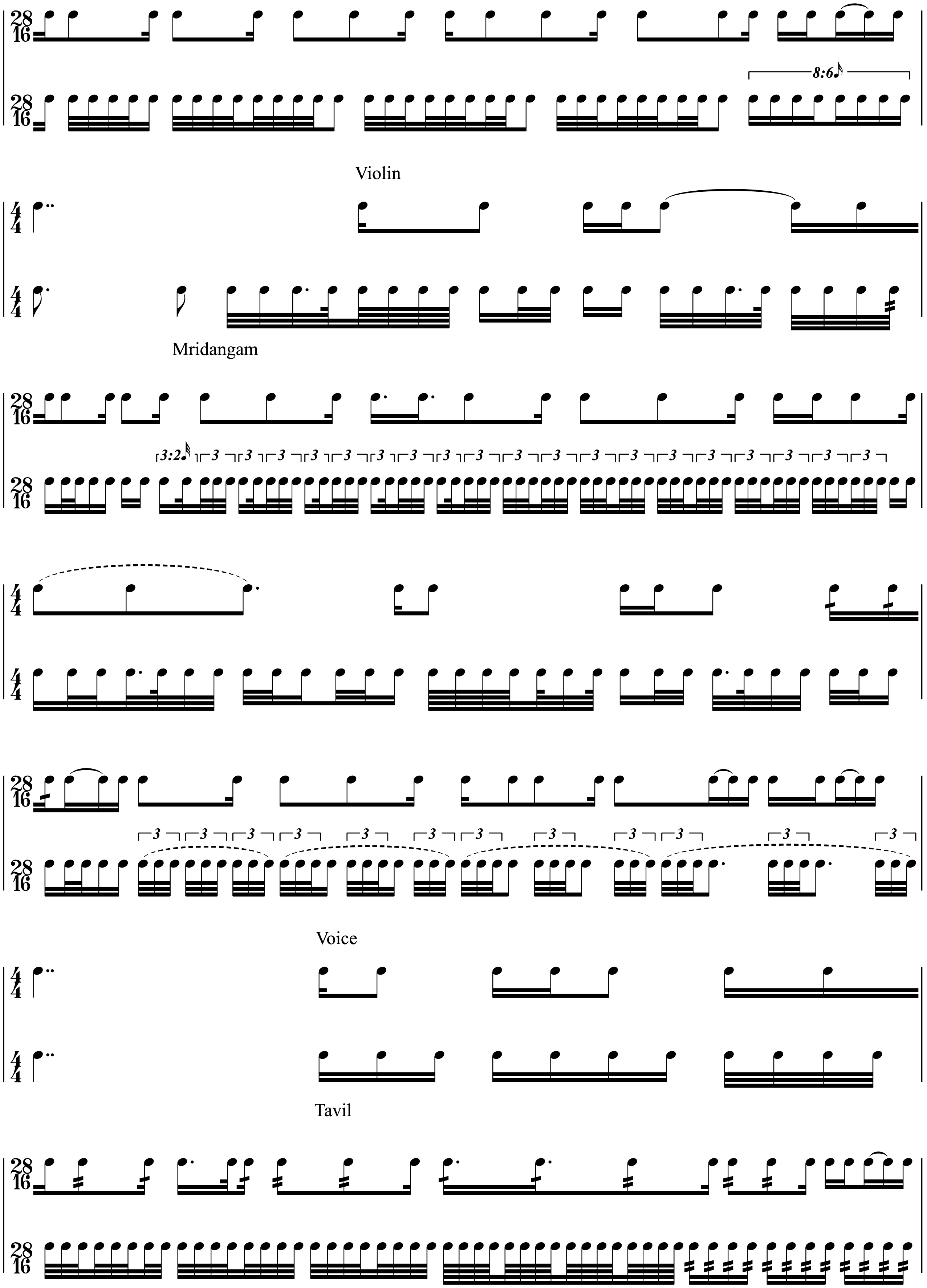
(track 233)

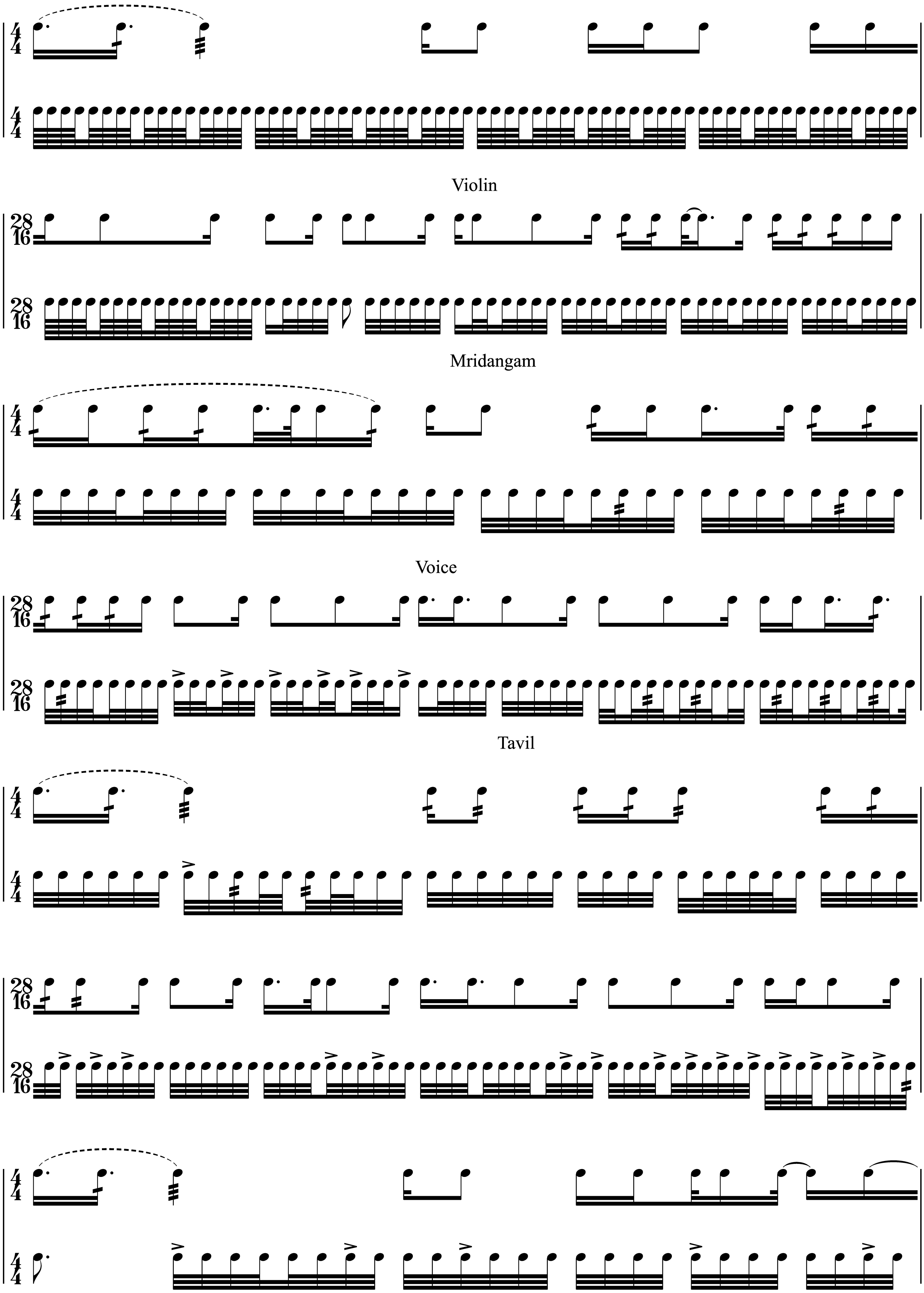
Pallavi by A.R.A.K. Sharma

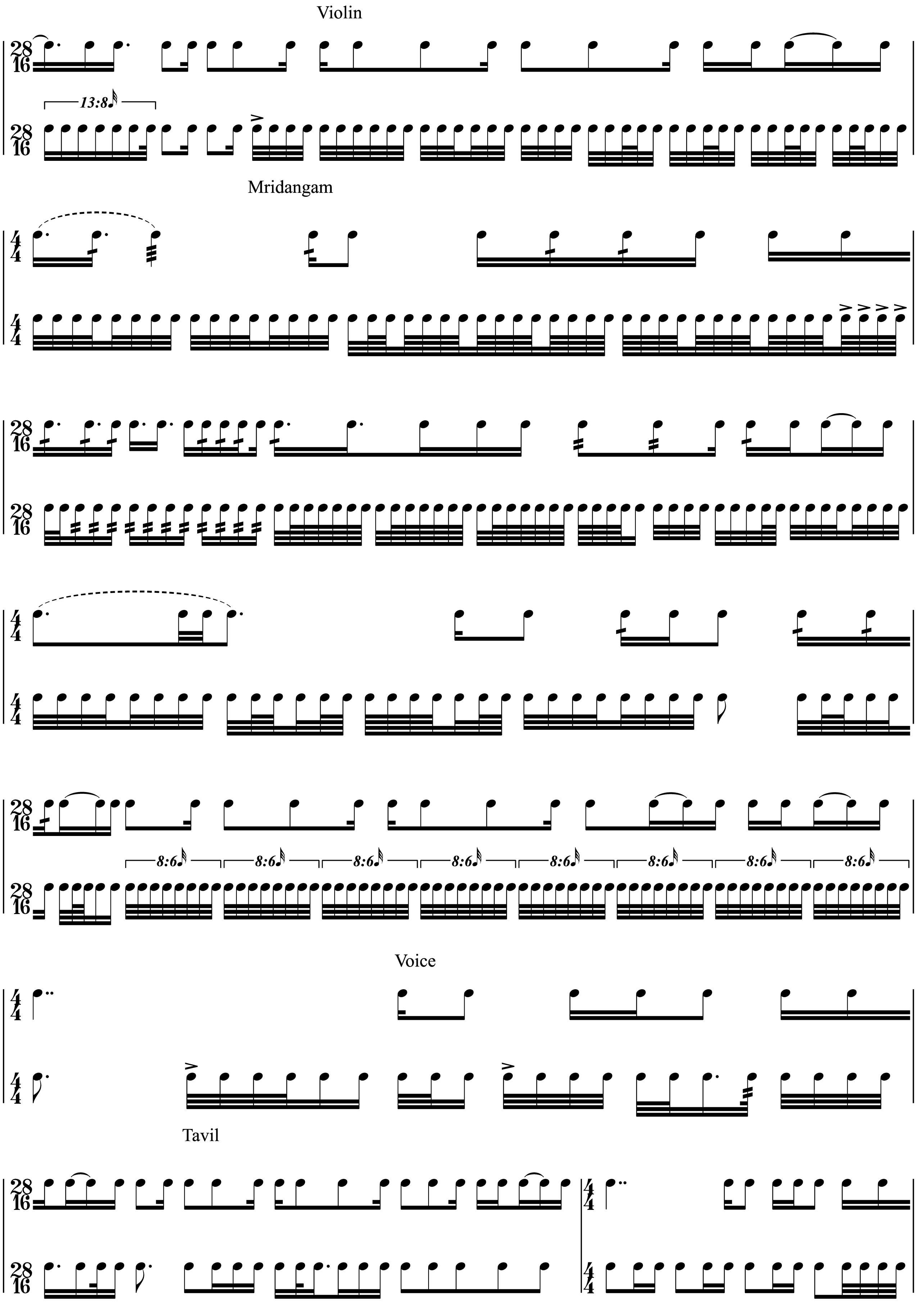

♪= 76
28/16
4/4
Tavil
Violin
4:3♪
Mridangam

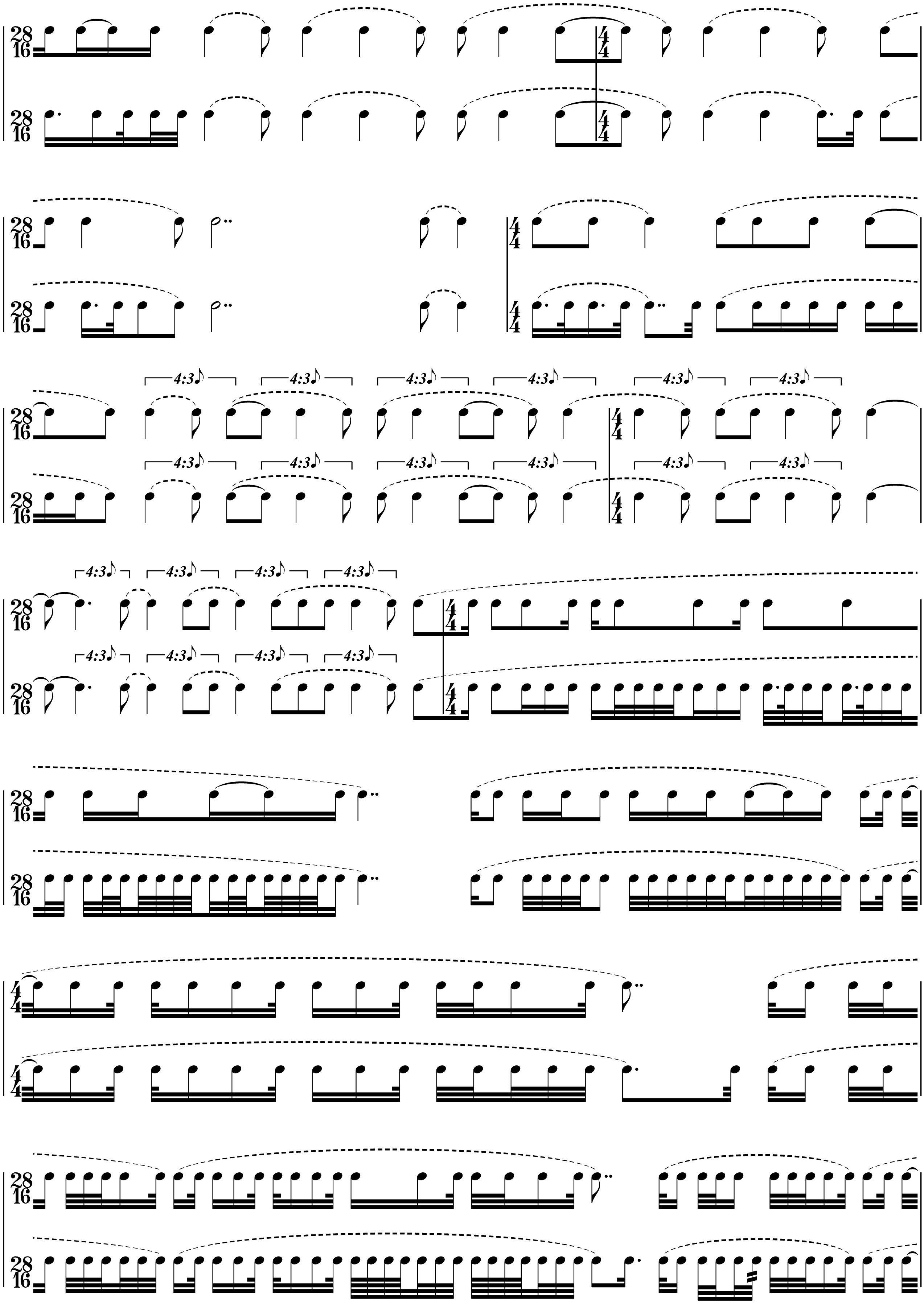

28/16
4:3
Voice
4/4
3:2
10:6
Tavil
Violin
Mridangam

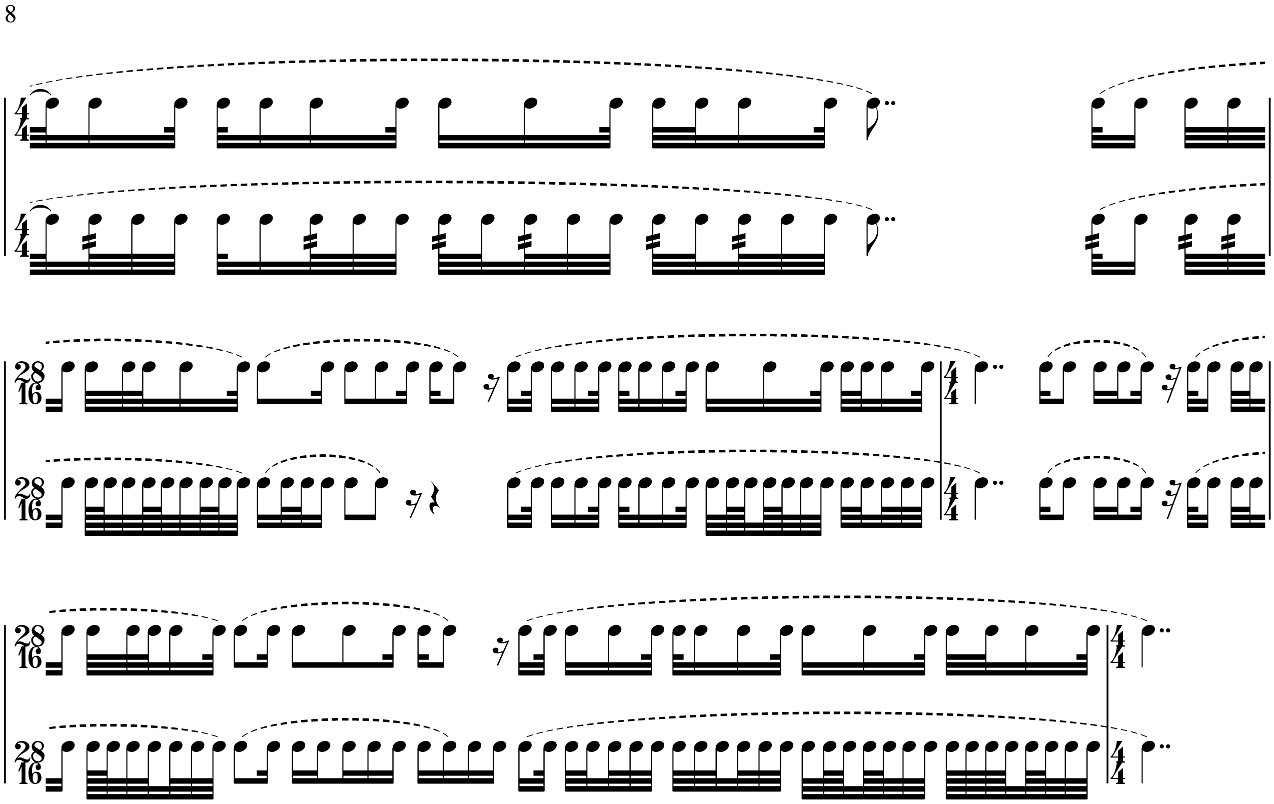

5:4
Voice
4:3𝅘𝅥𝅮
Tavil
3:2𝅘𝅥𝅮
9:6𝅘𝅥𝅯
3:2𝅘𝅥𝅮
4:3𝅘𝅥𝅮
3:2𝅘𝅥𝅮


28/16
8:6
Violin
4/4
Mridangam
3:2
3
Voice
Tavil


4/4
Violin
28/16
Mridangam
Voice
Tavil


Violin
28/16
13:8
Mridangam
4/4
8:6
8:6
8:6
8:6
8:6
8:6
8:6
8:6
Voice
Tavil


4:3♪



The reader may wonder whether this proliferation of new talas can succeed when the birth of new talas in the period XI to XV centuries was one of the causes of the total dissolution of the shadanga system. The answer comes from karnatic musicians: "*Since the 1990s, everything can be recorded in audio or video format, and either we can explain it to other musicians, record click tracks for them, or simply rely on the fact that video recordings of concerts and even rehearsals circulate in the market*". In other words, the evolution of infrastructure, communications and technology has made possible what six centuries ago endangered the unity of karnatic music[7].

TALA COMBINATIONS

Tala combinations are talas constructed upon two suladi talas of different duration used one after the other in a cyclic manner. The real karnatic term for tala combinations is *Dhruva rupaka* talas, a name which is derived from the first ever creation of a new tala by combining two different suladi talas. This occurred at the beginning of the XX century, in order to expand the possibilities of the 35 suladi talas. This idea does not necessarily imply that the new talas have to be extremely long, although this is often the result since short talas (5 to 9 beats) are sufficiently represented within the suladi system.

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[7] *Also, we must not forget the rigorous training undertaken by most karnatic musicians. I have seen how this piece in 44/16 was taught to a singer in two days to be performed at a concert the day after, while keeping tala throughout the whole piece, and improvising a long section!*

Therefore, any two talas can be taken and used alternately, thereby constantly forming a new tala. Once the two talas are presented, they form a new 'unit' and are treated as any other existing tala. In other words, the two talas would never be used randomly (i.e., 3 cycles of one tala followed by 1 of the other tala and afterwards 2 cycles of the first tala followed by 3 of the second one etc).

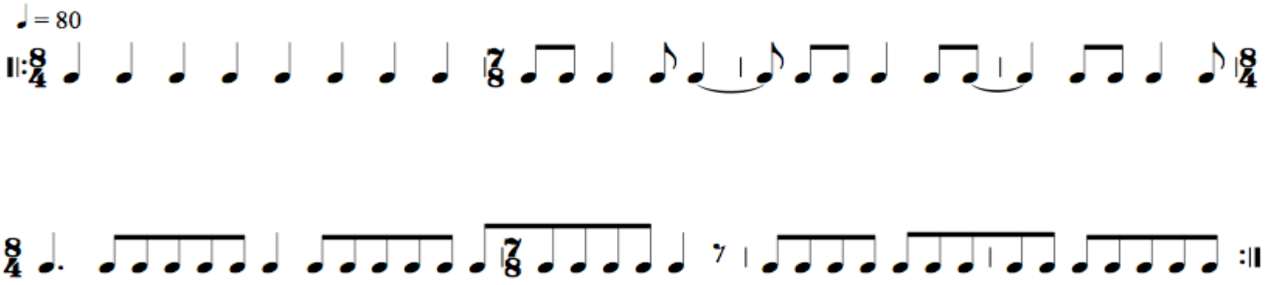
There are three anchor points in these new talas:

-Tala sam of the first tala as the strongest point
-Tala sam of the second tala as the second strong point of resolution
-Anga sams of both talas

After a couple of decades, combining a suladi tala with a chapu tala became another option. Due to the short duration of the chapu talas, a musician could choose to use between 1 to 5 cycles of the tala (a choice that remains unaltered for the whole piece), thus creating a new cyclic metre. Generally, the choice of number of cycles of the chapu tala would be an uneven number (1, 3 or 5) to create a more interesting tala structure (to repeat a chapu tala two or four times could be felt as a suladi tala performed once or twice). Since all chapu talas have an uneven number of beats, their repetition 1, 3 or 5 times avoids the feeling that the whole structure can be 'conducted' in ♩

In fact, this form of tala prastara is seldom utilised in karnatic music nowadays, due to the larger, richer amount of creative possibilities provided by the mukhy system and its continuous development.

A transcription of a theme in 37 beats can be found below. The structure of the tala combination takes an Adi tala (L4 D D) of 8 ♩ or 16 ♪, followed by three times misra chapu (7/8 repeated three times gives 21 ♪). Thus, 16/8 plus 21/8 results in 37/8, which constitutes a new cyclic metre that is repeated throughout the entire piece. *(track 234)*



PREVIOUS TECHNIQUES IN THE NEW TALAS

Every technique explained so far in the text can be used within the new talas without any problem, except for nadai bhedam.

Nadai bhedam needs the regularity that the suladi talas provide. The irregularity in the beating of all new talas makes the performance of nadai bhedam an almost impossible task. Therefore, this technique to create polypulses can exclusively be used within a suladi tala context.

The concept that has most benefited from the advent and development of the new talas is **combinations anuloma-pratiloma**. As a matter of fact, it can be said that, in general, this technique is easier to perform (or karnatic musicians have adapted this technique better) in the context and peculiarities of the new talas - especially those using the matra counting with the mukhy system - than within the suladi tala system.

Regrouping of the inner division

The mukhy system is not exclusively the concept of redistributing a given number of beats within the framework of a suladi tala: it also created the notion of **regrouping these beats into larger frames**. This regrouping implies that two or more contiguous 'numbers' in which the tala is subdivided can become one frame against which a gati (using an anuloma-pratiloma developmental technique) can be superimposed. It does not mean that the number of total beats of the tala are redistributed in an entirely different way: the original distribution of beats for every sam or finger-count and their order within the tala remain the same throughout the piece.

If the previous example of 19/8 with the pattern of Tisra Matya (L3 D L3) is taken, the concept of re-grouping the inner division would probably become more clear. The inner division is
3 2 2   3 2   3 2 2

The bigger structure, the large 'conducting' gesture resulting from this distribution of beats is
7   5   7

A few examples of regrouping are shown below *(track 235)*

1)   3 4   3 2   3 4
This is the result of summing up the numbers 2 2 of the first and third parts of the tala.

2)   3 2 5   2   3 4
In this example, the third and fourth numbers (2 and 3) are added producing a 5 ♪ frame. The last 4 is, once again, the result of adding up the last two digits.

3)   5 5   5   4
This example breaks the boundaries of the initial subdivision even further: the first 5 is the result of adding the first and second numbers (3 and 2); the second 5 of adding the third and fourth numbers (2 and 3); the third 5 of adding the fifth and sixth numbers (3 and 2); and the last 4 is once again the result of adding up the last two numbers.

4)   3 7   5   4
The last example uses the option of adding three contiguous numbers: this is the case of 7, which comes as a result of adding up the second, third and fourth numbers (2, 2 and 3). 5 is again arrived at by adding the fifth and sixth numbers (3 and 2).

There are two important points to take into consideration while regrouping the existing division of the tala:

a) The kriya or conducting pattern will always remain the same and will not change to adapt to the different regroupings. This notion is common to the general idea in karnatic music of not tampering with the tala: any technique creating crossing accents or polypulses never modifies the tala or tempo.

b) A regrouping can occur exclusively with the existing numbers and a new frame can never be the result of using a weak beat as part of the additions. For instance, in the previous tala, a regrouping resulting in the numbers 4 or 6 for the first frame is never possible. Only adding 3+2 or 3+2+2 (giving thus a 5 or 7) is possible as a first frame.

Similarly, if 5 is taken as the first frame, the second frame must be either 2, or the result of adding 2+3 or 2+3+2. Therefore, a frame of 3, 4 or 6 can never be the second frame if 5 was the first frame.

A few musical examples are presented below, using the 3rd developmental technique of combinations anuloma-pratiloma as source for the phrasing.

1) Original inner division 3 2 2   3 2   3 2 2 with khanda 1st speed *(track 236)*

⌐ 5:3♪¬ ⌐ 5:2♪¬ ⌐ 5:2♪¬ ⌐ 5:3♪¬ ⌐ 5:2♪¬ ⌐ 5:3♪ ¬ ⌐ 5:2♪ ¬ ⌐ 5:2♪¬

⌐ 5:3♪¬ ⌐ 5:2♪¬ ⌐ 5:2♪¬ ⌐ 5:3♪¬ ⌐ 5:2♪¬ ⌐ 5:3♪ ¬ ⌐ 5:2♪ ¬ ⌐ 5:2♪¬

2) First re-grouping 3 4   3 2   3 4   with misra 1st speed *(track 237)*

⌐ 7:3♪¬ ⌐ 7:4♪¬ ⌐ 7:3♪¬ ⌐ 7:2♪¬ ⌐ 7:3♪¬ ⌐ 7:4♪ ¬

⌐ 7:3♪¬ ⌐ 7:4♪¬ ⌐ 7:3♪¬ ⌐ 7:2♪¬ ⌐ 7:3♪¬ ⌐ 7:4♪ ¬

3) Second re-grouping 3 2   5 2   3 4 with tisra 2nd speed *(track 238)*

⌐ 6:3♪¬ ⌐ 6:2♪¬ ⌐ 6:5♪¬ ⌐ 6:2♪¬ ⌐ 6:3♪¬ ⌐ 6:4♪ ¬

⌐ 6:3♪¬ ⌐ 6:2♪¬ ⌐ 6:5♪¬ ⌐ 6:2♪¬ ⌐ 6:3♪¬ ⌐ 6:4♪ ¬

4) Third re-grouping 5   5   5   4 with chatusra 2nd speed *(track 239)*

⌐ 8:5♪¬ ⌐ 8:5♪¬ ⌐ 8:5♪¬ ⌐ 8:4♪¬

⌐ 8:5♪¬ ⌐ 8:5♪¬ ⌐ 8:5♪¬ ⌐ 8:4♪¬

5) Fourth re-grouping 3   7   5   4 with misra 2nd speed *(track 240)*

⌐ 14:3♪¬ ⌐ 14:7♪¬ ⌐ 14:5♪¬ ⌐ 14:4♪¬

⌐ 14:3♪¬ ⌐ 14:7♪¬ ⌐ 14:5♪¬ ⌐ 14:4♪¬

6) Overall structure 7   5   7 with khanda 2nd speed *(track 241)*

⌐ 10:7♪¬ ⌐ 10:5♪¬ ⌐ 10:7♪¬

⌐ 10:7♪¬ ⌐ 10:5♪¬ ⌐ 10:7♪¬

Combinations Anuloma-Pratiloma with the kala system

The kala system resembles more a suladi tala with the last beat lengthened or shortened. The concept of regrouping numbers to create different frames is applied only to the matra system. The quality or 'novelty' of the kala method is the cyclic irregularity that the lengthened or shortened beat provides.

Below are a few examples with the tala 4+ ¾. During the 'regular' beat, the performer uses different inner frames of ♩ or ♪ as he would do within a suladi tala. The last, shortened beat of ¾ or 3/16, breaks the regularity.

1) Misra 1st speed *(track 242)*

┌─ ***7:6♪*** ─┐ ┌─ ***7:6♪*** ─┐ ┌─ ***7:3𝅘𝅥𝅯*** ─┐ | ┌─ ***7:6♪*** ─┐ ┌─ ***7:6♪*** ─┐ ┌─ ***7:3𝅘𝅥𝅯*** ─┐

2) Khanda 1st speed *(track 243)*

┌─ ***5:6♪*** ─┐ ┌─ ***5:4♪*** ─┐ ┌─ ***5:4𝅘𝅥𝅯*** ─┐ ┌─ ***5:3𝅘𝅥𝅯*** ─┐ | ┌─ ***5:6♪*** ─┐ ┌─ ***5:4♪*** ─┐ ┌─ ***5:4𝅘𝅥𝅯*** ─┐ ┌─ ***5:3𝅘𝅥𝅯*** ─┐

3) Tisra 1st speed *(track 244)*

┌─ ***3:2♩*** ─┐ ┌─ ***3:2♩*** ─┐ ┌─ ***3:2♩*** ─┐ ┌─ ***3:3𝅘𝅥𝅯*** ─┐ | ┌─ ***3:2♩*** ─┐ ┌─ ***3:2♩*** ─┐ ┌─ ***3:2♩*** ─┐ ┌─ ***3:3𝅘𝅥𝅯*** ─┐

4) Chatusra 1st speed *(track 245)*

┌─ ***4:3♪*** ─┐ ┌─ ***4:4♪*** ─┐ ┌─ ***4:5♪*** ─┐ ┌─ ***4:3𝅘𝅥𝅯*** ─┐ | ┌─ ***4:3♪*** ─┐ ┌─ ***4:4♪*** ─┐ ┌─ ***4:5♪*** ─┐ ┌─ ***4:3𝅘𝅥𝅯*** ─┐

5) Tisra 1st speed *(track 246)*

┌─ ***3:5♪*** ─┐ ┌─ ***3:3♪*** ─┐ ┌─ ***3:4♪*** ─┐ ┌─ ***x:3𝅘𝅥𝅯*** ─┐ | ┌─ ***3:5♪*** ─┐ ┌─ ***3:3♪*** ─┐ ┌─ ***3:4♪*** ─┐ ┌─ ***x:3𝅘𝅥𝅯*** ─┐

Combinations Anuloma-Pratiloma with jathi bhedam

A step further in the level of complexity occurs when these two concepts are combined.

Jati bhedam sequences are developed in the new talas very much in the same fashion as they are with suladi talas.

However, when a technique of anuloma-pratiloma is to be superimposed over a jathi bhedam sequence, the latter cannot trespass the boundaries of the large inner structure of the tala: the jati bhedam cells need to resolve on the strong points of the tala.

The next two examples utilise the tala of 27/8 explained previously. The inner division is

3 2 2 | 3 3 | 3 2 2 | 3 2 2

giving as a result the overall large structure of 7 6 7 7. Consequently, the jathi bhedam sequences will start and resolve within the boundaries of every large fragment and anuloma-pratiloma phrasing will be superimposed in a manner similar to that presented in the chapter dedicated to combinations anuloma-pratiloma. The difference in this context is that, instead of using the same number of notes per cell (the concept that enabled anuloma-pratiloma to be used on a jathi bhedam sequence), 3rd and 4th developmental techniques can be added.

1) Chatusra 1st and 2nd speeds *(track 247)*

┌──────── ***7♪*** ────────┐ ┌────── ***6♪*** ─────┐ ┌────── ***7♪*** ─────┐ ┌─────────── ***7♪*** ───────────┐

⌐ ***4:5𝅘𝅥𝅯*** ¬ ⌐ ***4:6𝅘𝅥𝅯*** ¬ ⌐ ***4:3𝅘𝅥𝅯*** ¬ ⌐ ***4:7𝅘𝅥𝅯*** ¬ ⌐ ***4:5𝅘𝅥𝅯*** ¬ ⌐ ***8:4♪*** ¬ ⌐ ***8:3♪*** ¬ ⌐ ***4:4𝅘𝅥𝅯*** ¬ ⌐ ***4:5𝅘𝅥𝅯*** ¬ ⌐ ***4:3𝅘𝅥𝅯*** ¬ ⌐ ***4:2𝅘𝅥𝅯*** ¬

2) Khanda 1st, 2nd and 3rd speeds *(track 248)*

┌──────── ***7♪*** ────────┐ ┌────── ***6♪*** ─────┐ ┌────── ***7♪*** ─────┐ ┌─────────── ***7♪*** ───────────┐

⌐ ***5:5𝅘𝅥𝅯*** ¬ ⌐ ***5:6𝅘𝅥𝅯*** ¬ ⌐ ***5:3𝅘𝅥𝅯*** ¬ ⌐ ***5:7𝅘𝅥𝅯*** ¬ ⌐ ***5:5𝅘𝅥𝅯*** ¬ ⌐ ***15:4♪*** ¬ ⌐ ***10:3♪*** ¬ ⌐ ***5:4𝅘𝅥𝅯*** ¬ ⌐ ***5:5𝅘𝅥𝅯*** ¬ ⌐ ***5:3𝅘𝅥𝅯*** ¬ ⌐ ***5:2𝅘𝅥𝅯*** ¬

To conclude the section dedicated to anuloma-pratiloma combinations within the new talas, it is relevant to note which developmental techniques could be used.

-First technique can be utilised exclusively if the chosen gati and speed ignores any possibility of regrouping. It is difficult to perform due to the regularity required for this technique, but if the chosen frame is in ♪ or 𝅘𝅥𝅯 this becomes easier.

-Second technique is practically impossible to perform, because it is based on keeping the same number of beats while the different speeds of a gati succeed one another. This is essentially the same problem that nadai bhedam has with the new talas.

-Third and fourth techniques can be used, because both are based on the change of the frame while keeping gati and speed (3rd technique) or only the gati (4th technique).

-Techniques fifth and sixth, where the gati could change, are for all practical purposes impossible, in great part for the same reasons as the 2nd technique, but also because of the already mentioned reticence of karnatic musicians to change the gati in the middle of a tala.

Therefore, as was the case with nadai bhedam, any technique that would demand regularity in the beating is discarded.

Moharas

Moharas is one of the few techniques where a regularity of the beat is required, due to its characteristics of equal division of the tala in four equal phrases. However, and contradicting the previous paragraph, moharas is the only technique for which karnatic musicians have found solutions.

1) Phrases with different frame: the first solution is derived from the possibility provided by the mukhy system of regrouping the inner division of the tala. Through this option, a regrouping is sought by which

-The resulting number of frames should be four 4.

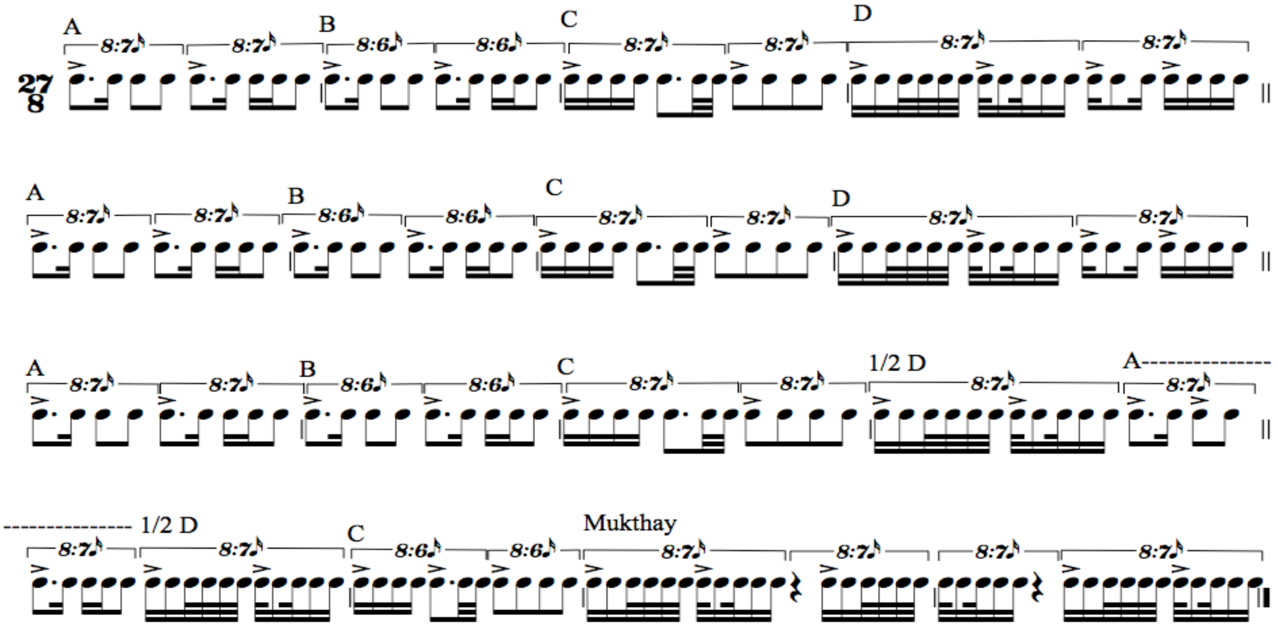
-At least two frames (preferably three) should be of the same length.

In the tala of 19 beats, with the inner division 322 32 322, one of the regrouping options was 5 5 5 4. This regrouping fulfils both requirements just mentioned. Consequently, a mohara in which the same gati would be performed against the two different resulting frames (5 and 4) could be constructed. Therefore, if for instance, misra gati is chosen, the four phrases would follow the frames:

⌐ 7:5♪¬ ⌐ 7:5♪¬ ⌐ 7:5♪¬ ⌐ 7:4♪¬

On this frame, any of the possible mohara phrasing constructions, along with the whole structure of the end of the 3rd cycle and the entire 4th cycle of ½ D A ½ D C Mukthay could be used.

The transcription below is of a mohara in 27/8, with the large structure of 7 6 7 7 used as the frames for the four phrases of the mohara. The chosen gati is chatusra and the phrase division is 4+4 in all four phrases. *(track 249)*



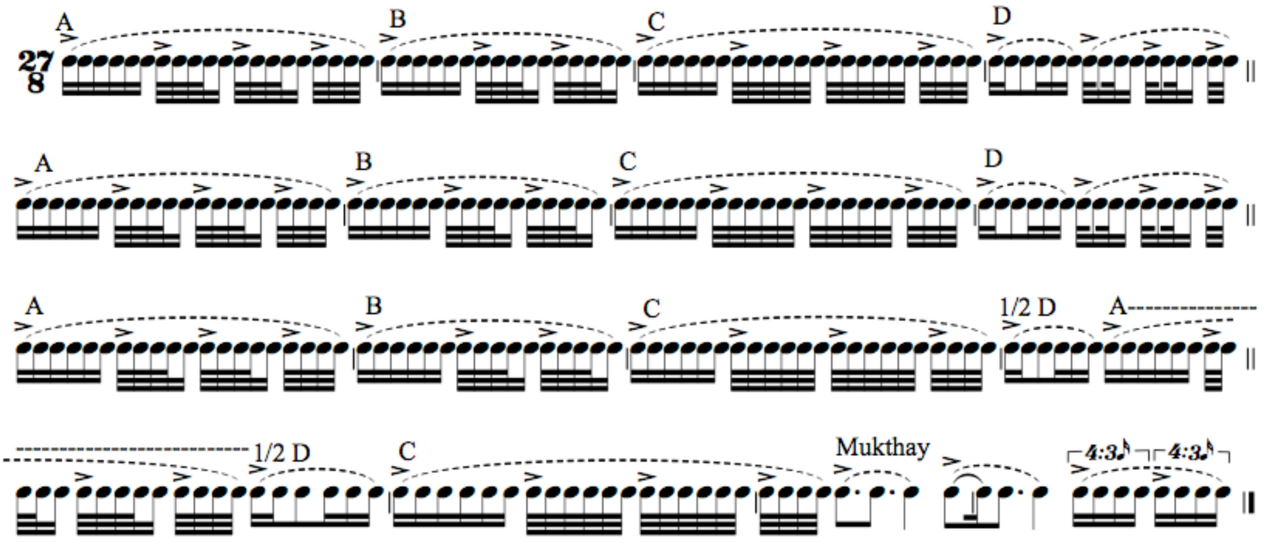
2) Phrases with different duration: the same principle applies here - four frames as a result of regrouping the inner division of the tala, and at least two of them (preferably three, especially with this type of moharas) of the same duration.

As opposed to the first 'solution', in which ultimately every phrase has the same number of matras, in this second possibility at least one phrase would be shorter or longer than the rest.

This second option, while being generally much easier to perform that the first, is utilised less frequently than the first option because it goes against one of the basic pillars of moharas: the equal length of every phrase.

The following example is once again constructed on the 27/8 tala with the inner division of 7 6 7 7. Therefore the B phrase is an ♪ shorter than the rest of phrases.

(track 250)



PRACTICE METHOD

The majority of techniques are, in most cases, more difficult to perform due to the lack of regularity of the counting or beating, but this can be solved by creating click tracks for different talas in their matra and kala forms, and creating sequences of

-Phrasing with gatis (including sankirna, 11 and 13).

-Gati and jathi bhedam (including tree of gati bhedam)

-All sorts of mukthays (except for 3-fold mukthays).

-Yati phrases and yati prastara

-Tirmanas and compound-related mukthays

-Poruttam A and B

-Mixed jathi nadai bhedam

-Phrasing through gati changes

-Combinations anuloma-pratiloma

Since it is the latter the technique that most benefited from the development of the Tala Prastara, a few exercises are presented that can be taken as an example in order to produce one's own examples in a variety of talas. Creating some form of click track with a computer aid should greatly help the work on these exercises.

All gatis in at least two speeds should be used for every exercise against the written numbers/frames.

1) Regrouping with the matra system

Since there are a few recorded examples in the tala of 19/8, to use the same regroupings as the B.C Manjunath recordings of chapter 27 could be a good starting point to superimpose combinations anuloma-pratiloma. Two different tempi are suggested for the same frames.

♪ = 80 / 120

19/8			
	7	5	7
	3 2 2	3 2	3 2 2
	3 4	3 2	3 4
	3 2 5	2	3 4
	5 5	5	4
	3 7	5	4
	7	5	7

2) Kala system talas: Practicing the alternation between a regular beat and a final incomplete beat is recommendable as well. Once again, using the examples of the recordings could be a good starting point.

♩ = 46 / 56

6/4 + 3/16 ┌─ x:3♩ ─┐ ┌─ x:3♩ ─┐ ┌─ x:3𝅘𝅥𝅯 ─┐

┌─ x:3♩ ─┐ ┌─ x:2♩ ─┐ ┌─ x:1♩ ─┐ ┌─ x:3𝅘𝅥𝅯 ─┐

┌─ x:2♩ ─┐ ┌─ x:2♩ ─┐ ┌─ x:2♩ ─┐ ┌─ x:3𝅘𝅥𝅯 ─┐

┌─ x:3♪ ─┐ ┌─ x:4♪ ─┐ ┌─ x:5♪ ─┐ ┌─ x:3𝅘𝅥𝅯 ─┐

┌─ x:5♪ ─┐ ┌─ x:3♪ ─┐ ┌─ x:4♪ ─┐ ┌─ x:3𝅘𝅥𝅯 ─┐

3) Tala combination suladi-chapu

A few frames used in the percussion solo presented in chapter 28 are shown as a starting point to practice.

♪ = 140

37/8 ┌─ x:3♩ ─┐ ┌─ x:3♩ ─┐ ┌─ x:2♩ ─┐

┌─ x:3♪ ─┐ ┌─ x:4♪ ─┐ ┌─ x:3♪ ─┐ ┌─ x:4♪ ─┐ ┌─ x:3♪ ─┐ ┌─ x:4♪ ─┐

37/8 ┌─ x:5♩ ─┐ ┌─ x:3♩ ─┐

┌─ x:5♪ ─┐ ┌─ x:2♪ ─┐ ┌─ x:5♪ ─┐ ┌─ x:2♪ ─┐ ┌─ x:5♪ ─┐ ┌─ x:2♪ ─┐

37/8 ┌─ x:7♪ ─┐ ┌─ x:5♪ ─┐ ┌─ x:4♪ ─┐

┌─ x:3♪ ─┐ ┌─ x:2♪ ─┐ ┌─ x:2♪ ─┐ ┌─ x:3♪ ─┐ ┌─ x:2♪ ─┐ ┌─ x:2♪ ─┐ ┌─ x:3♪ ─┐ ┌─ x:2♪ ─┐ ┌─ x:2♪ ─┐

4) Short jathi bhedam sequences within the larger subdivision of talas

Once again, a good starting point for a performer is to use the example of the recordings.

27/8
┌──── 7♪ ────┐ ┌──── 6♪ ────┐ ┌──── 7♪ ────┐ ┌──── 7♪ ────┐
┌ x:5𝅘𝅥𝅯 ┐┌ x:6𝅘𝅥𝅯 ┐┌ x:3𝅘𝅥𝅯 ┐ ┌ x:7𝅘𝅥𝅯 ┐┌ x:5𝅘𝅥𝅯 ┐ ┌ x:4♪ ┐┌ x:3♪ ┐ ┌ x:4𝅘𝅥𝅯 ┐┌ x:5𝅘𝅥𝅯 ┐┌ x:3𝅘𝅥𝅯 ┐┌ x:2𝅘𝅥𝅯 ┐

Chapter 28

PHRASING THROUGH GATI CHANGES

The very last chapter of the part dedicated to describe the most important karnatic rhythmical techniques and concepts presents the latest development taking place nowadays in South India: phrasing through gati changes.

A glimpse of this concept was already seen in the development of mixed gati moharas, in the section on '½ D, A, ½ D, C, Mukthay'; due to the shortening of the 'D' phrase, and the pattern established by this type of moharas after this shortening, the 'A' and 'C' phrases, as well as the mukthay, are always performed in two different gatis, whilst the phrase is never interrupted or modified by this change of gatis. Except for this technique, all gati changes presented thus far have always resulted in a new phrase starting in a gati or speed change.

However, a transformation is rapidly taking place in karnatic music today. An increasing number of musicians are starting to break the limits of the gati changes and their subsequent phrase development by combining two or more gatis in a tala, as well as constructing phrases (or using the rhythmical sangati concept taken to a higher level of complexity) in which a number of matras are part of one gati and the remaining matras are part of a different gati without interruption in the flow of the phrase or the application of any accent where the gati change occurs.

Much has been said during the previous chapters not only about the reticence, but also almost the pride shown by karnatic musicians in the notion of changing gatis only on tala or anga sam (the latter even in a quite restricted fashion). Only if a very clear set of parameters is present, can this gati change occur somewhere else in the tala. Undoubtedly, this strict approach has enabled karnatic music to develop a highly sophisticated rhythmical system where the creation and performance of intricate and complex material go hand in hand.

The new approach is not far removed from this ingrained idea. The difference is that gati changes occur more often and phrases are not confined to the length of a particular gati but, whether using 'regular phrasing' or gati/jathi bhedam, the phrases trespass the boundaries of the gati change. However, the placement of the gati change will generally take place on the tala or anga sams of the tala (if the phrase is completely new); or eventually, and always using the notion of rhythmical sangati, on some other beat, provided that the phrase has a clear resemblance to the original (the latter being a more subjective matter and, therefore, somewhat polemic amongst musicians).

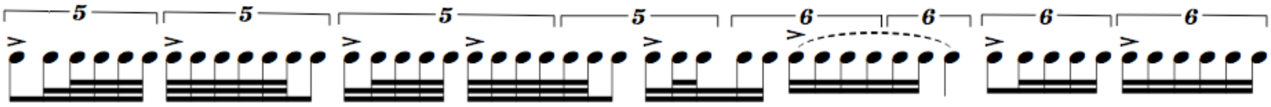
Nonetheless, these are the two parameters that enable musicians to change gatis as often as they could or would like, with the phrase being free to be part of two gatis:

-Gati changes occur only on the sams of the tala

-Gati changes can be placed on a different beat, provided that the change is the **result of a rhythmical sangati** on a previous phrase, and that in one way or another the placement of the gati resembles the original placement of a cell of the original phrase.

A few examples will be analysed to show some of the possibilities that this new concept allows or calls for[1].

1) The first example is set to Adi tala (L4 D D) and takes the gatis khanda and tisra 2nd speed. The gati changes in the first drutam sam, thus obeying the first 'rule'. *(track 251)*



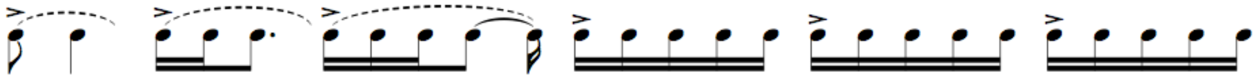
If the phrase itself is analysed, it can be observed that it consists of a combination of regular phrasing with a short jati bhedam sequence. The numbers would be 5 5 3 5 4 10 (6+4) 6 6. The total number of matras is 20 in khanda and 24 in tisra, resulting in 44 matras (this would be the number of matras of a chatusra phrase in a tala of 11 beats).

The first two beats, as well as the last two, take phrases that follow the flow of the respective gatis. The 3rd accent starts the short jathi bhedam sequence and it is on the 5th accent that the 4-matra phrase goes through the gati change; the first two matras are in khanda and the last two matras in tisra. The jathi bhedam continues until the last two beats are reached.

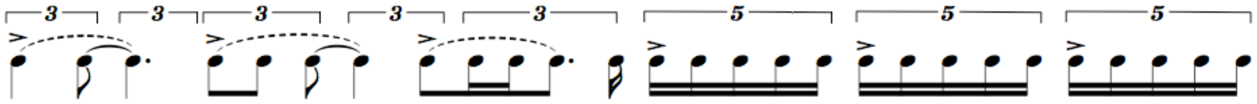
From this particular example, it can be deduced that as long the number of matras is the result of adding up the length of each gati, and it is known beforehand where the gati change(s) can happen, any combination of gatis is possible in any tala. Due to the fact that there are three sams in this tala, a hypothetical third gati could have been used starting on the second drutam sam, or alternatively, a return to the original khanda would have been possible.

Once the number of matras is obtained and the placement of the gati changes is clear, the musician is free to elaborate a phrase, making sure that the gati change does not coincide with a new cell of the phrase, but rather that a cell is created that deliberately crosses the boundary of the gati change.

2) The second example is also based on a phrase in chatusra in Adi tala.



In the first rhythmical sangati version (combining tisra and khanda), there are a few elements that move away from the 'clean' approach shown in chapters 6 and 10; also, the gati change occurs on a weak beat of the tala, and an extra note that was not part of the original phrase is added before the change to khanda.



The first 4 beats in tisra scrupulously follow the transformation of the first 12 matras of the original phrase into tisra 1st speed. However, and still as part of the same cell, in the 5th beat the tisra unit is 2nd speed anuloma. In order to complete the beat, a new note is added before proceeding to play the last 15 matras of the original phrase (chatusra jathi 5) in 3 beats of khanda. The latter probably explains why the gati change takes place on a weak beat, namely in order to resemble the idea of a phrase of 5 matras within the remaining length of the tala.

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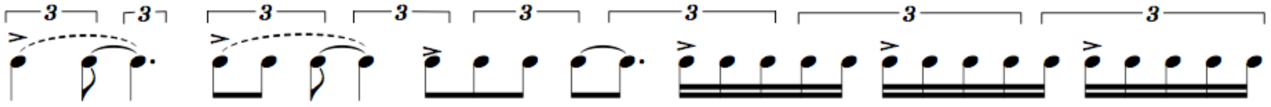
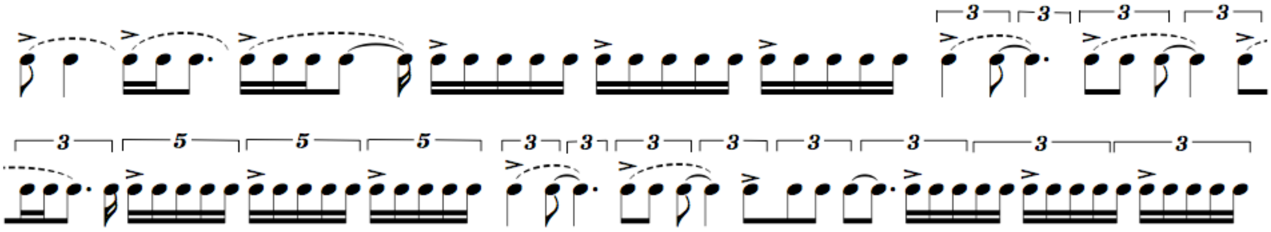
[1] *Needless to say that, due to the very recent appearance of this technique, many more possibilities are likely to develop in the next few years.*

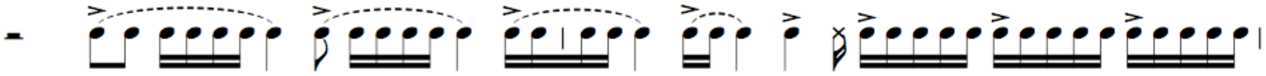
The second version on the same phrase is done exclusively in tisra but combining both speeds. Also, the last note before tisra 2nd speed jathi 5 starts, is elongated in order for the feature of 5 notes to fit neatly into the tala.



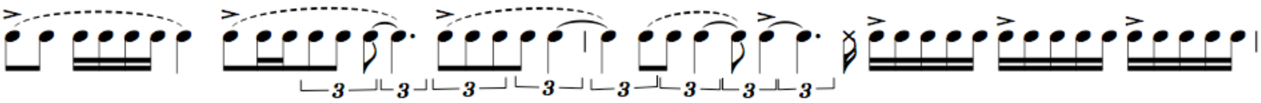
The whole phrase, thought out as a complete development of the initial idea, looks like this *(track 252)*



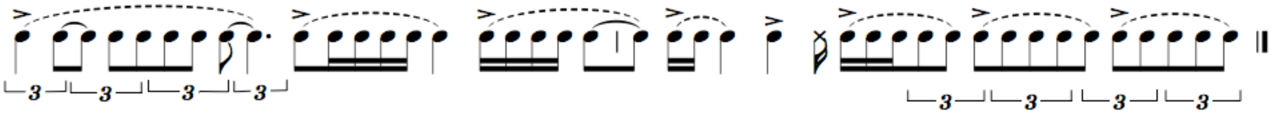
3) The third example takes as starting point a phrase of 14 beats in chatusra (56 matras) to later develop it in two different ways combining tisra and chatusra within two cycles of Adi tala.



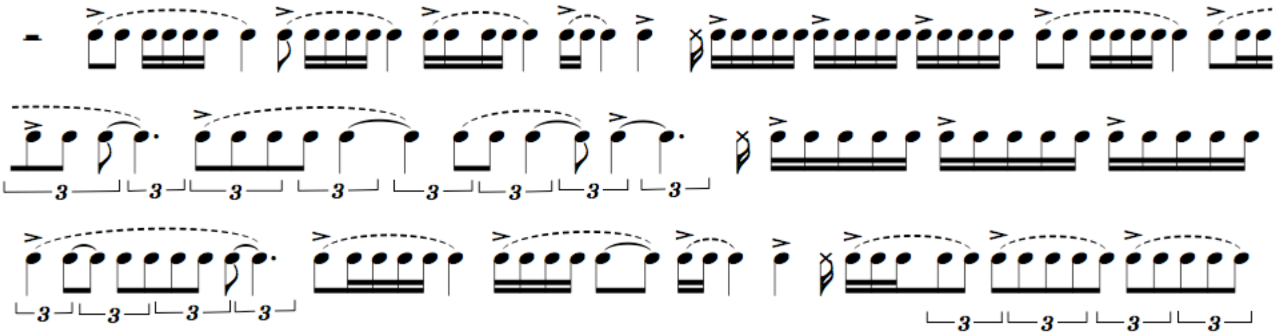
Both versions scrupulously follow the rules as to when the gati changes can take place. In the first case, the change occurs in the first drutam sam, and the return to chatusra also takes place in the same position.



In the second version, the only alteration as far as phrasing through gati changes is concerned, occurs with the jathi 5 cells when the phrase goes into tisra from the 4th matra of the jathi, with the first three matras in chatusra.



Once again, the whole sequence performed as a unit looks thus[2]. *(track 253)*



4) The fourth example is the transcription of a solo by B.C. Manjunath in a tala of 37/8, tala described in the previous chapter. It is a tala combination made up of Adi tala (8/4 or 16/8) followed by three times misra chapu (7/8 x 3=21/8).

An in-depth analysis of this solo would probably take too much space. Suffice it to say that it comprises the following main elements:

-Similar notion as in mixed gati mohara, most of the time dividing the 8/4 in two equal halves and applying two different gatis to every tala fragment. Similarly, the 7/8 is continuously subdivided in 3+4, taking different gatis or speeds for every part.

-An overall idea of anuloma-pratiloma permeates the entire solo, although manifesting clearly in only a few cycles or part of a cycle.

-The length of phrases varies continuously: musicians always look for the surprise factor that the gati change or a different anuloma-pratiloma speed may provide.

-The notion behind the phrase development is similar to the fashion mixed jathi nadai bhedam develops phrases: through repetition of cells in both frames. However, the varying length of phrases and greater freedom in their development, together with the irregularity of the tala, avoids any feeling of predictability.

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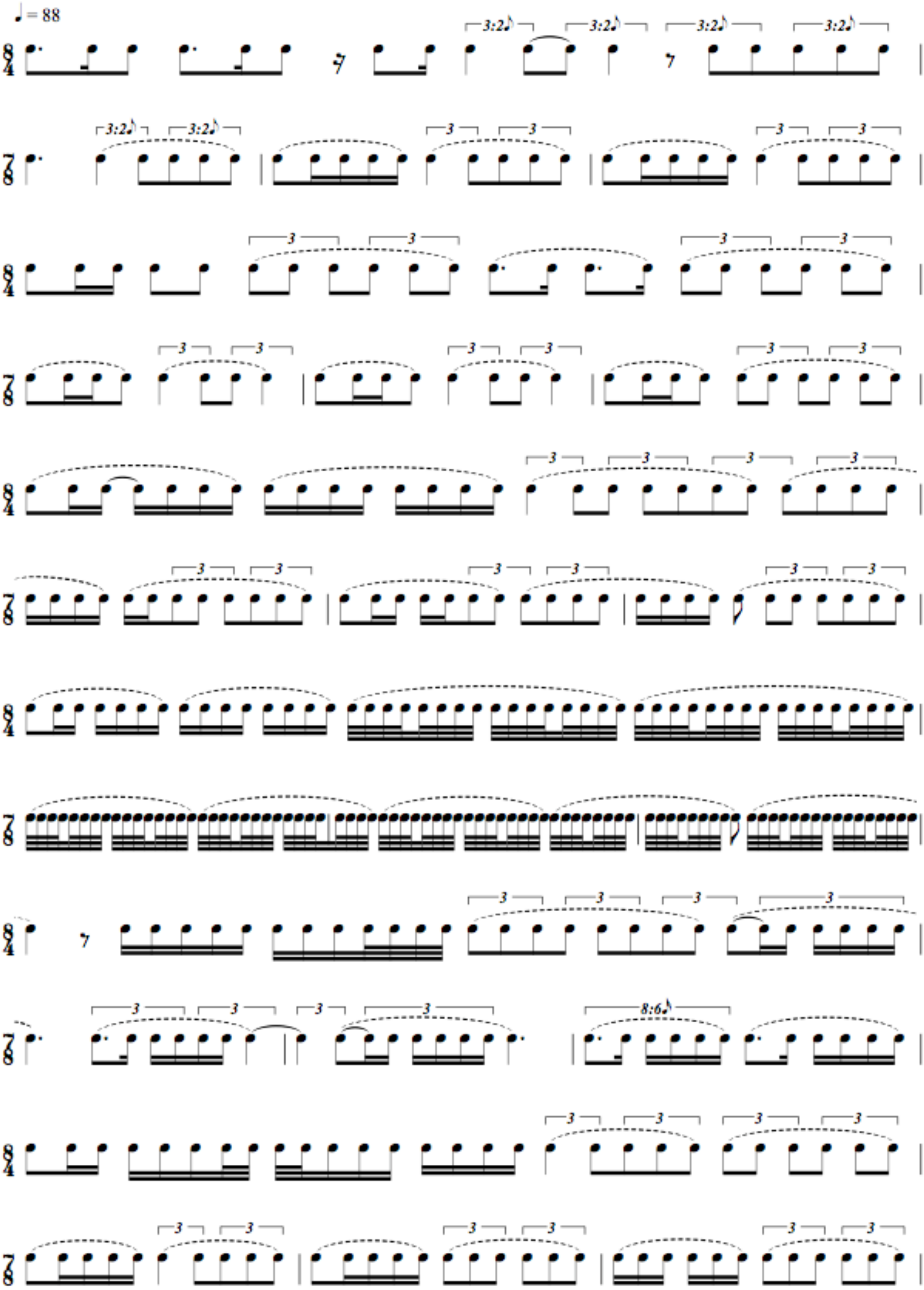
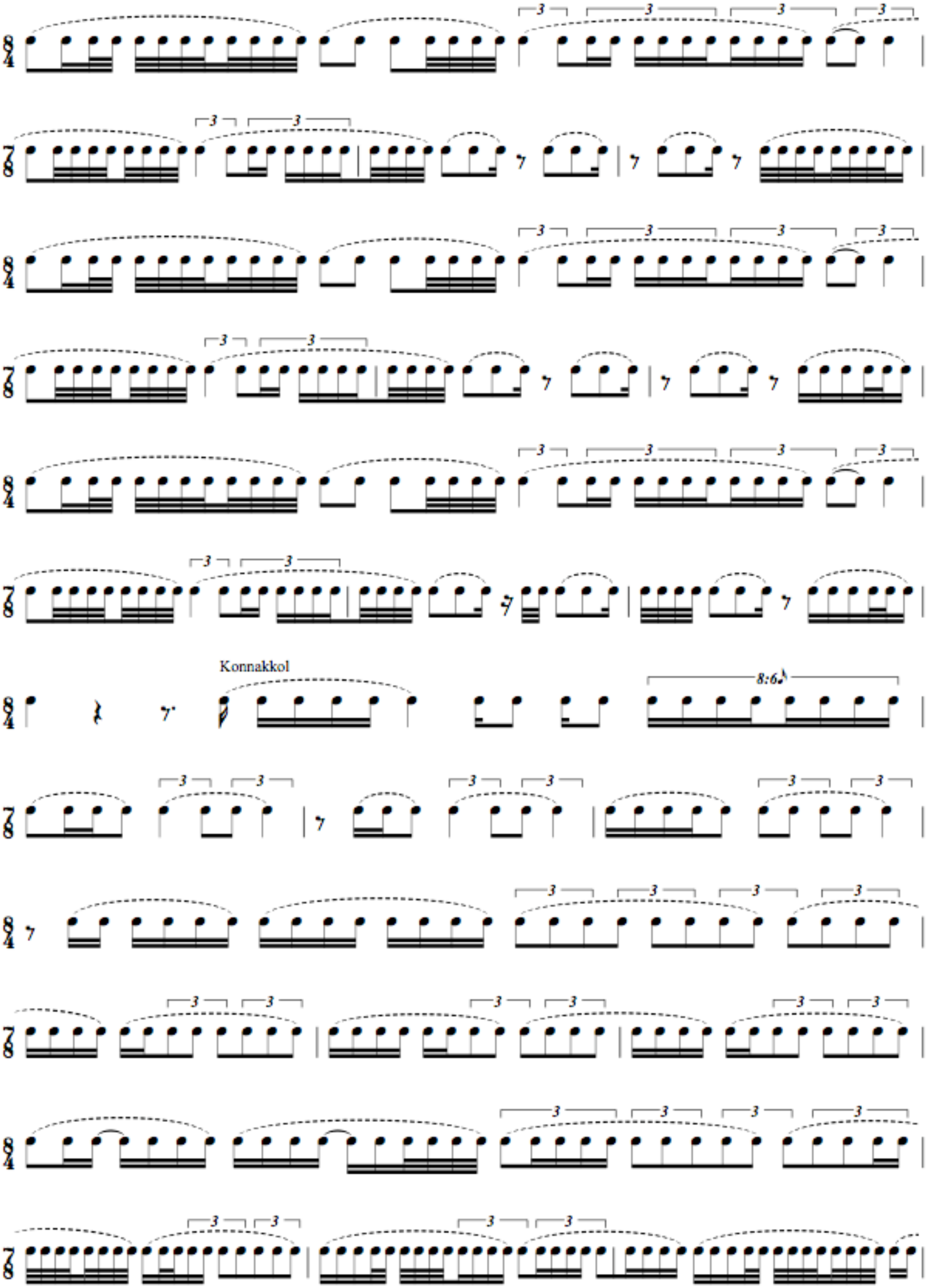
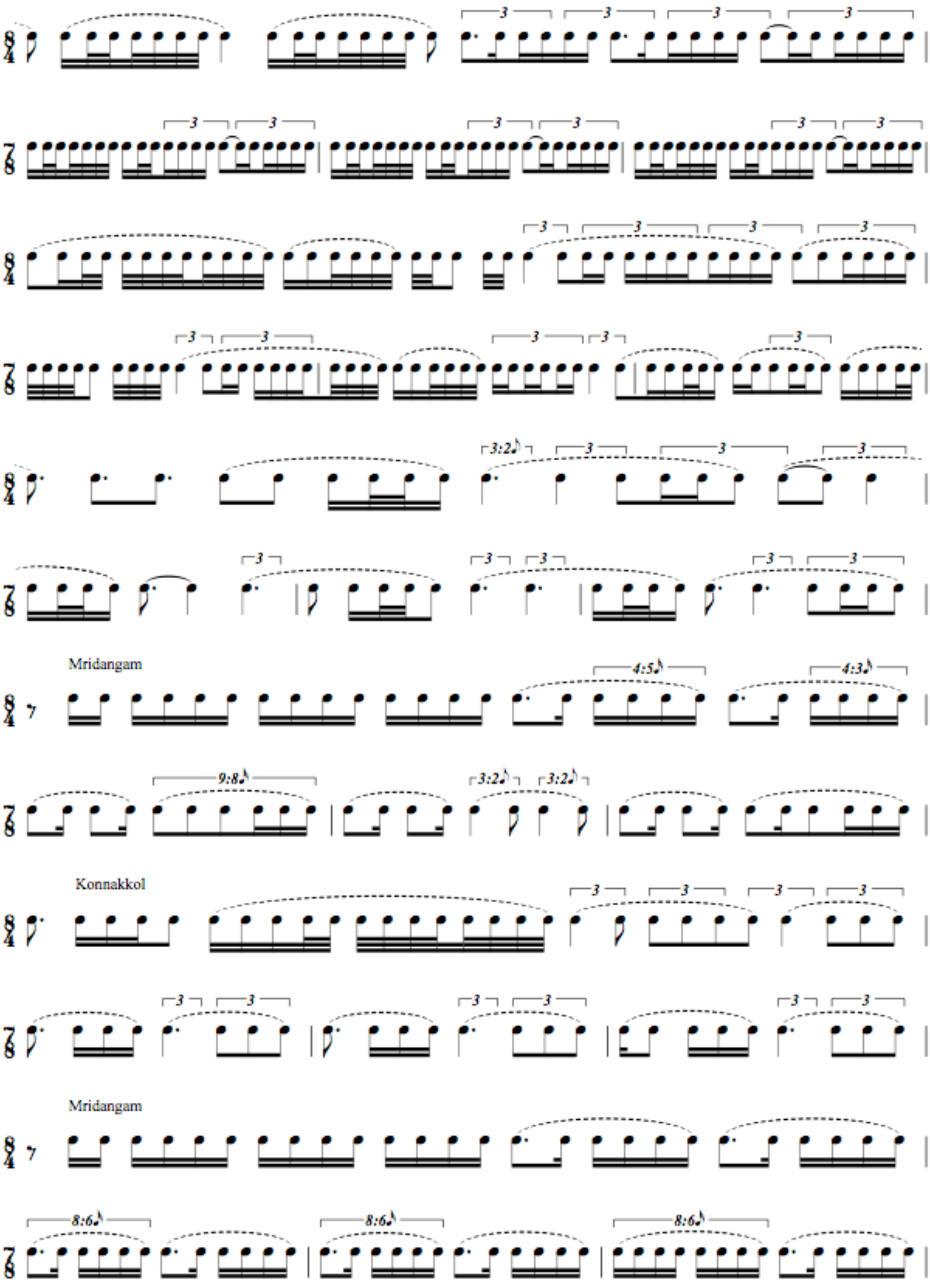
[2] *The fact that the three examples have been played as a unit does not imply that this is the only manner to work with the concept exposed in this chapter. Whether as a new phrase or as a rhythmical sangati, the concept can be applied anywhere in the development of a piece.*

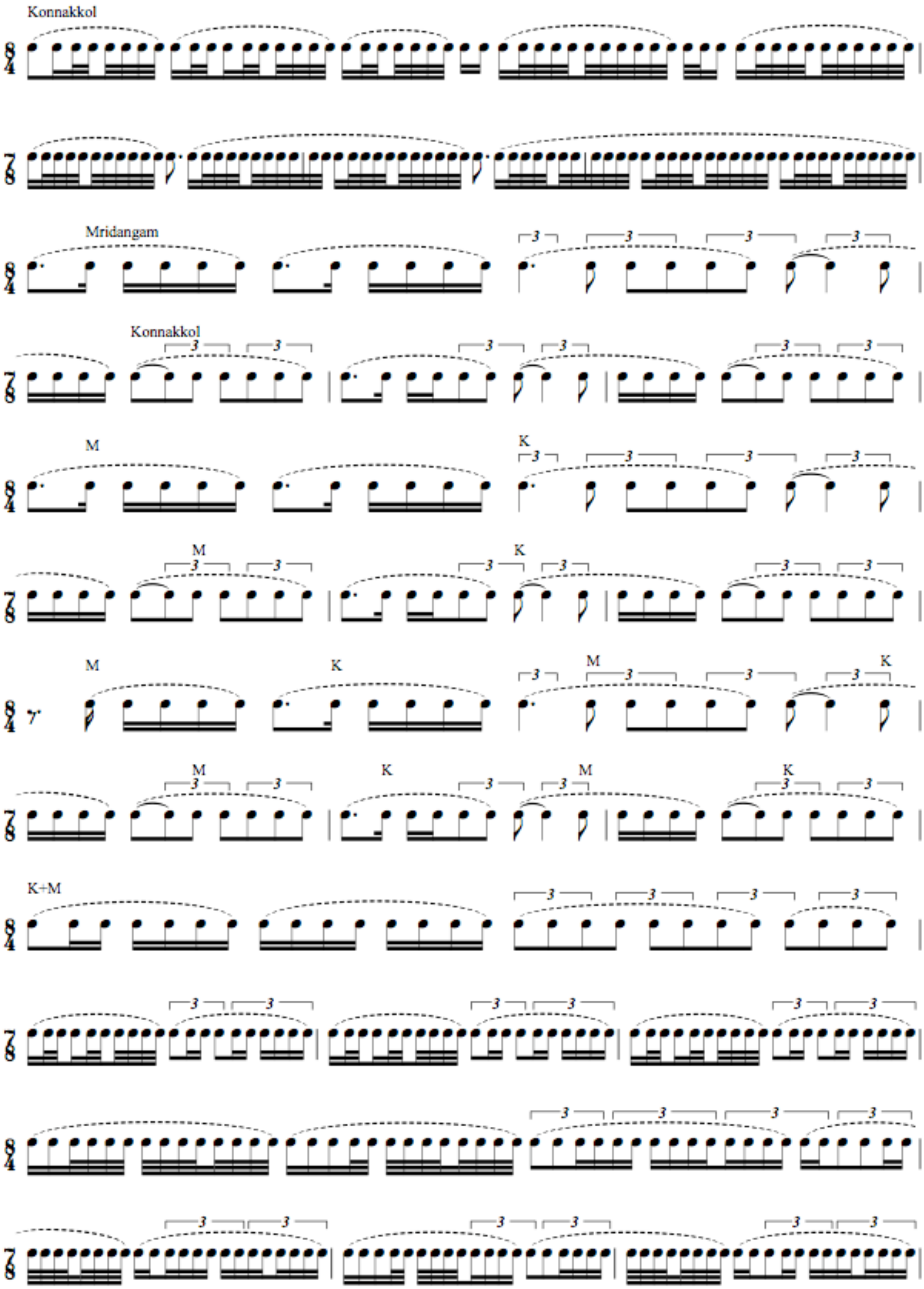
(track 254)

Percussion solo by B.C. Manjunath
Tala: Adi tala (8/4) + Misra chapu (7/8) x 3 = 37 beats (37/8)

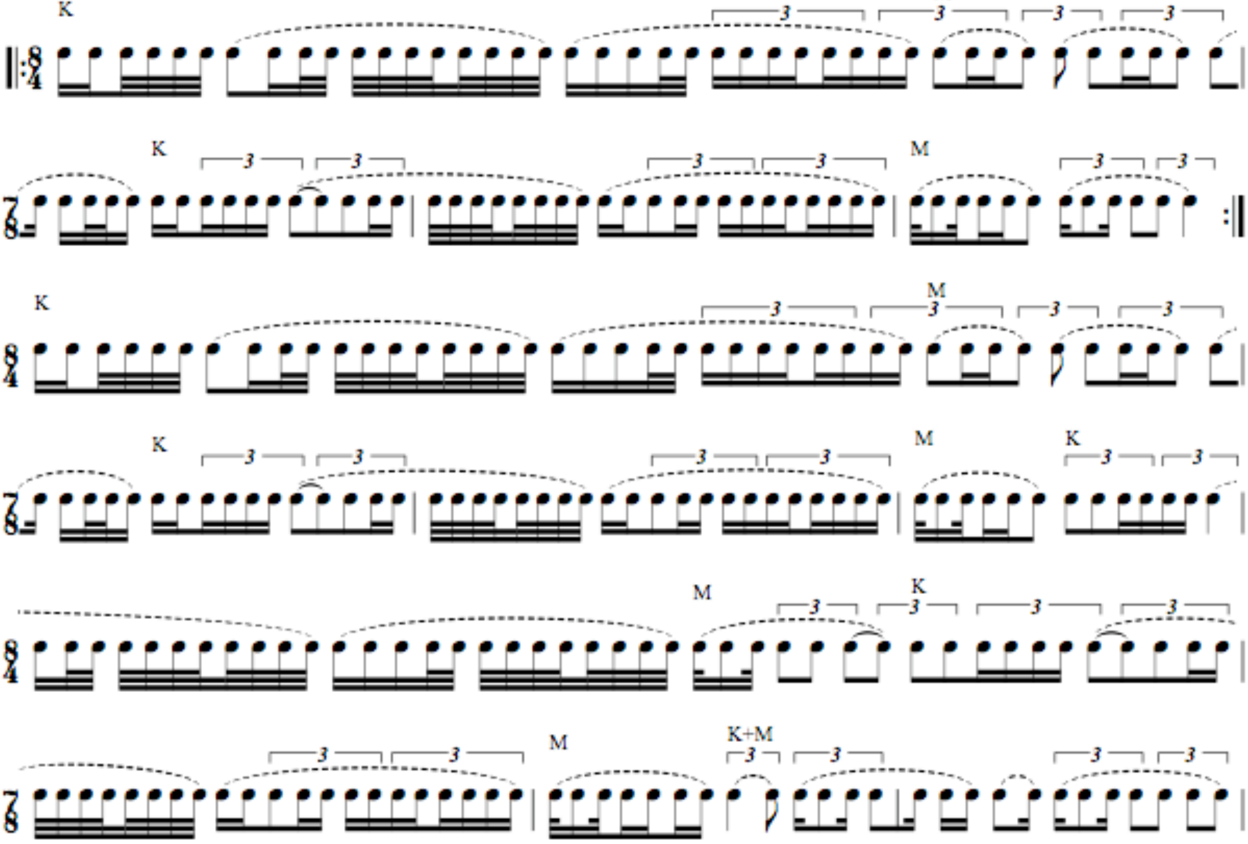



Konnakkol
8:6♪

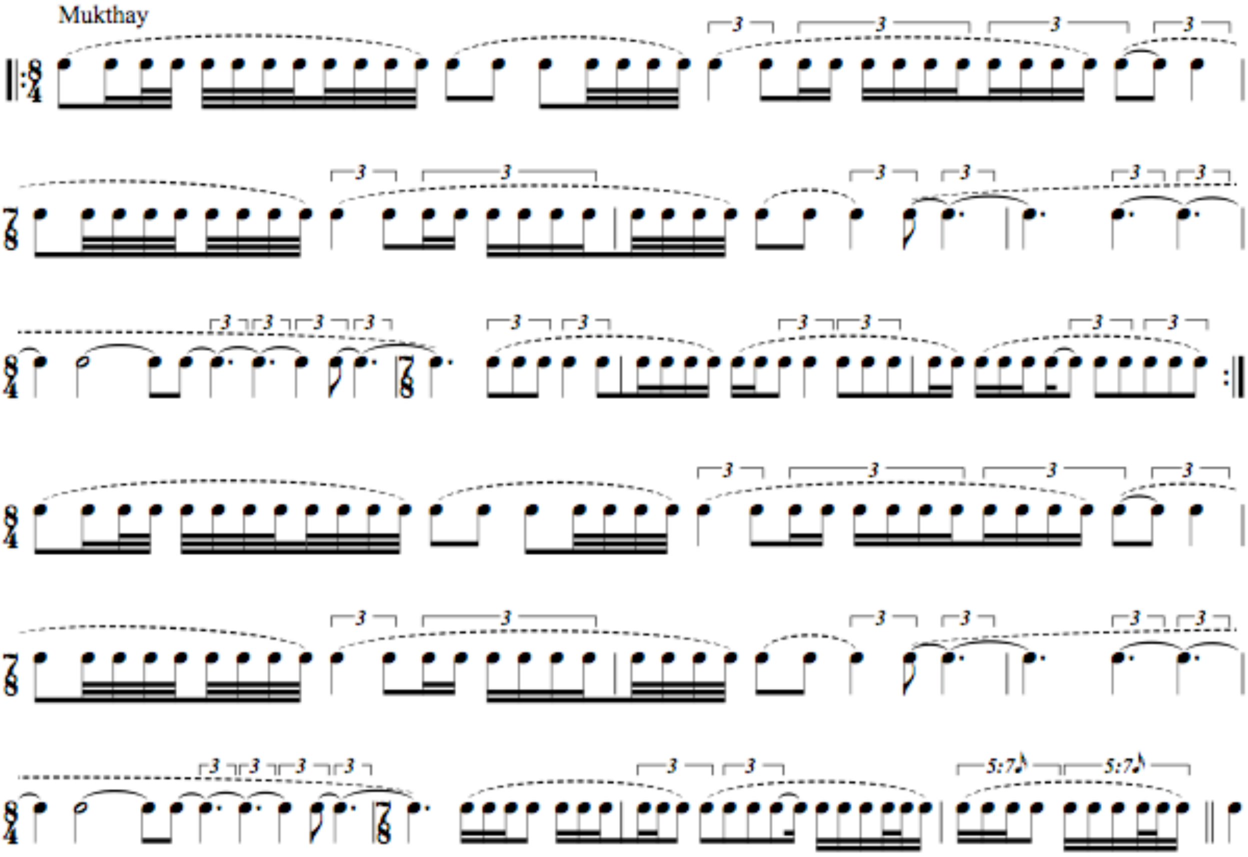

Mridangam
4:5
4:3
9:8
3:2
Konnakkol
Mridangam
8:6


Konnakkol
Mridangam
Konnakkol
M
K
M
K
M
K
M
K
M
K
K
M
K
K+M

Mohara


K
M
K
M
K
M
K
M
K
M
K+M

Mukthay



5) The last example presents the concept explained in this chapter a few times. However, I have transcribed it as a sort of final recapitulation of all techniques described in the text so far[3]. As with the previous example, a deep analysis of this 27 minute long percussion duo is not possible here; suffice to say that most techniques presented in the text are used in some manner or another. A.R.A.K. Sharma is responsible for the tala construction and main ideas developed in this duo. Since it is written with an almost continuous metre change, I have included a double line at the end of the second 4/4 of the cycle so that the reader can see the cycles as conceived by the composer.

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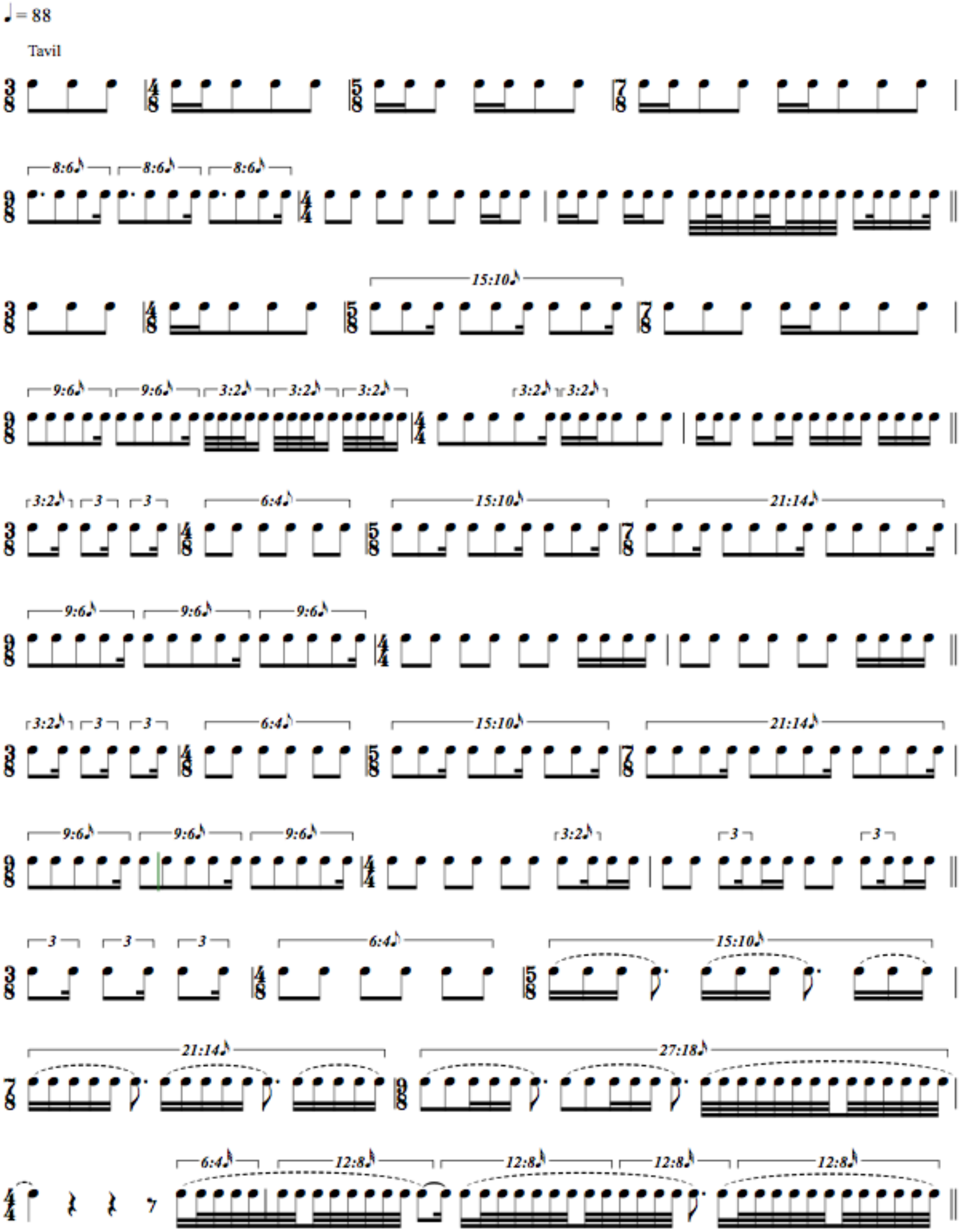
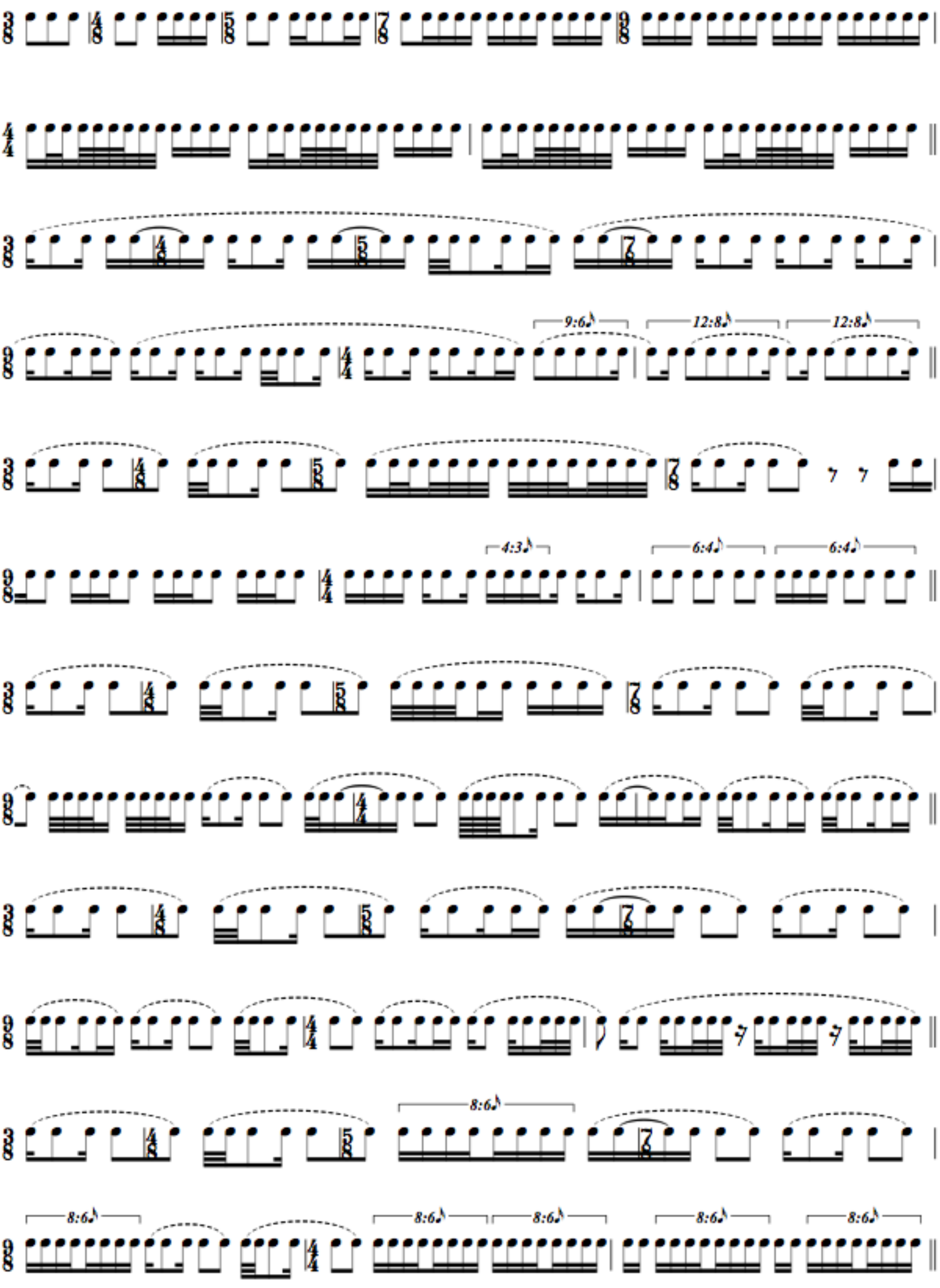
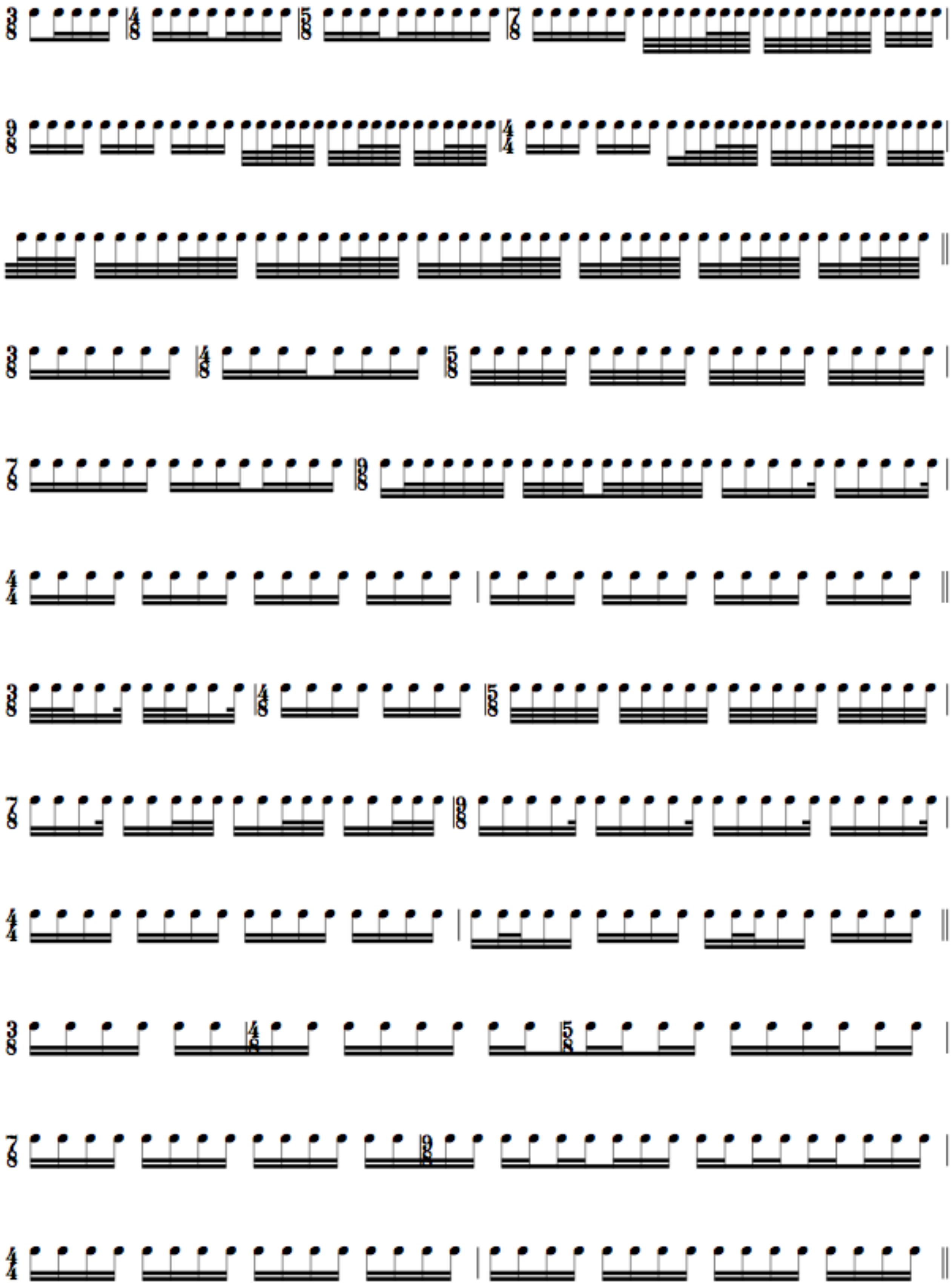
[3] *At the end of the transcription, the reader can find the practice method section pertaining to this technique*

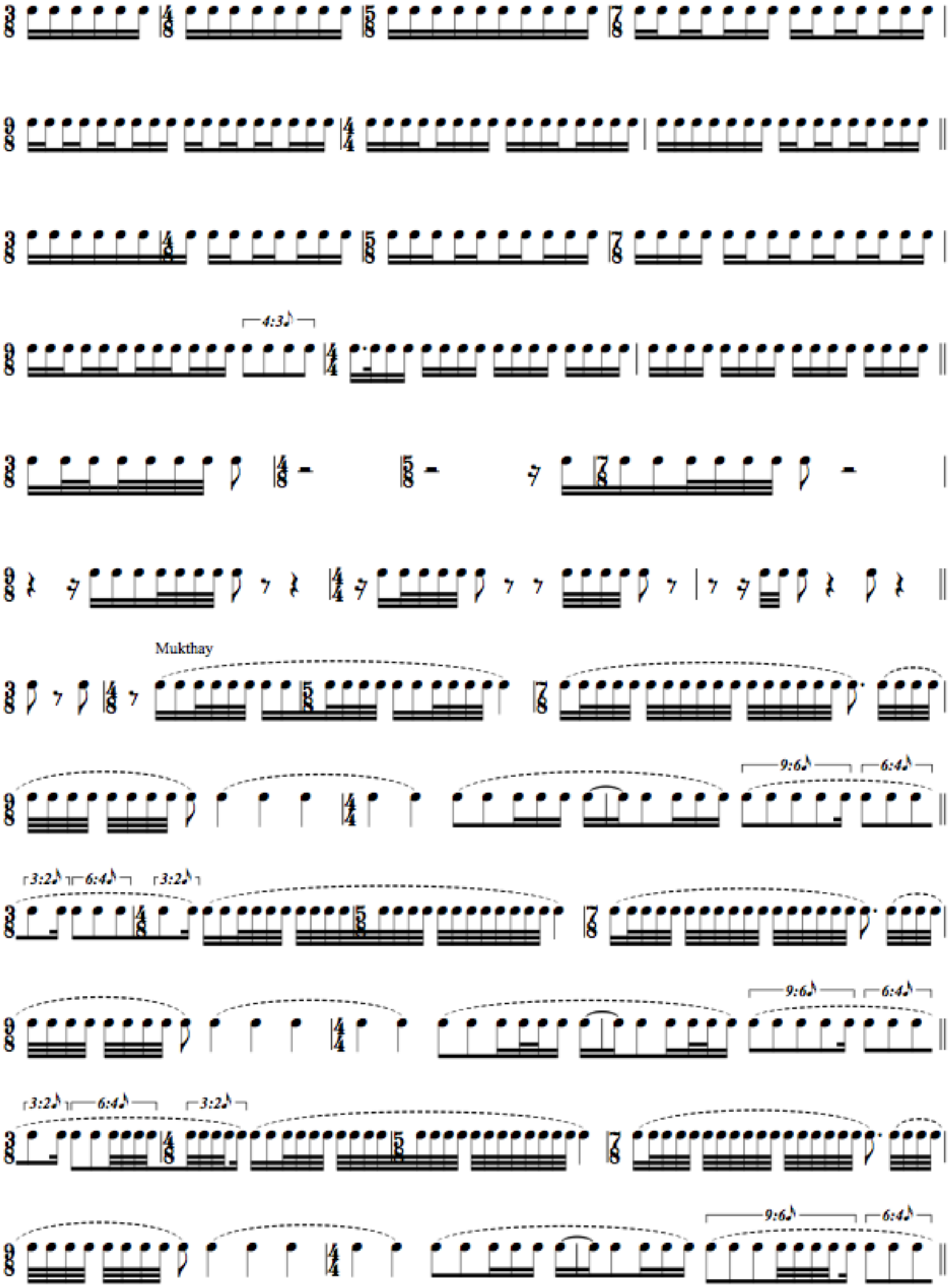
(track 255)

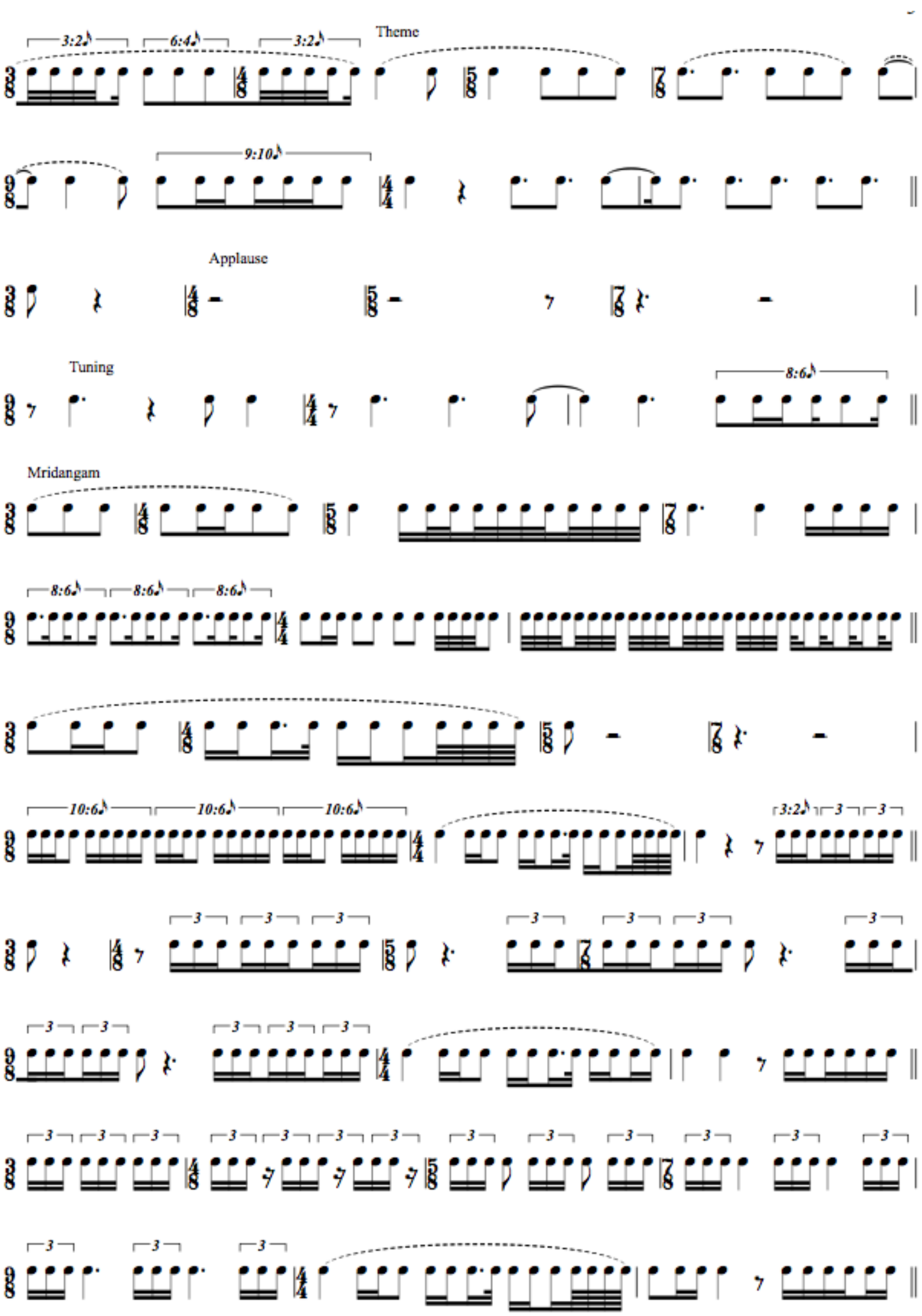
Percussion duo by A.R.A.K. Sharma (Tavil / S) and B.C. Manjunath (Mridangam / M)
Tala: Tisra chapu (3/8) + Chatusra chapu (4/8) + Khanda chapu (5/8) + Misra chapu (7/8) + Sankirna chapu (9/8) + Dhrutam (4/4) + Dhrutam (4/4) = 44 beats (44/8)
Eduppu: 4/8 after Tala sam (= 2nd beat of Chatusra chapu)

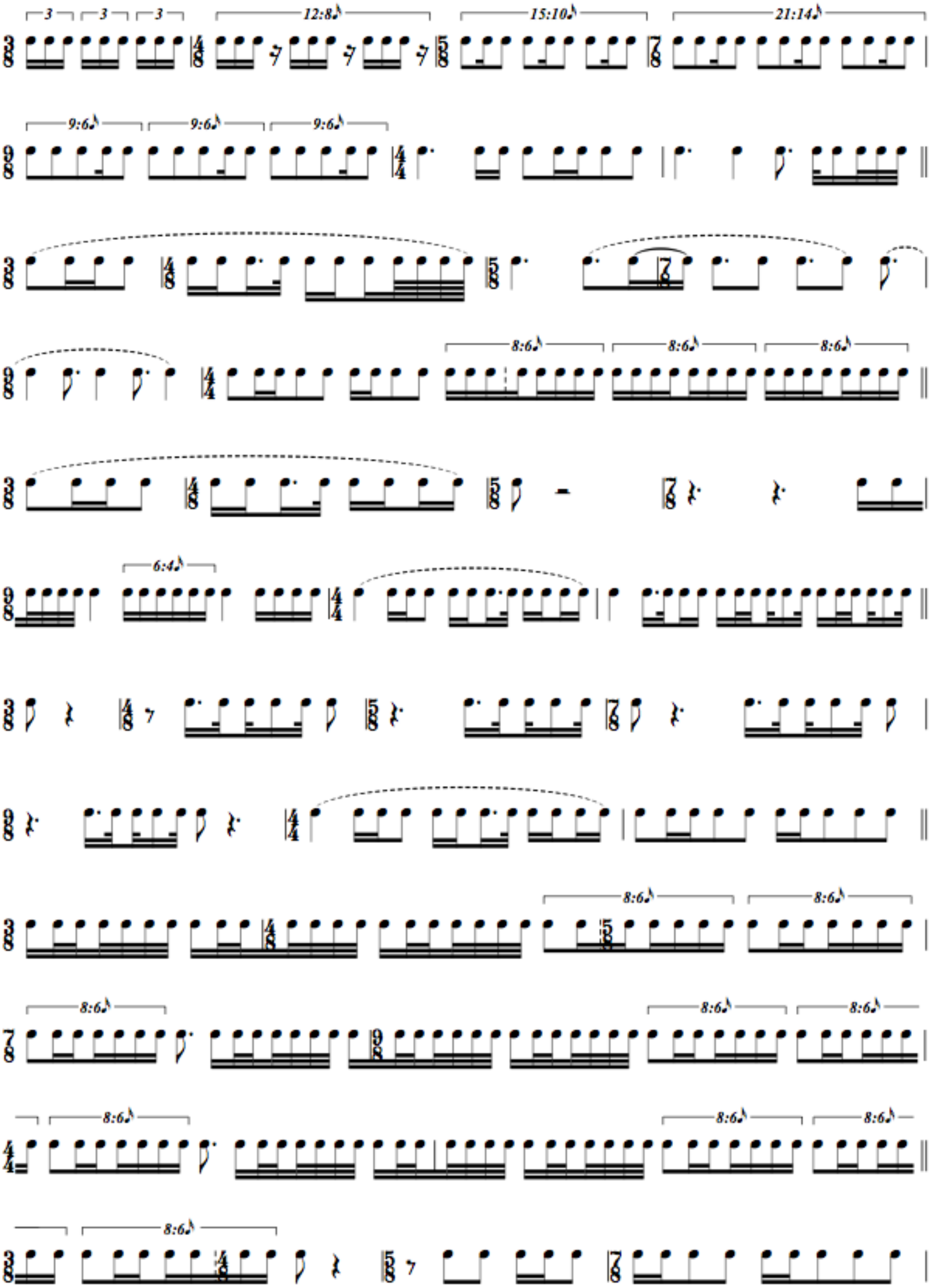

♩= 88
Tavil
8:6♪
9:6♪
3:2♪
3
6:4♪
15:10♪
21:14♪
27:18♪
12:8♪

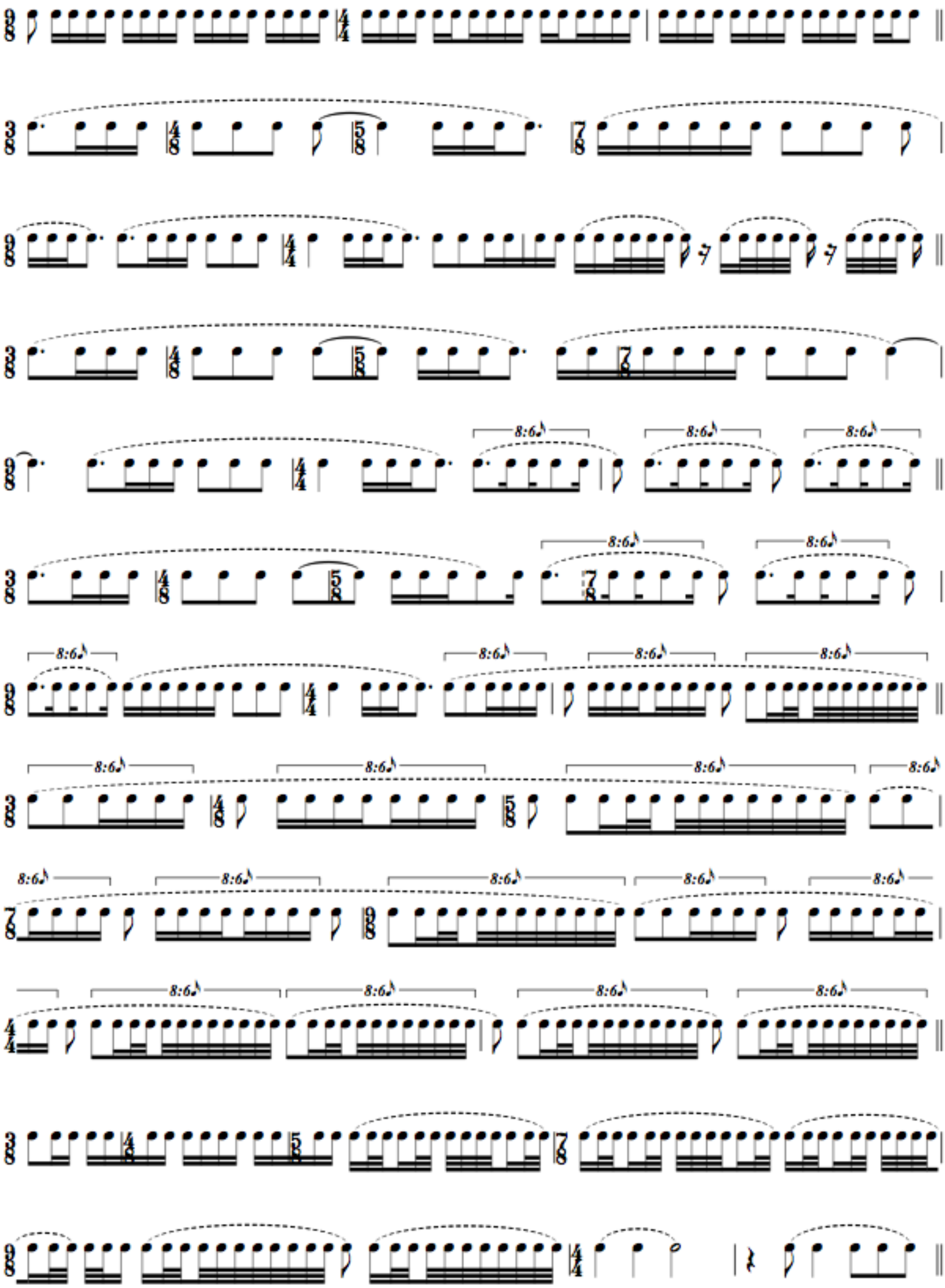

9:6♪
12:8♪
12:8♪
4:3♪
6:4♪
6:4♪
8:6♪
8:6♪
8:6♪
8:6♪
8:6♪
8:6♪




4:3♪
Mukthay
9:6♪
6:4♪
3:2♪
6:4♪
3:2♪
9:6♪
6:4♪
3:2♪
6:4♪
3:2♪
9:6♪
6:4♪


3:2
6:4
3:2
Theme
9:10
Applause
Tuning
8:6
Mridangam
8:6
8:6
8:6
10:6
10:6
10:6
3:2
3


3
3
3
12:8♪
15:10♪
21:14♪
9:6♪
9:6♪
9:6♪
8:6♪
8:6♪
8:6♪
6:4♪
8:6♪
8:6♪
8:6♪
8:6♪
8:6♪
8:6♪
8:6♪
8:6♪
8:6♪


8:6♪
8:6♪
8:6♪
8:6♪
8:6♪
8:6♪
8:6♪
8:6♪
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8:6♪
8:6♪
8:6♪
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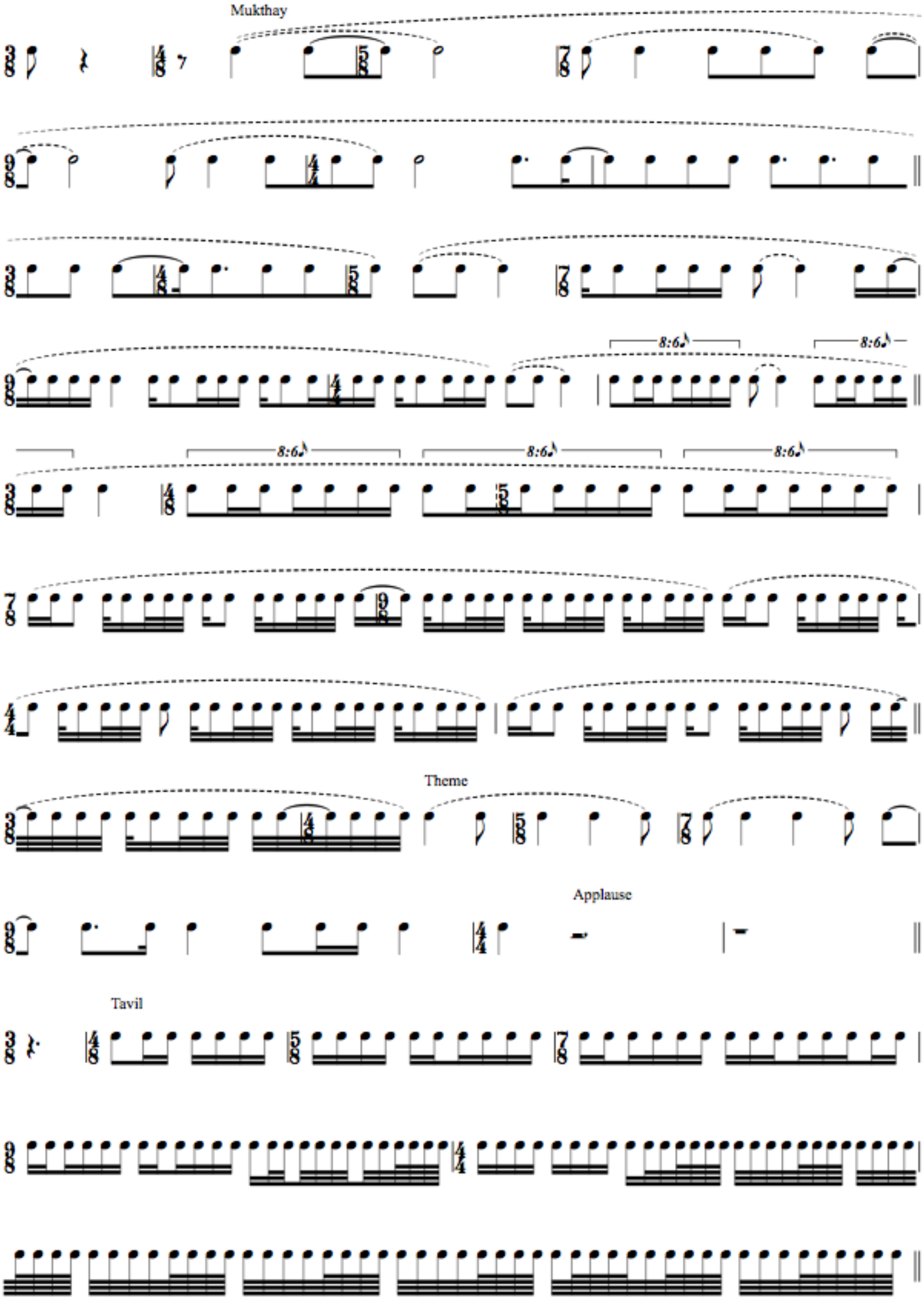
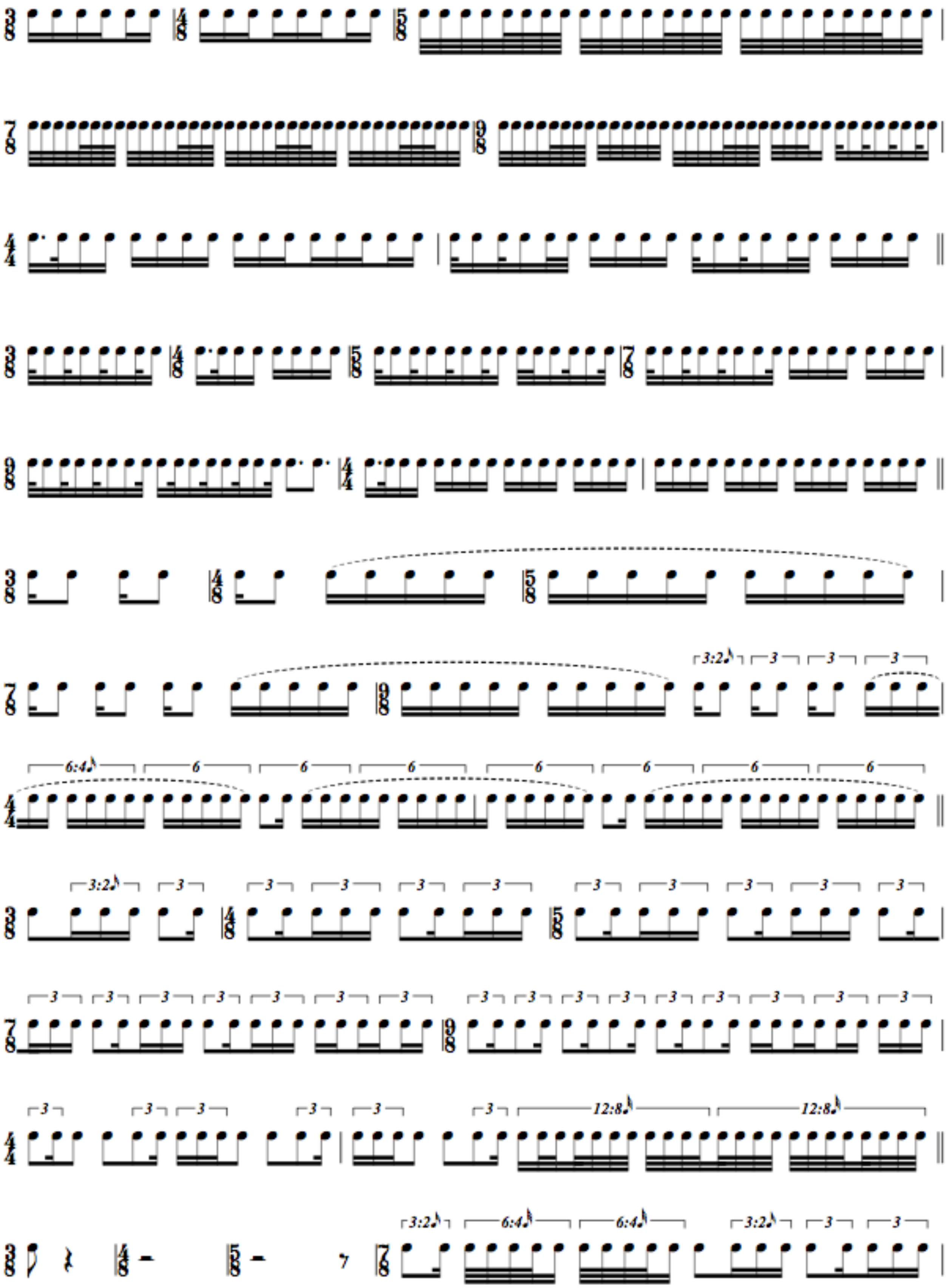
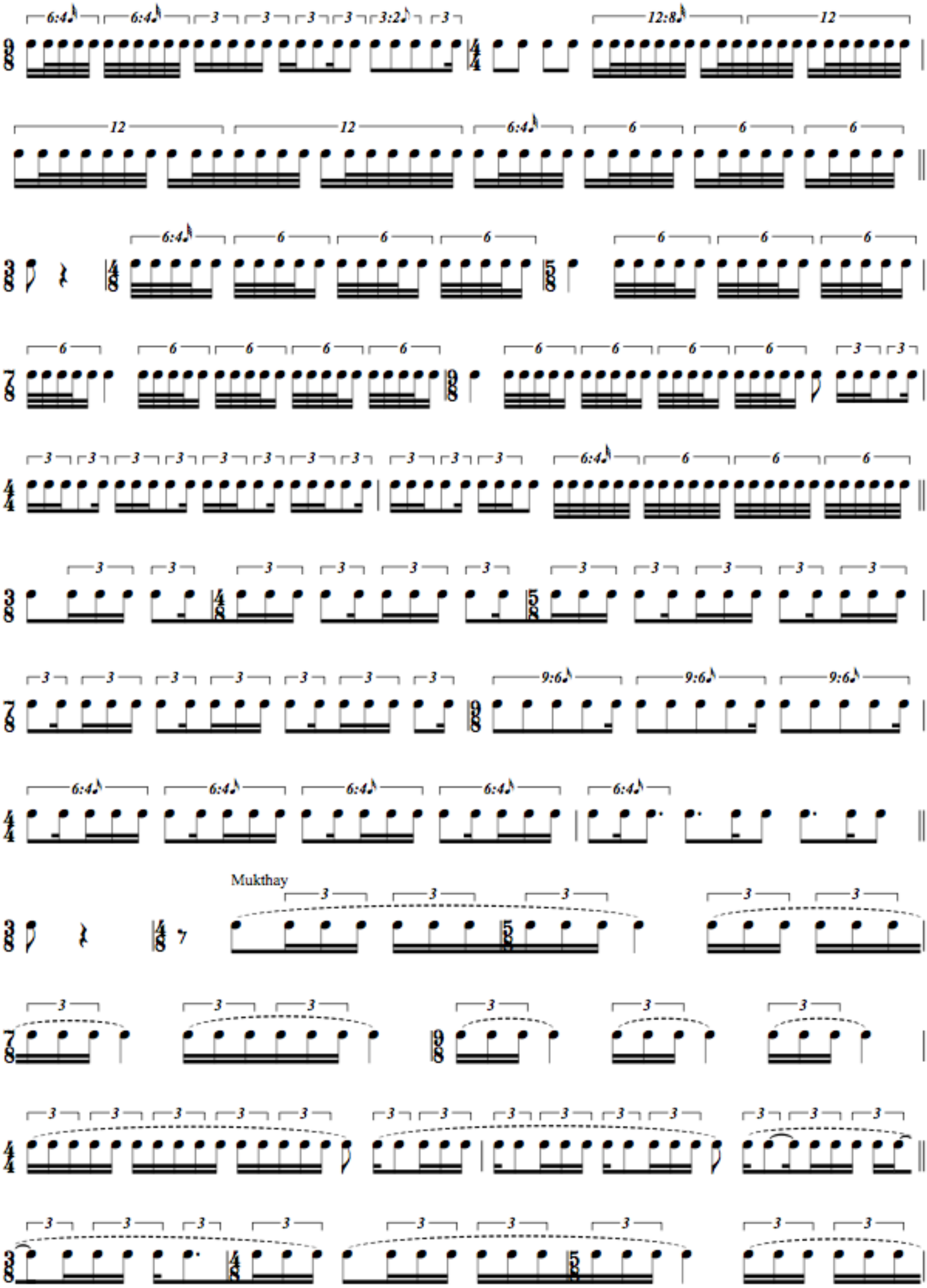
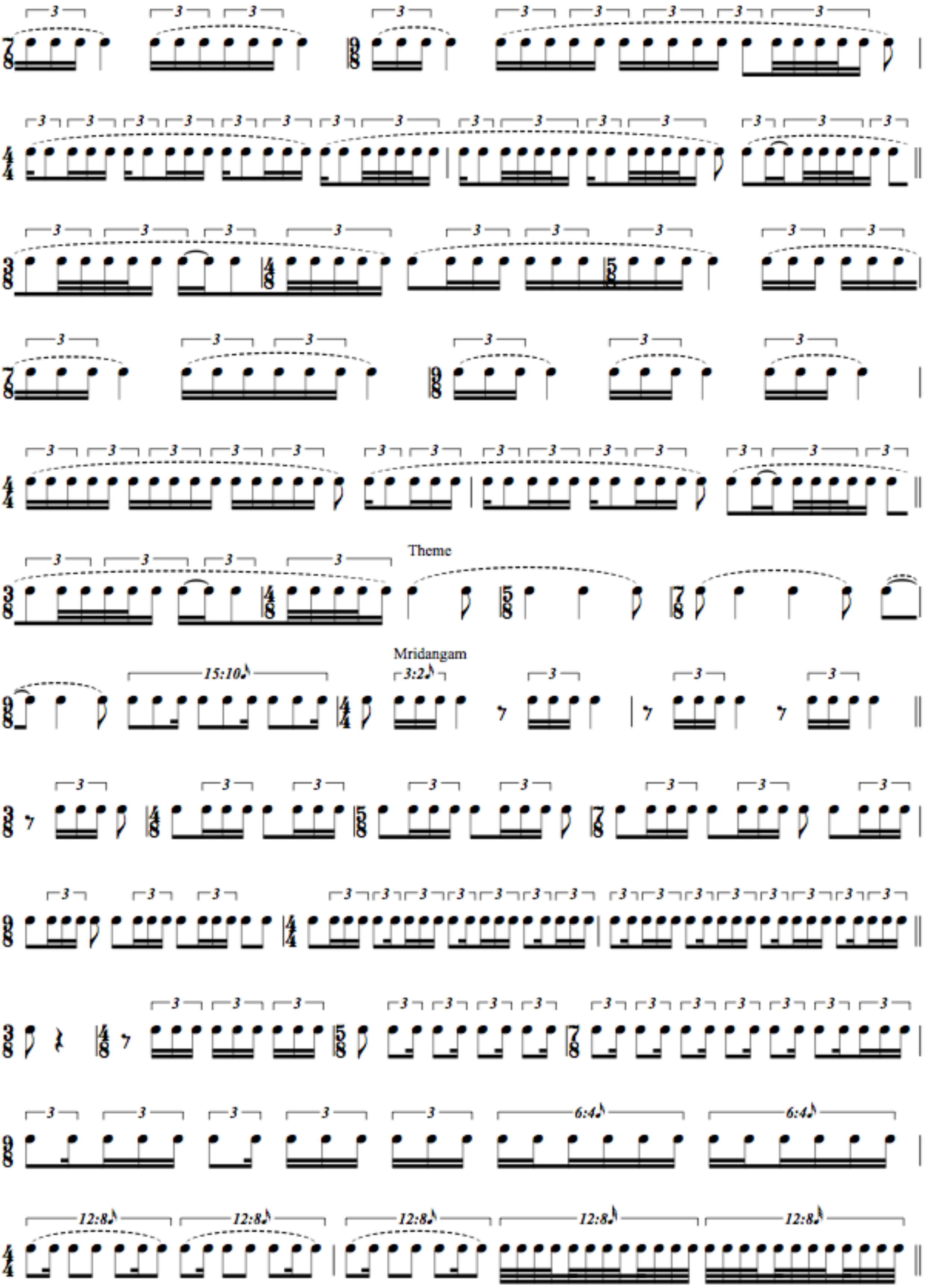
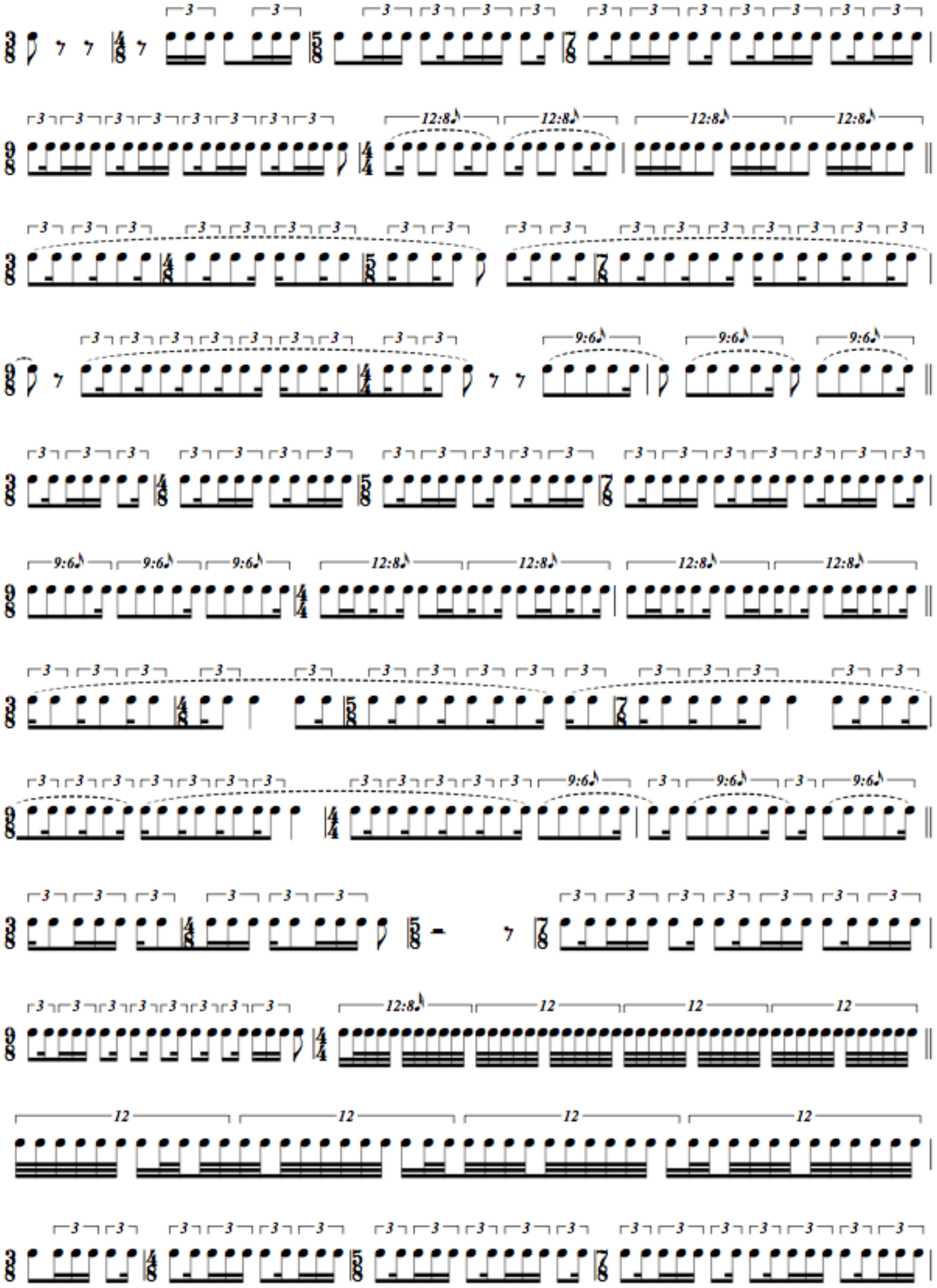
8:6♪
8:6♪
8:6♪

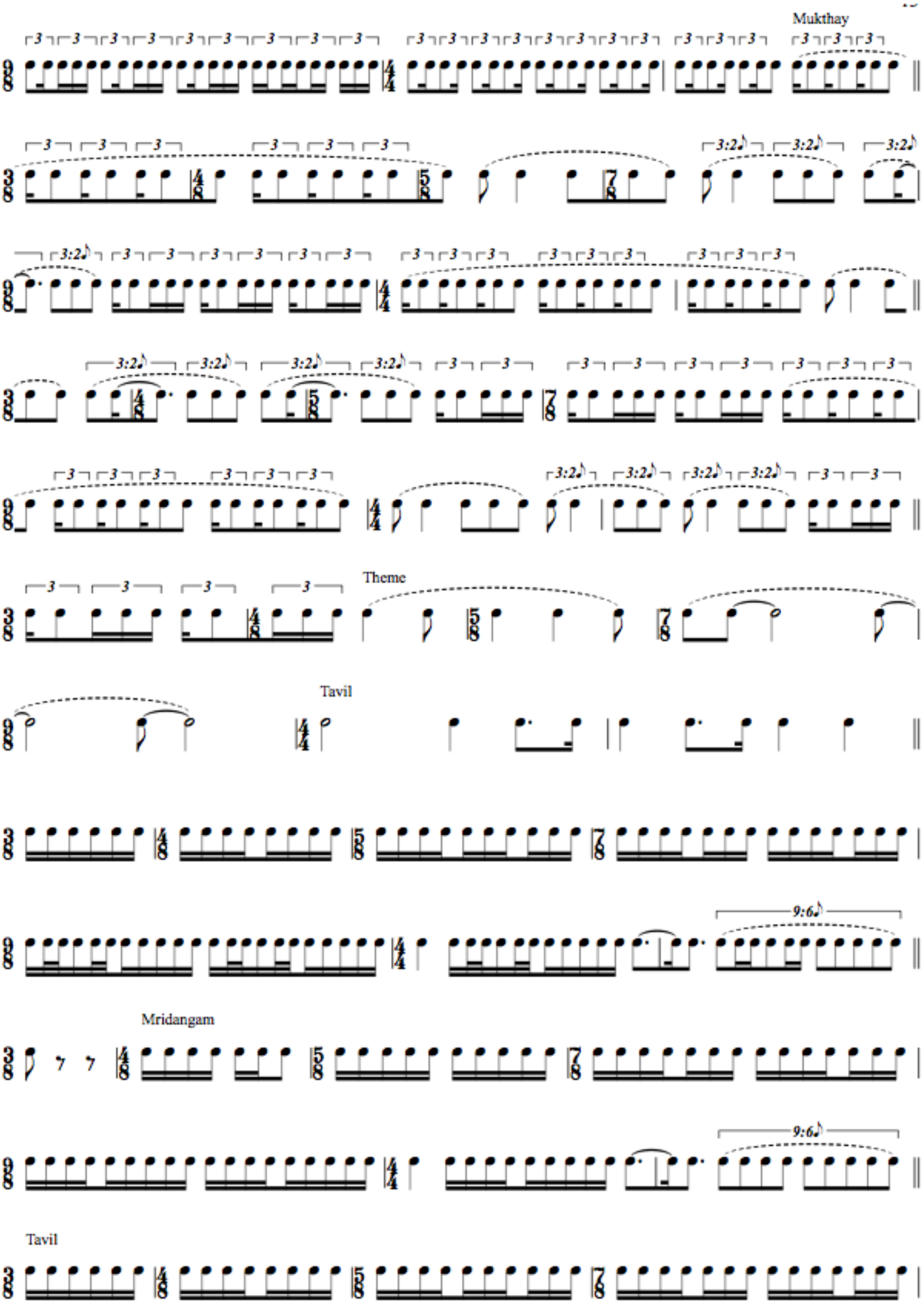

Mukthay
8:6♪
8:6♪
8:6♪
8:6♪
8:6♪
Theme
Applause
Tavil

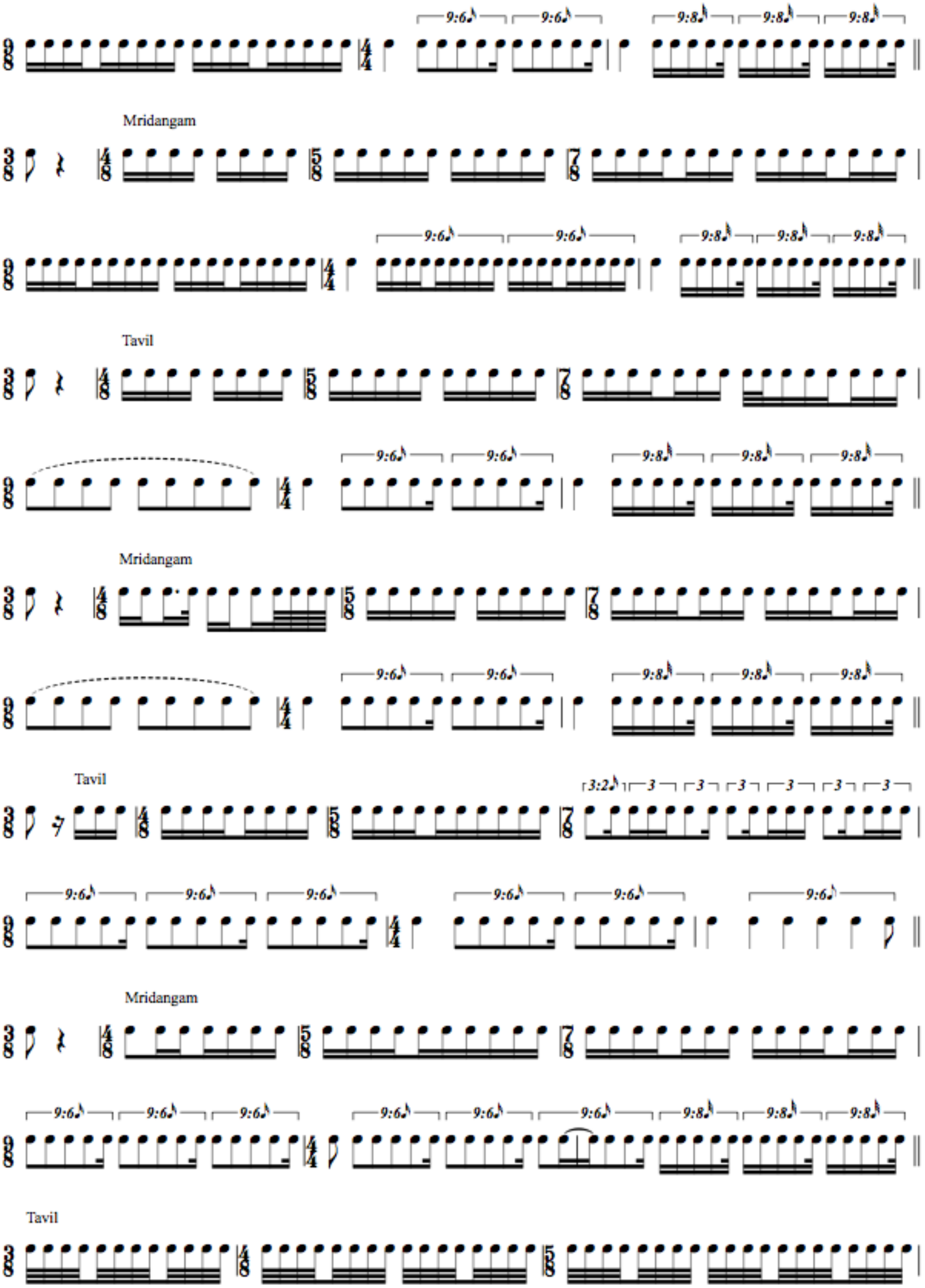

3:2♪
3
6:4♪
6
12:8♪

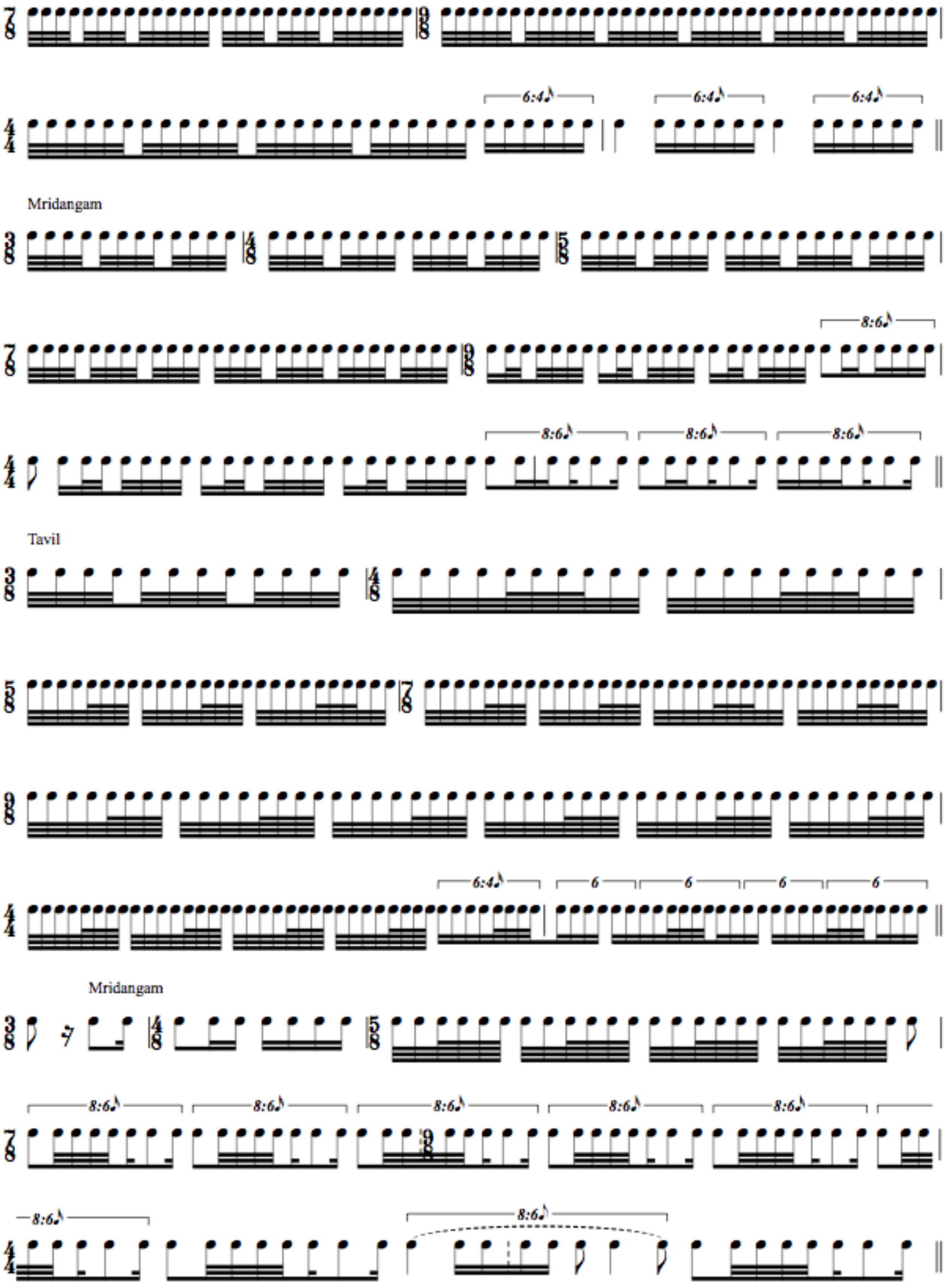

Mukthay

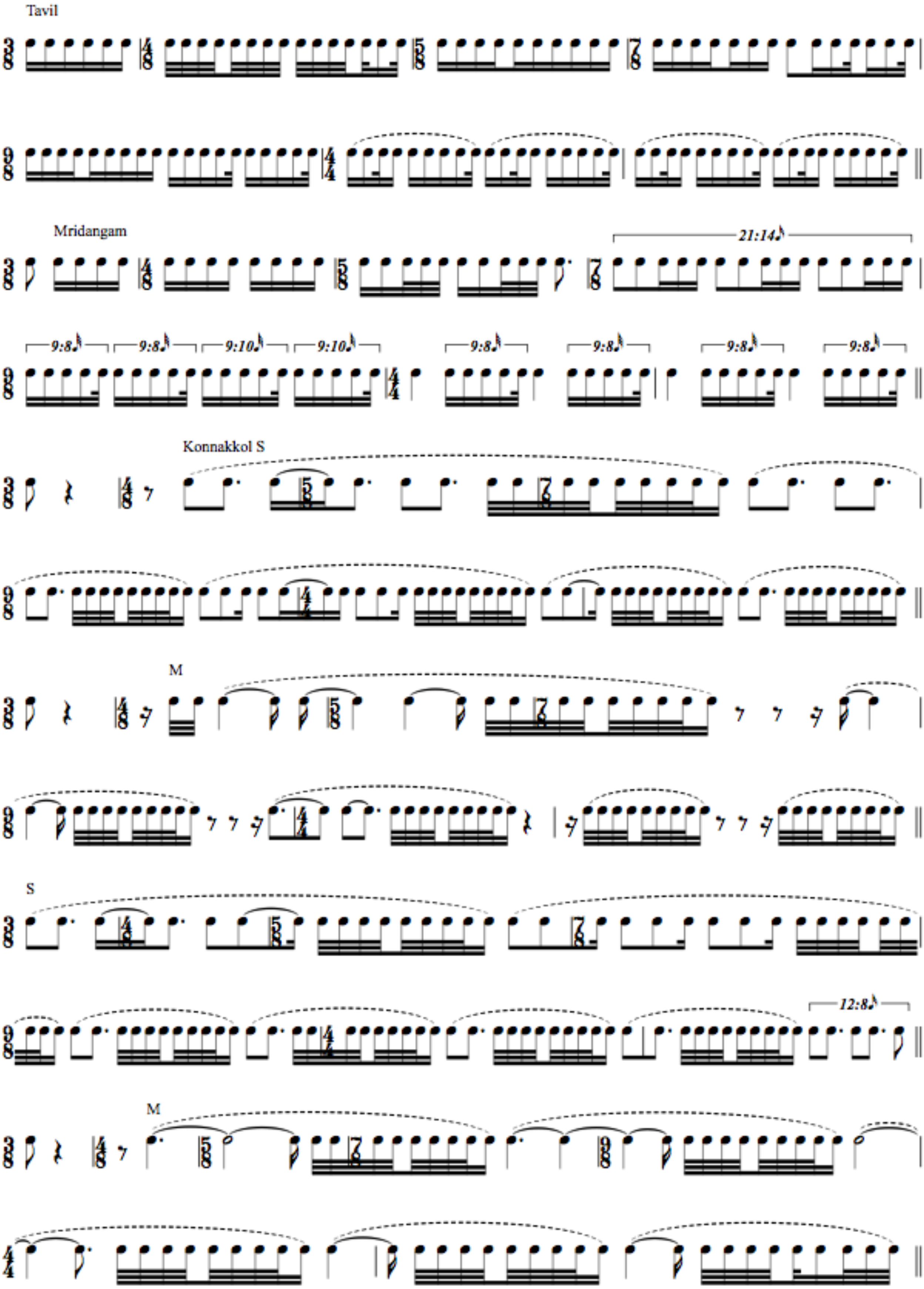

Theme
Mridangam
15:10
3:2
6:4
12:8

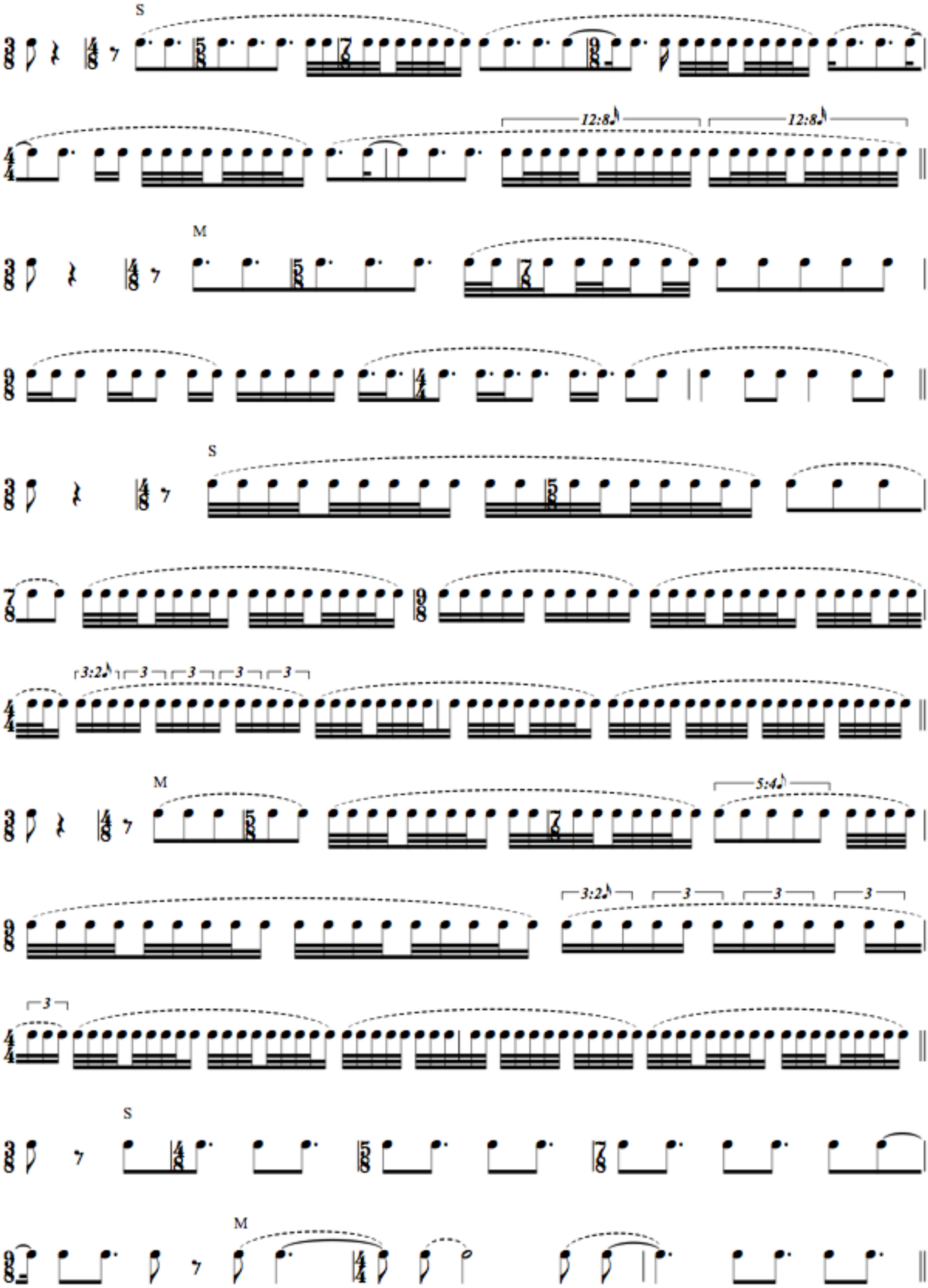


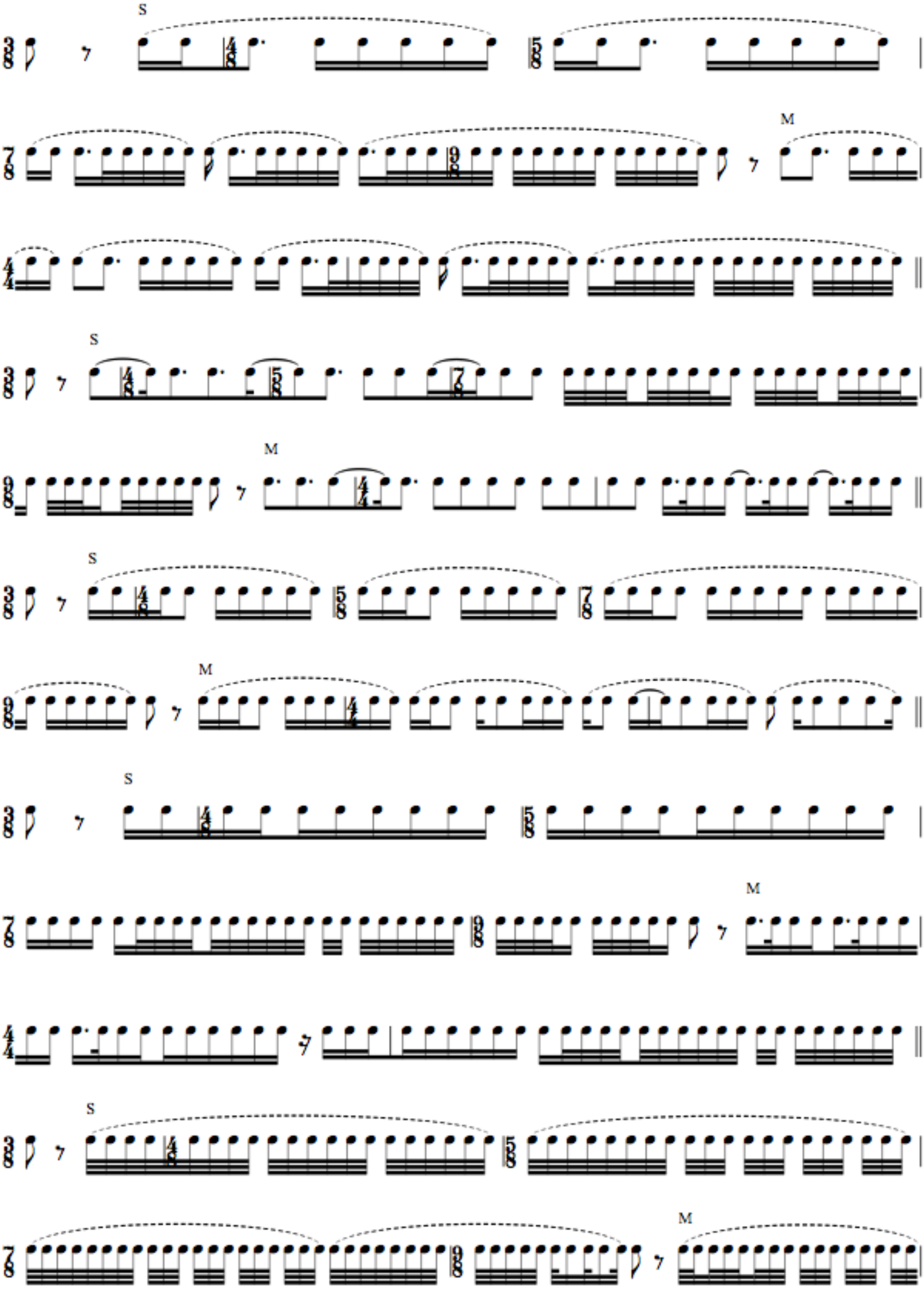

Mukthay
Theme
Tavil
Mridangam
Tavil

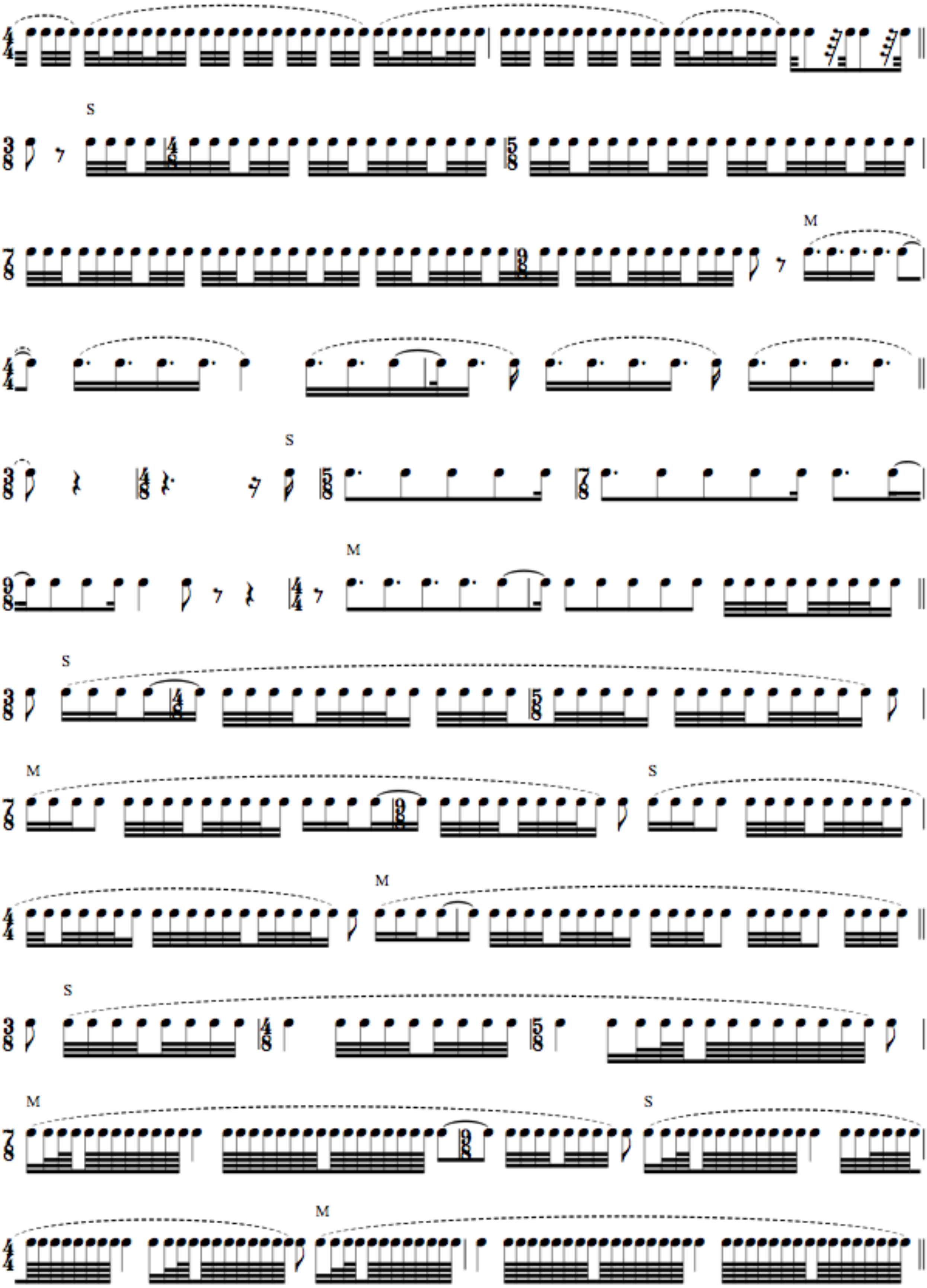

9:6
9:8
Mridangam
9:6
9:8
Tavil
9:6
9:8
Mridangam
9:6
9:8
Tavil
3:2
3
9:6
Mridangam
9:6
9:8
Tavil

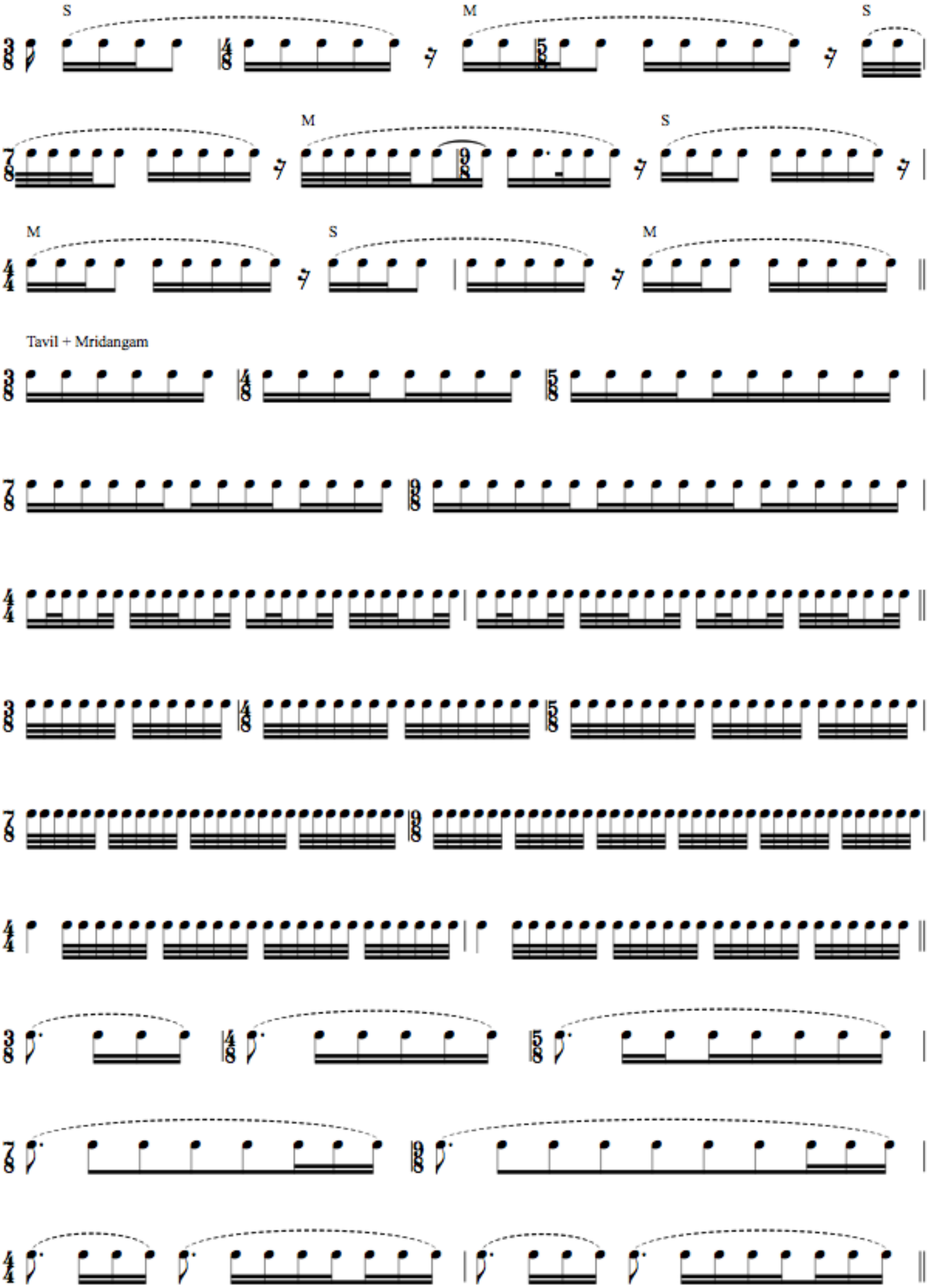

Mridangam
Tavil
Mridangam
6:4
8:6
6

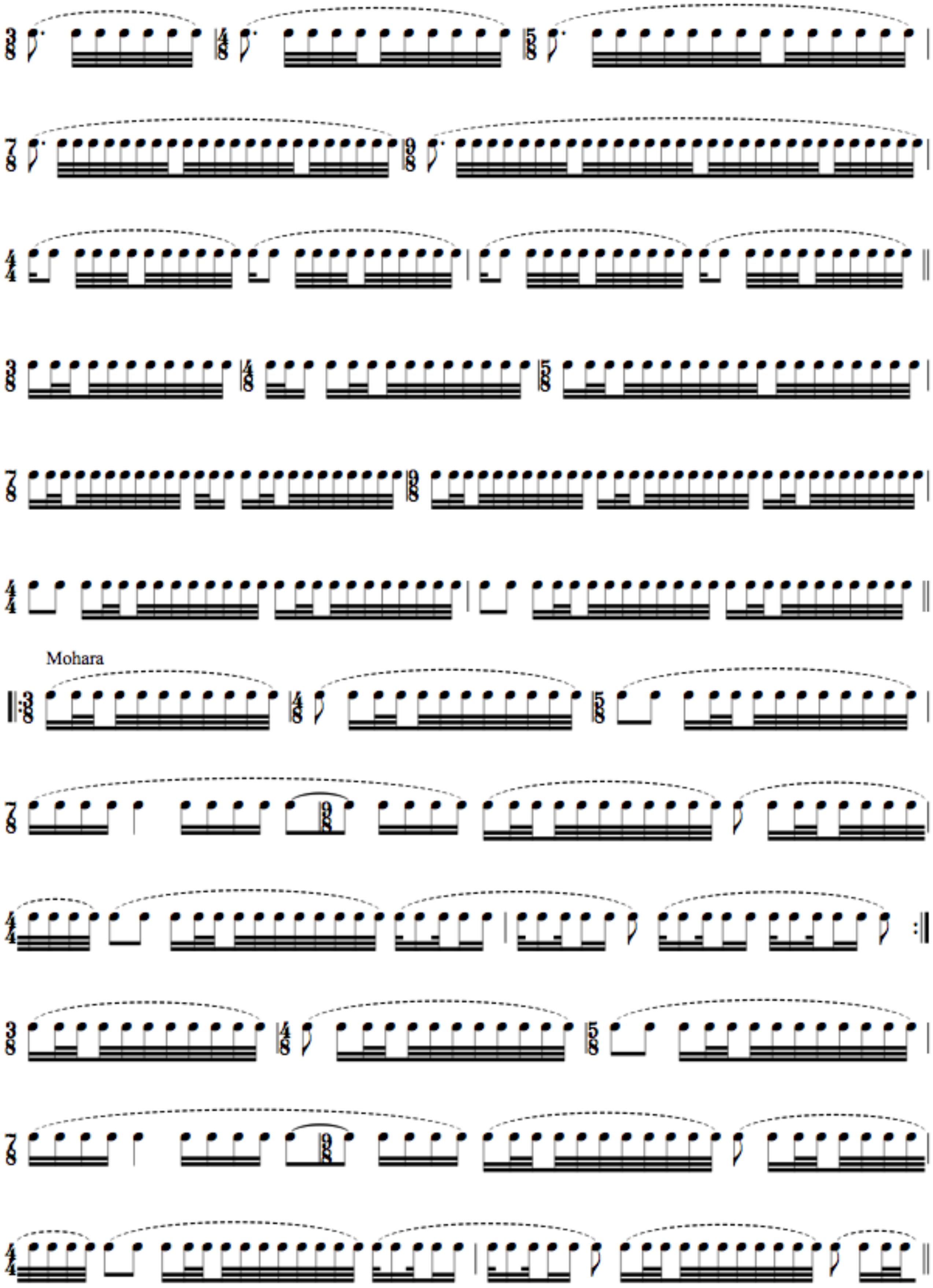

Tavil
Mridangam
21:14
9:8
9:8
9:10
9:10
9:8
9:8
9:8
9:8
Konnakkol S
M
S
12:8
M

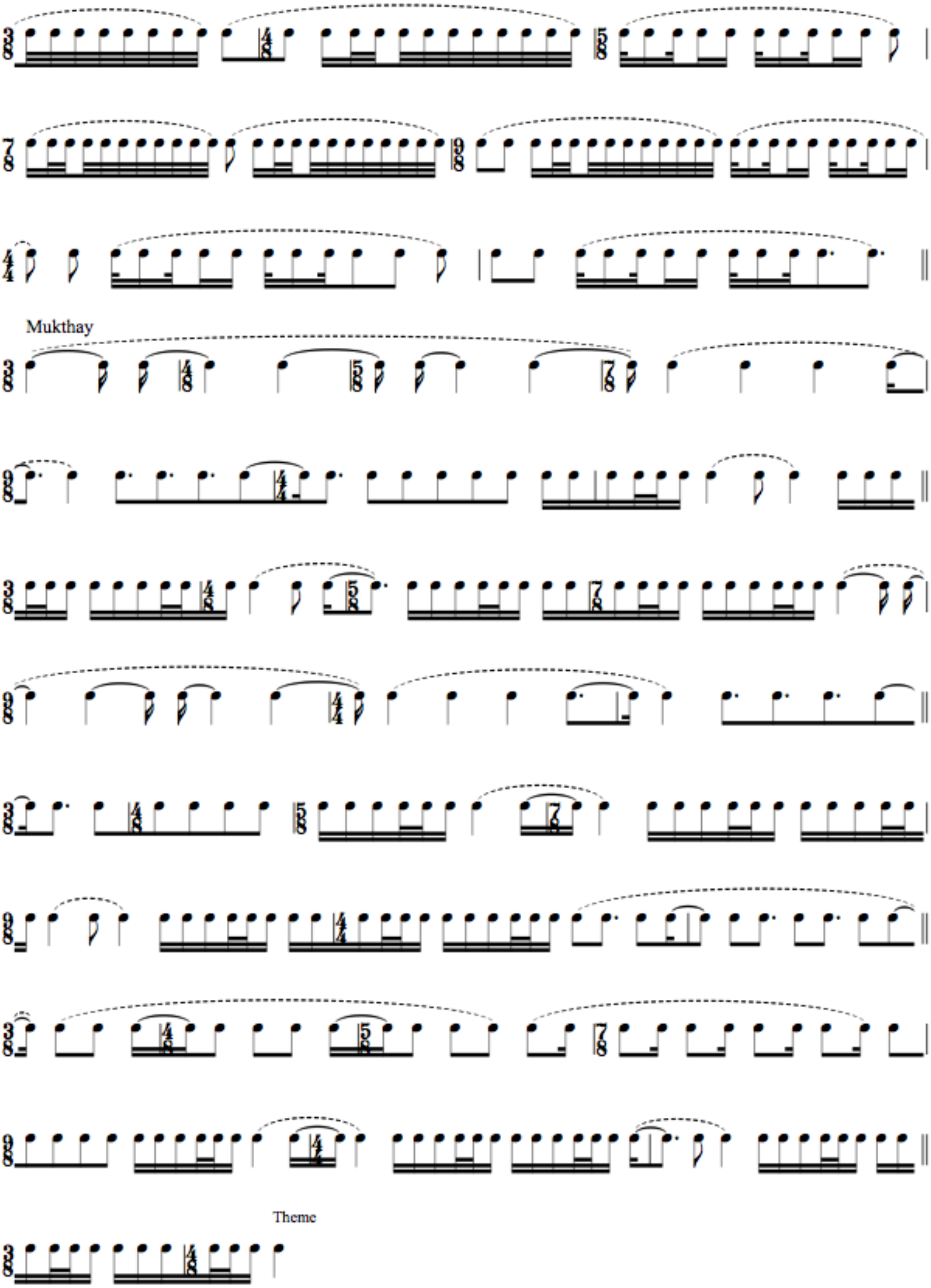

S
12:8
12:8
M
S
3:2
3
3
3
3
M
5:4
3:2
3
3
3
3
S
M


S
M
S
M
S
M
S
M
S
M


S
M
S
M
S
M
S
M
S
M
S
M


S
M
S
M
S
M
S
M
Tavil + Mridangam


Mohara

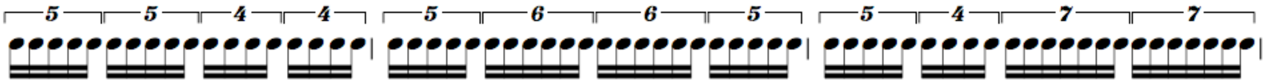

Mukthay
Theme

PRACTICE METHOD

In order to master the latest development in karnatic music, a concept that is abundantly utilised in western contemporary music (without any of the self-imposed restrictions existing in karnatic music), working separately on the different elements would be the best approach initially.

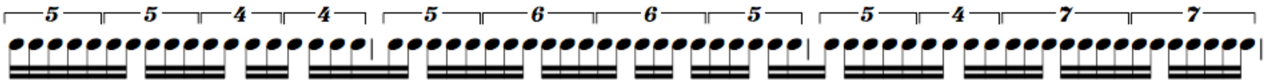
1) Sing all the matras and gati changes of a sequence to become acquainted with the proportionalities provided by the gati changes. First, it would be convenient to start with sequences with only one change. For instance, chatusra-tisra, chatusra-khanda, tisra-khanda and so forth.

Then proceed to construct sequences with two gati changes, then three changes etc. Also, the frequency of changes should increase with every exercise. The following example presents all four gatis.

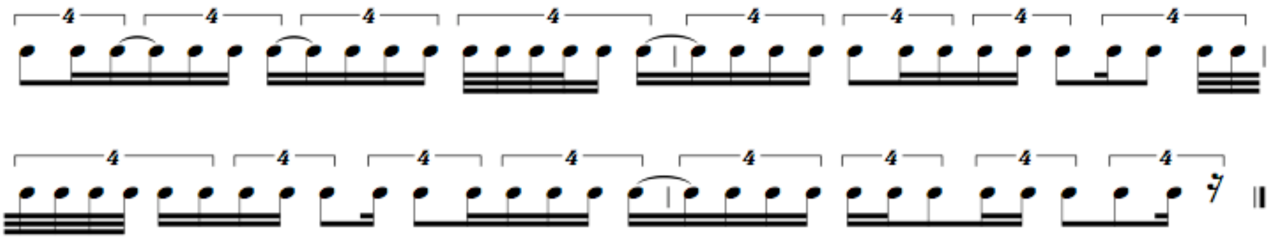


2) Perform only the matras of each cell of the phrase (therefore, with the internal division, displaced accents, different lengths of each cell etc.), so that the two different elements - the gati changes and the phrase - start getting closer to one another. Emphasise solely the accents and never the beat where a change occurs.

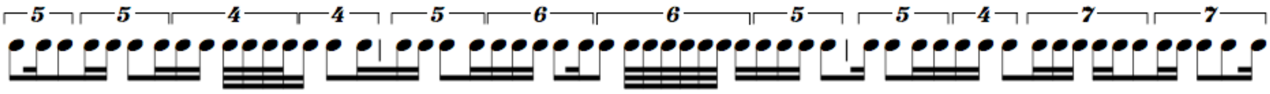
In the example below, the whole sequence is 63 matras long, divided
7 5 3 5 6 5 3 4 3 6 5 6 5 *(track 256)*



3) Re-write the phrase in just one gati (preferably chatusra), regardless of whether the re-written phrase finishes neatly on a beat or not. This approach will facilitate the musician in achieving a better feeling for the phrase as such without the difficulties that the gati changes produce.



4) Once the previous three steps have been independently and sufficiently rehearsed, **proceed to perform the phrase as written**. The musician could take the first three examples of this chapter as starting point to then proceed to elaborate his own phrases. Similarly, working on the transcribed solo and duo presented in the chapter will add a considerable amount of **intuition** to the whole process; even if these solos are eminently karnatic, listening to them and trying to reproduce them as accurately as possible will deepen the intuitive (feeling) side of the working process. *(track 257)*



PART 2

Pedagogical and creative applications to western music

Section A

APPLICATION OF KARNATIC TECHNIQUES TO EXISTING WESTERN PIECES

The first aim of the two goals enunciated in the introduction is to analyse existing pieces of western classical contemporary and jazz repertoire in order to:

a) **Find unintentional parallels between western and karnatic concepts**; the word unintentional is used deliberately since although most western composers or improvisers (except, perhaps, for a handful of creators exposed to karnatic music in the last few decades) do not posses any knowledge of the karnatic rhythmical system, fragments of their music may, somehow, resemble karnatic structures.

b) **Apply karnatic techniques to existing pieces of the XX and XXI centuries** in order to improve the rhythmical awareness and accuracy of performers (or any musician for that matter), possibly one of the most important aims of the whole text.

This research and its application to western music that has never intended to use any karnatic concept, can become a highly needed tool: next to studying the karnatic techniques as such, many musicians can see how these techniques can be applied to rhythmically complex western pieces.

I have limited myself to the provision of one or two examples per main topic in order to offer a glimpse of unintentional parallels and/or the application of karnatic techniques to western pieces. Nonetheless, I have found it quite necessary to try to be as specific and detailed as possible in explaining how pieces with a higher level of complexity can be dissected and approached from a performers point of view. The explanation that the reader will find in examples 12 to 17 should suffice in understanding how subjects like nadai bhedam or anuloma-pratiloma combinations can be applied to those pieces in order to obtain the desired result of complete accuracy and understanding of the rhythmical processes.

In western music, the way of organising and developing 'complex irregular groupings'[1] as established by nadai bhedam and combinations anuloma-pratiloma in karnatic music, simply does not exist. The way western 'irregular groupings' are conceived, deviates widely from these highly regulated developmental techniques, and the different use and purpose of both concepts in karnatic music.

What prevails in the west seems to be something more along the lines of 'numbers against numbers', without any conceptual resemblance to what is proposed by karnatic music. Therefore, to establish a creative parallel between karnatic and western music in this particular issue is practically impossible.

However, applying nadai bhedam and combinations anuloma-pratiloma to a variety of rhythmically complex western pieces can greatly contribute to perform the music with the accuracy demanded by the notation that many composers utilise.

As far as the jazz pieces are concerned, the research has gone much more in the line of how a number of creators in this field, mostly unintentionally as well, have found ways to express ideas that clearly resemble a variety of aspects of karnatic concepts.

---

[1] *As they came to be usually termed by most western musicians*

1) Esprit Rude/Esprit Doux II (Elliot Carter)[2]

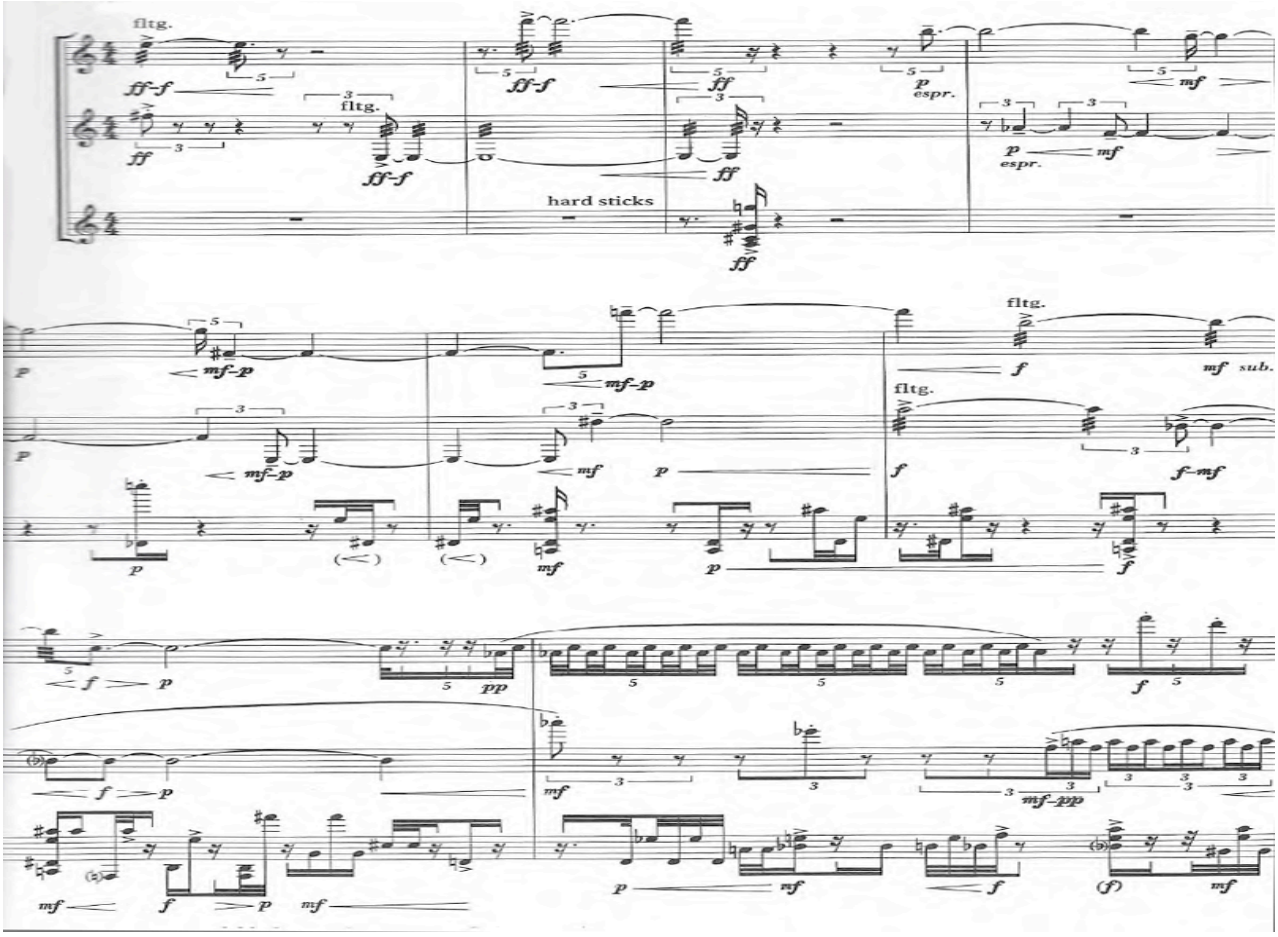
In this piece, the three instruments systematically play a different gati throughout the whole composition. The flute stays in khanda whilst the clarinet plays tisra and the percussion performs phrases in chatusra.

This approach (a layer staying systematically in one gati for a long segment, or even an entire piece), while being a common occurrence in karnatic music, is rather exceptional in western music, where mixing gatis and different speeds of any gati in a linear fashion is used more frequently.

As mentioned on several occasions, karnatic music quite frequently uses different gatis in different layers (in a simple and linear way, without resorting to any sort of polypulse). This notion is exclusively explored by the melodic instruments in one layer, and the percussion instruments in another layer.

By contrast, Carter uses this concept of different gatis in different layers, through three different instruments. A parallel with the karnatic approach of keeping the same gati and phrasing within these gatis for lengthy periods can be established.

In order to perform this piece with complete accuracy, it would be necessary for every performer to develop a very good sense of the gatis and their phrasing (and consequently a good sense of independence) as well as trying to 'groove' with them, so that the listener can really appreciate the difference in feeling of each layer. One element that can greatly help the musician to keep the feeling of every gati is by internally keeping the 'matra' feeling continuously, even in notes longer than a beat.



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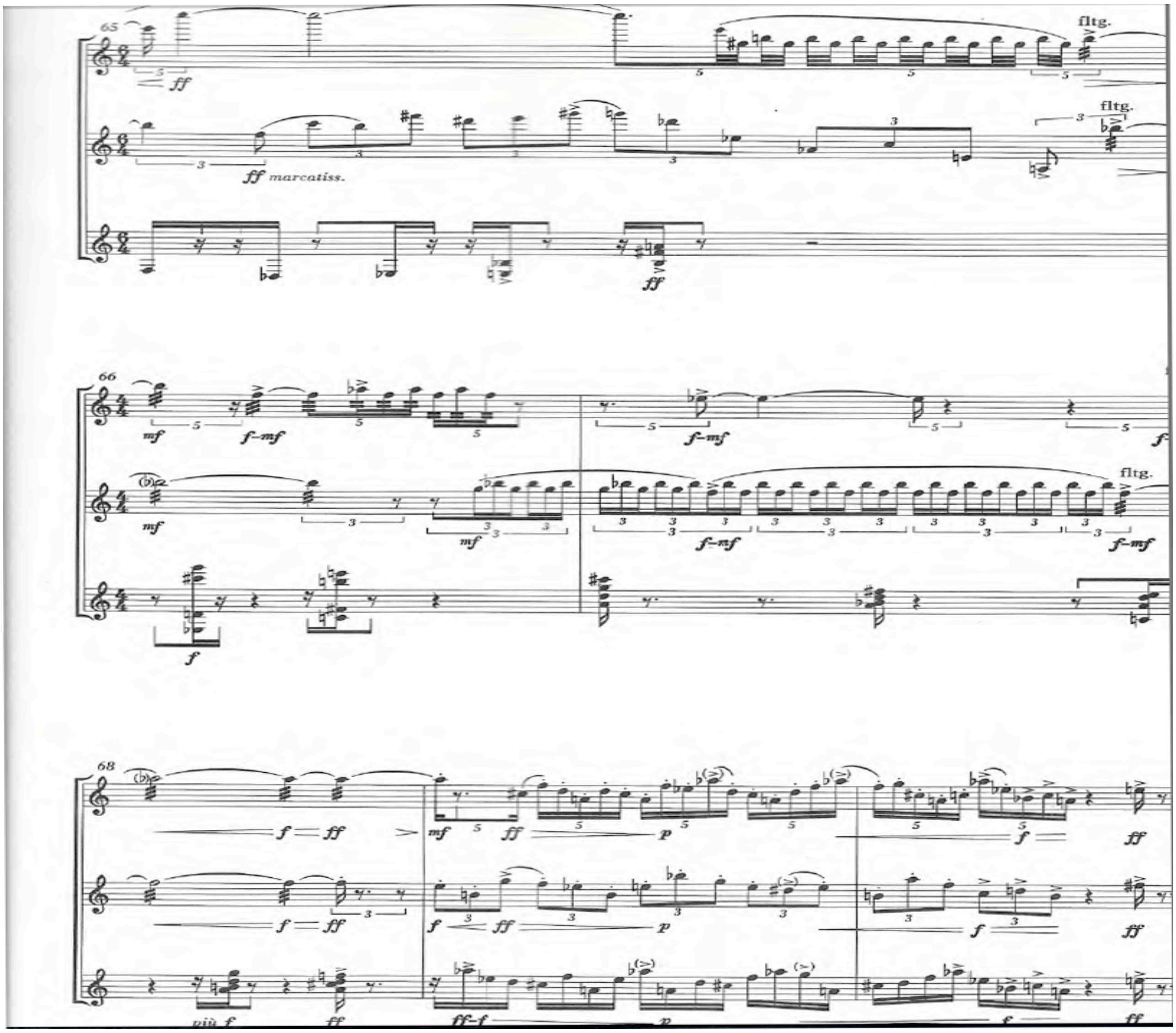
[2] *Published by Boosey & Hawkes (1994)*

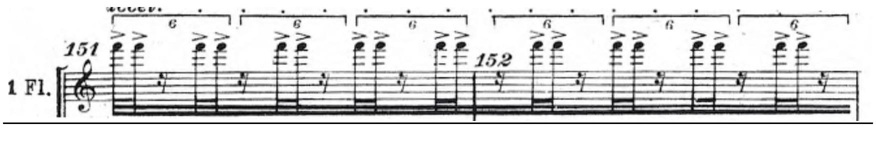


2) Movimiento (Franco Donatoni)[3]

This short fragment of Donatoni's piece is quite representative of the composition as a whole, and it shows a clear parallel to the notion of using different gatis with the same jathi as explained in chapter 3. However, Donatoni uses the same element in different ways, essentially by combining notes and rests complementing layers that use the same gati/jathi combination. Similarly, khanda, tisra and chatusra are utilised in different layers whilst various accents, in addition to the notion of mixed jathi, are presented systematically. All layers use a bracket per ♪, therefore the 𝅘𝅥𝅯 is the unit.

-Layer 1

Tisra jathi 4, with two attacked notes and a silence of two matras



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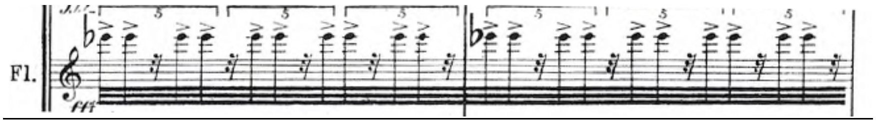
[3] *Published by Edizioni Suvini Zerboni (1960)*

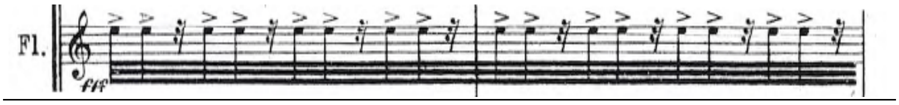
-Layer 2

Khanda jathi 3, with two attacked notes and a silence of one unit



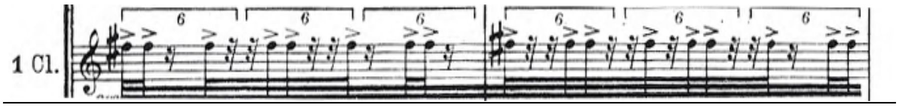
-Layer 3

Chatusra jathi 3, also with two attacked notes and a silence of one unit



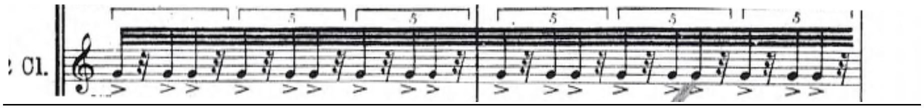
-Layer 4

Tisra, with mixed accents of 4+3; the jathi 4 is performed as in layer one, and the jathi 3 is realised by attacking one note and keep the other two silenced.



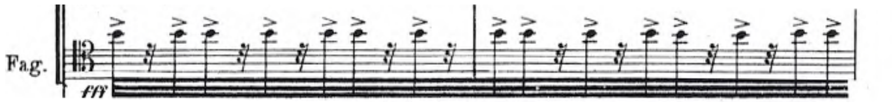
-Layer 5

Written in khanda, it also utilises the notion of mixed jathi, 2+3 in this case. Jathi 2 is achieved by attacking the first note followed by a silence, whereas the jathi 3 responds to the pattern established in layer two.



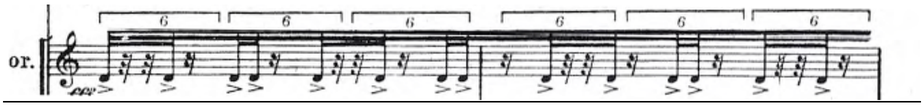
-Layer 6

Same idea as in the previous layer but in chatusra; mixed jathi 2+3 with the same combination of attacked notes and silences.



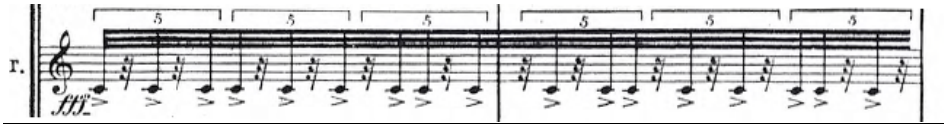
-Layer 7

In tisra, utilising the idea of a triple accent of 3+3+4. In jathi 3 only the accent is attacked while the other two matras are silenced, whereas the jathi 4 responds again to the pattern of layer 1 - two attacked notes followed by a silence of two matras.



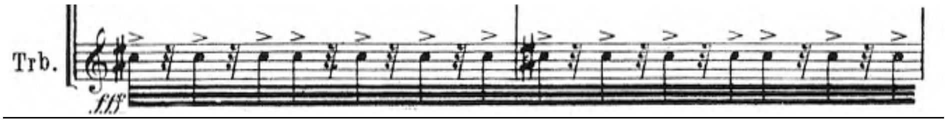
-Layer 8

This instrument performs the idea of a triple jathi of 2+2+3 in khanda. The sequence of attacked and silenced notes responds to the pattern established by the previous layer: in jathi 2 only the accent is attacked while the other note is silenced, whereas the jathi 3 responds again to the pattern of layer 2 - two attacked notes followed by a silence of one note.



-Layer 9

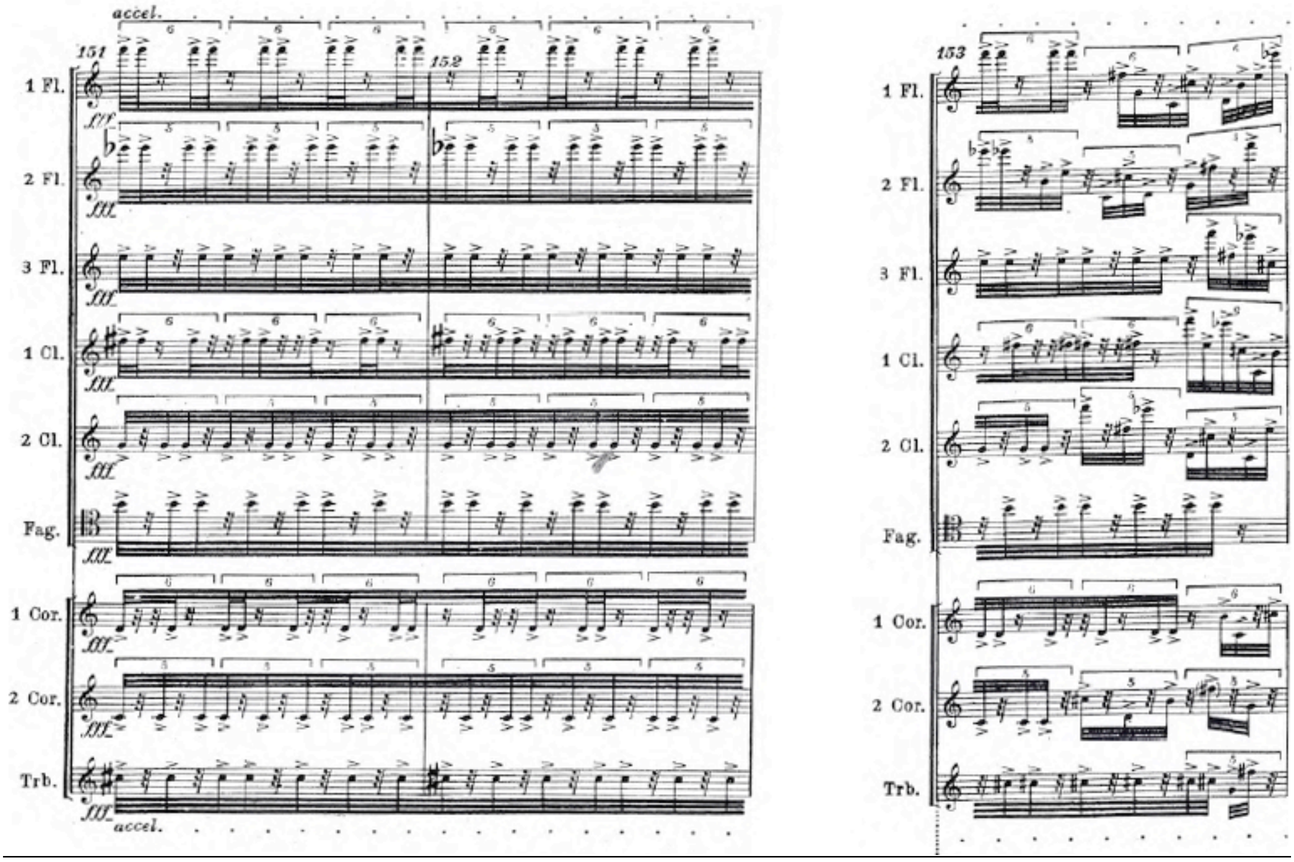
Same idea as in the previous layer but in chatusra gati: 2+2+3



The overall result is a texture of different attacks and silences in different gatis, but all of them thought out systematically. It can be observed that every layer plays only one pitch, therefore the focus seems to be on the rhythmical texture.

In order to perform this fragment without making it sound chaotic, I find it of extreme importance that the performer applies the principle of independence provided by the different two-layered exercises of gati/jathi combinations explained in lesson 3.

The short fragment looks like this:

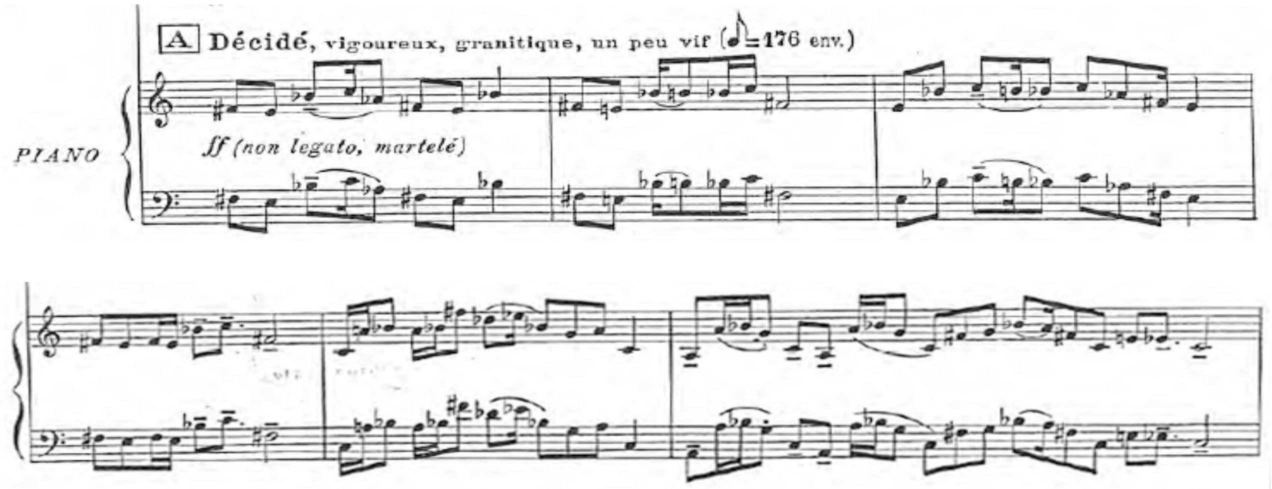

accel.
151
152
153
1 Fl.
2 Fl.
3 Fl.
1 Cl.
2 Cl.
Fag.
1 Cor.
2 Cor.
Trb.
fff
accel.

3) Quatuor pour la fin de temps (Olivier Messiaen)[4]

The following fragment of this composition is a clear western parallel of the concept of jathi bhedam. Although Messiaen wrote bar lines and every measure is of a different length, no time signatures are specified.

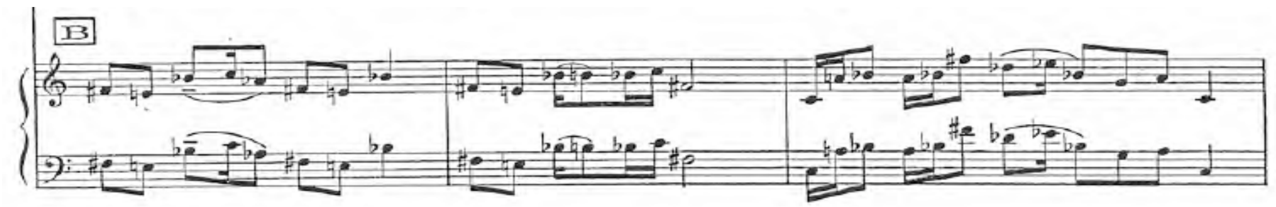
This section uses the following *jathi bhedam sequence* or succession of phrases of different length beamed together, as proposed in chapter 4:

4 5 4 4 4 5 8 4 5 5 4 6 4 8 4 4 3 6 4 6 4 4 6 7 4 4 4 5 4 4 4 6 8 4 4 3 6 4


A Décidé, vigoureux, granitique, un peu vif (♪=176 env.)
PIANO
ff (non legato, martelé)

---

[4] *Published by Editions Durand (1942)*

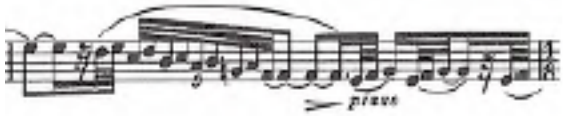


4) Concerto in Re (Igor Stravinsky)[5]

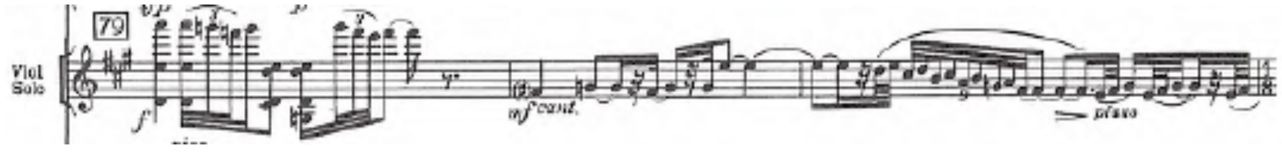
Stravinsky is well known for his use of outer and inner amalgamation, as mentioned in chapter 3. While the clearest example of the former is to be found in 'Le Sacre du Printemps', the latter (jathi bhedam in karnatic parlance) is a constant in much of his music. Notwithstanding the fact that he does not beam the phrase as proposed in chapter 4 (or as Messiaen does), but rather keeps the imaginary beat-line characteristic of western notation, may make it look as if regular phrasing in any given gati is sought for.

The concept of inner amalgamation is used quite loosely in the following example, a violin solo of this concerto; it does not follow any sequence as was the case in Messiaen's piece. However, the solo is permeated with the notion of crossing accents in an irregular fashion. His manner of asking for this technique is usually represented by the bowing that, on many occasions embraces phrases of different lengths.

Measure 3 is a good example: the first bowing takes the last two 𝅘𝅥𝅰 of the first beat, going all the way to the second note of the third beat; this long gesture is followed by three short bowings that last 3, 5 and 3 matras respectively (taking the 𝅘𝅥𝅰 as the matra).



Throughout the whole selected passage there are many occasions where he uses bowings that do not follow the western imaginary beat-line. It can be argued, because of the notation, that the bowings have only a technical application. However, knowing Stravinsky's music, I would argue in favour of a *jathi bhedam* approach to the phrasing, regardless of whether this one is pre-structured or not. In my view, to perform this passage with a down-beat feeling on every beat, ignoring the bowing and its structural significance, would quite drastically change his musical intention. Approaching it with a jathi bhedam notion (every first note of a bowing being attacked with a down-beat feel) would provide a much more accurate account of his phrasing.



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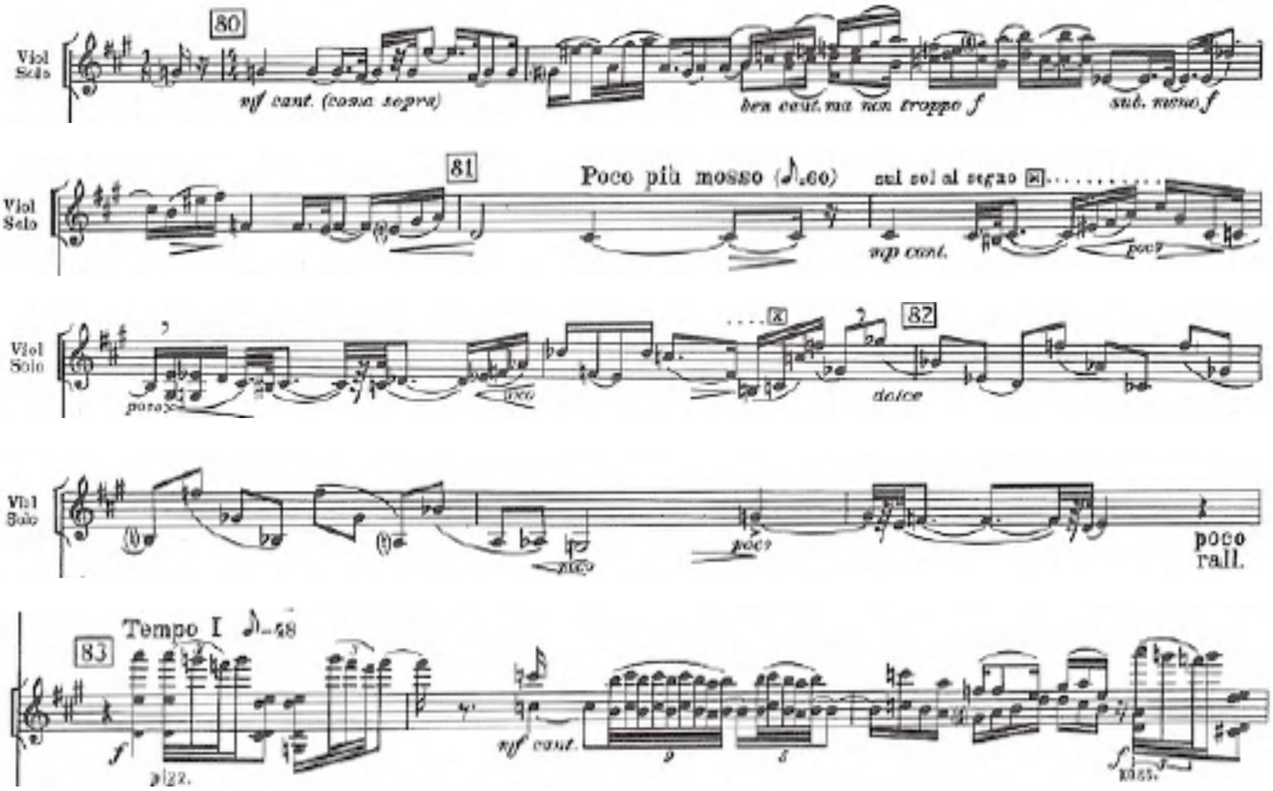
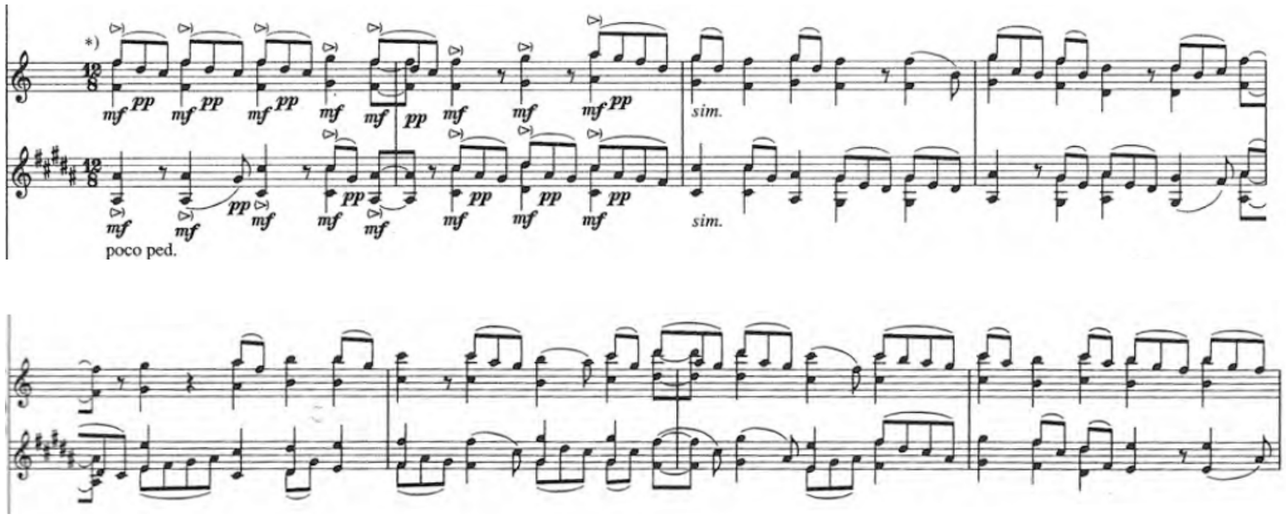
[5] *Published by Boosey & Hawkes (1946)*


80
Viol Solo
mf cant. (come sopra)
ben cant. ma non troppo f
sub. meno f
81
Poco più mosso (♪.60)
sul sol al segno
mp cant.
poco
82
dolce
poco rall.
83
Tempo I ♪=68
f
pizz.
mf cant.
arco

5) Piano Concerto (György Ligeti)[6]

This composition is another clear example of jathi bhedam, this time in tisra, since the time signature is 12/8. The composer plays solely with accents every 2, 3 and 4 matras, conveying a sequence that, from the very first measure, breaks the regularity of 3 matras per beat, with the first beat of the measure quite often being ignored. For the purposes of illustrating the technique for this section of the text, only the following two systems have been selected. The sequence of numbers in this short fragment is

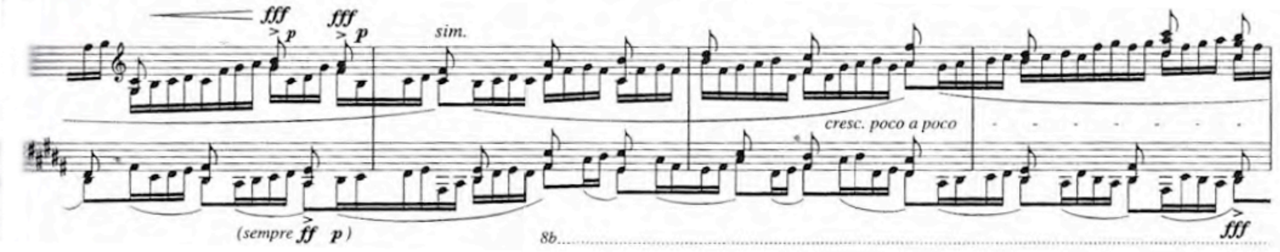
3 3 3 2 3 3 3 4| 2 2 2 3 3 3 2 3 3 3 4 2 4 2| 3 3 3 2 3 3 3 4 2 2 2 3 3


*)
12/8
mf
pp
sim.
poco ped.

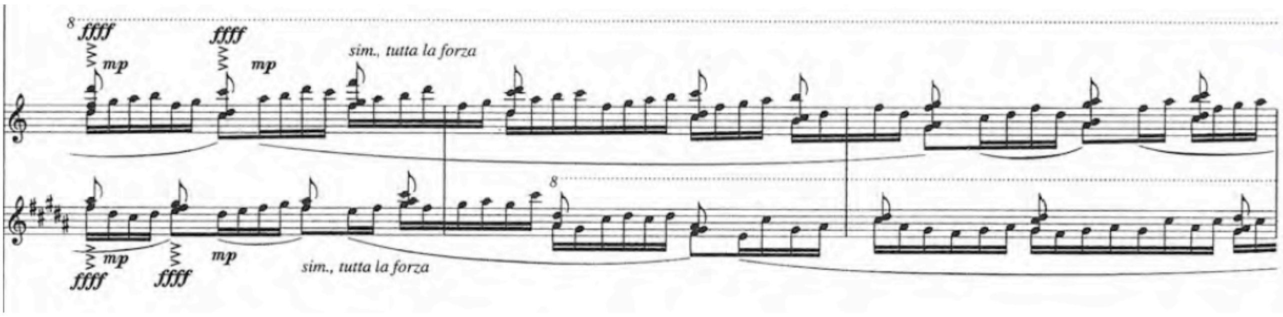
---

[6] *Published by Schott Music (1988)*

In the example below, the idea of chatusra jathi 3 can be observed; the longer note in the upper stem provides the accents whilst the lower stem performs all the matras of the gati/jathi combination. The left hand attacks some of the accents of the jathi 3.



This regular jathi of 3 matras, becomes doubled into 6 in the subsequent passage to immediately combine the numbers 4, 6 and 8 (essentially the same numbers as in the tisra passage). However, each hand performs a different combination of these numbers.



6) Vesalii Icons (P. Maxwell Davies)[7]

For the last example of jathi bhedam, I have reserved a fragment of this composition in which every measure changes its time signature, a feature that has become a key characteristic of music of the XX and XXI centuries. In spite of the fact that this contradicts the karnatic notion of irregularly distributed accents from the creative viewpoint (that is, as a sequence contained in x number of cycles of a tala), jathi bhedam is ultimately a technique that can greatly help performers to gain accuracy while facing pieces where a continuous change of metres occurs.

The following fragment could be approached with the following number sequence in mind (if the ♪ is taken as the matra).

6 6 7 4 2 3 2 3 2 2 3 2 5 at this point the feeling should switch to an underlying pulse of 𝅘𝅥𝅯 and count the sequence as 5 6 7 7. Again, switch the feeling to ♪ and continue with 5 6 4 4 3.

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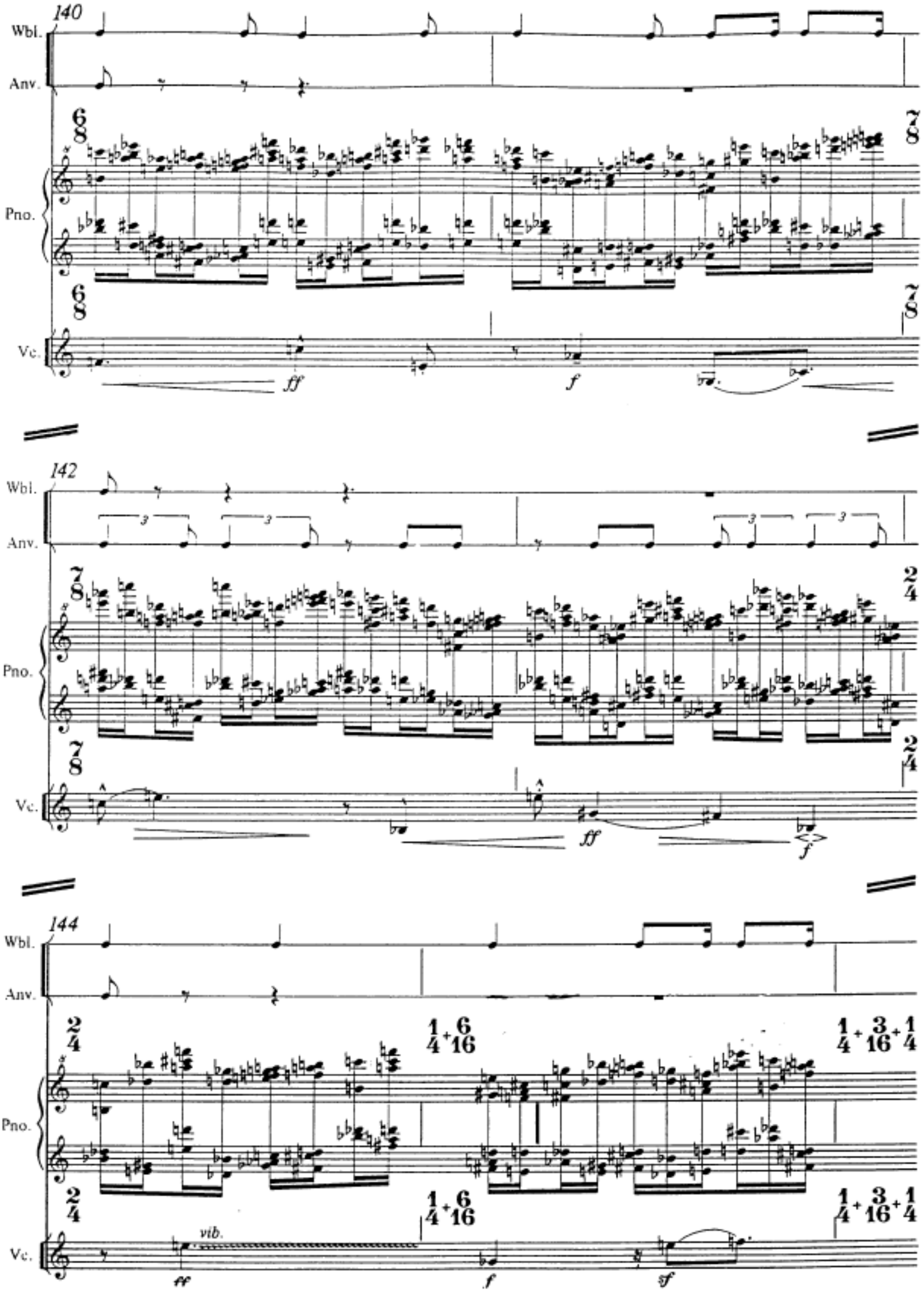
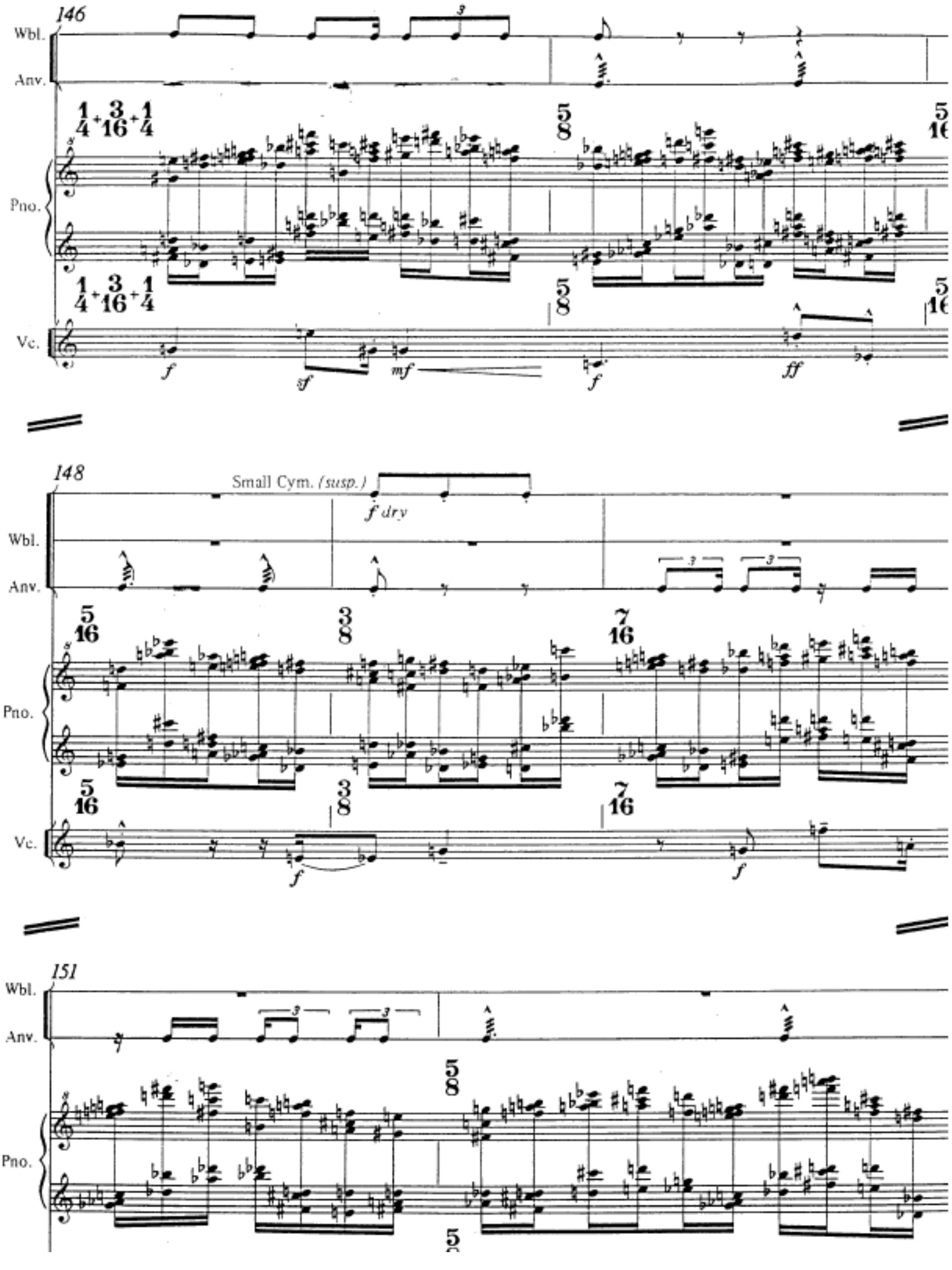
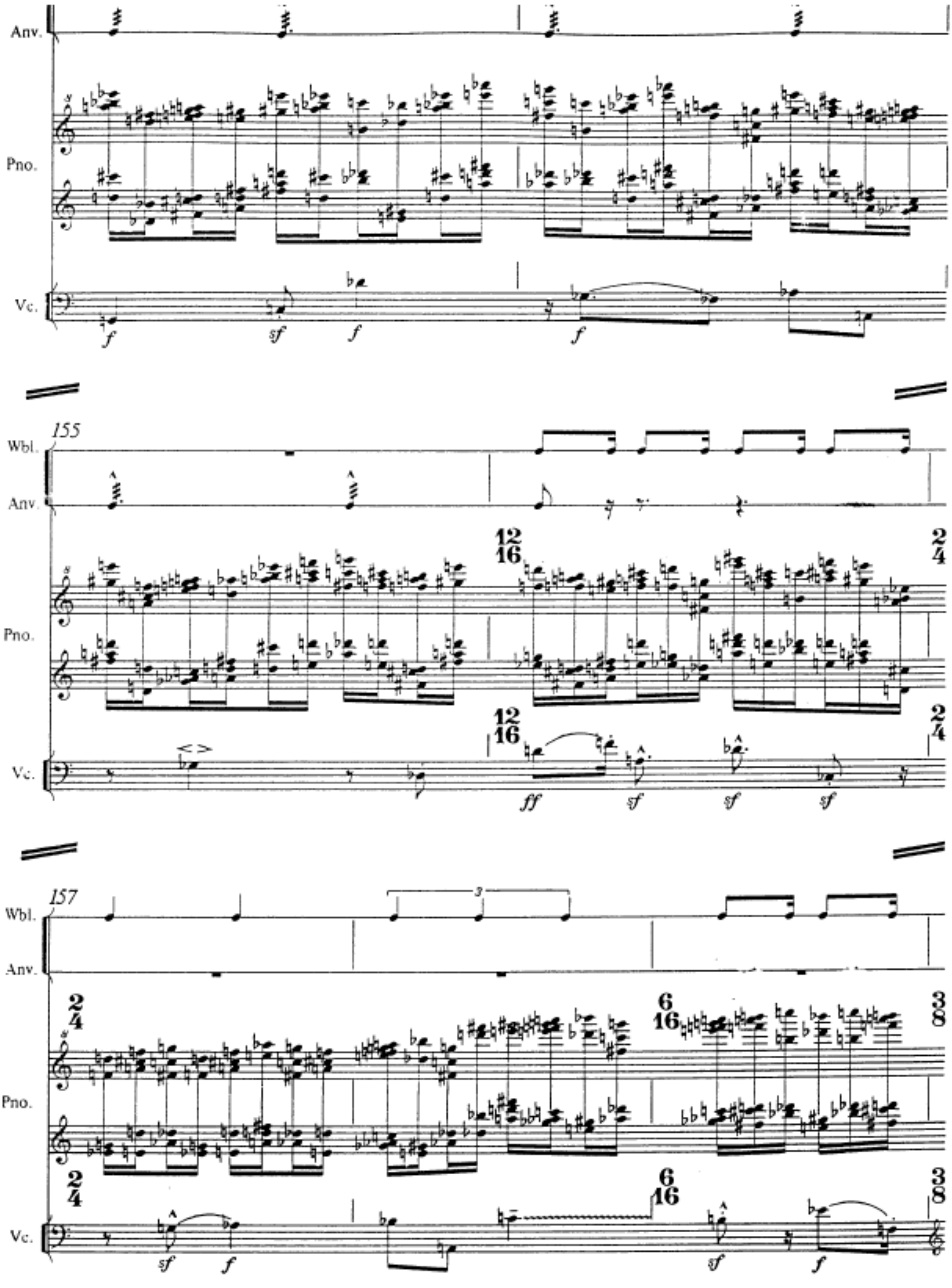
[7] *Published by Boosey & Hawkes (1969)*


140
Wbl.
Anv.
Pno.
Vc.
ff
f
142
ff
f
144
vib.
ff
f
sf

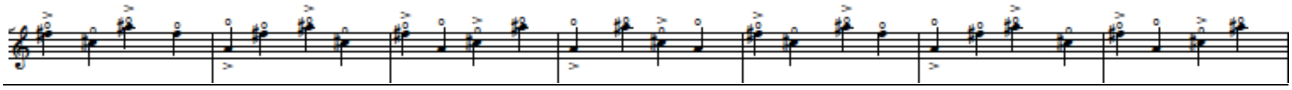

146
Wbl.
Anv.
Pno.
Vc.
1/4+3/16+1/4
5/8
5/16
f
sf
mf
f
ff
148
Small Cym. (susp.)
f dry
3/8
7/16
f
f
151
5/8


Anv.
Pno.
Vc.
f
sf
f
f
155
Wbl.
Anv.
12
16
2
4
Pno.
12
16
2
4
Vc.
ff
sf
sf
sf
157
Wbl.
3
Anv.
2
4
6
16
3
8
Pno.
2
4
6
16
3
8
Vc.
sf
f
sf
f

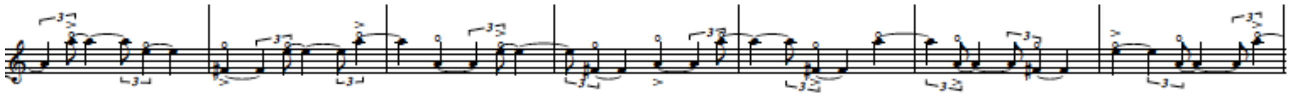
7) 16_1/64_1 (Toru Nakatari)[8]

The following fragment of this composition uses different gatis and jathis combinations but with an underlying rhythmical sangati concept. As opposed to Webern's piece, where the 3-note cell appeared in different parts of the measure, in this composition the original idea expressed in ♩ is transformed into different gatis and systematic augmentations within these gatis whilst all layers are performed simultaneously.

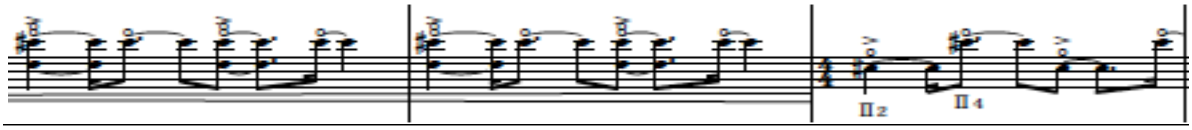
-Layer 1: The original phrase in ♩



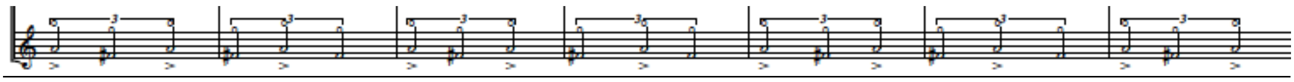
-Layer 2: Every note value of the original phrase is transformed into 5 matras of tisra (every ♩ without a bracket of tisra should be counted as 3 matras of tisra).



-Layer 3: Every note is subjected to an augmentation of a ratio of 4:5 in chatusra, therefore every ♩ of the original phrase becomes five matras in the new phrase.



-Layer 4: In this line every note value has become four matras within a 3:4♩



These seven measures look thus:

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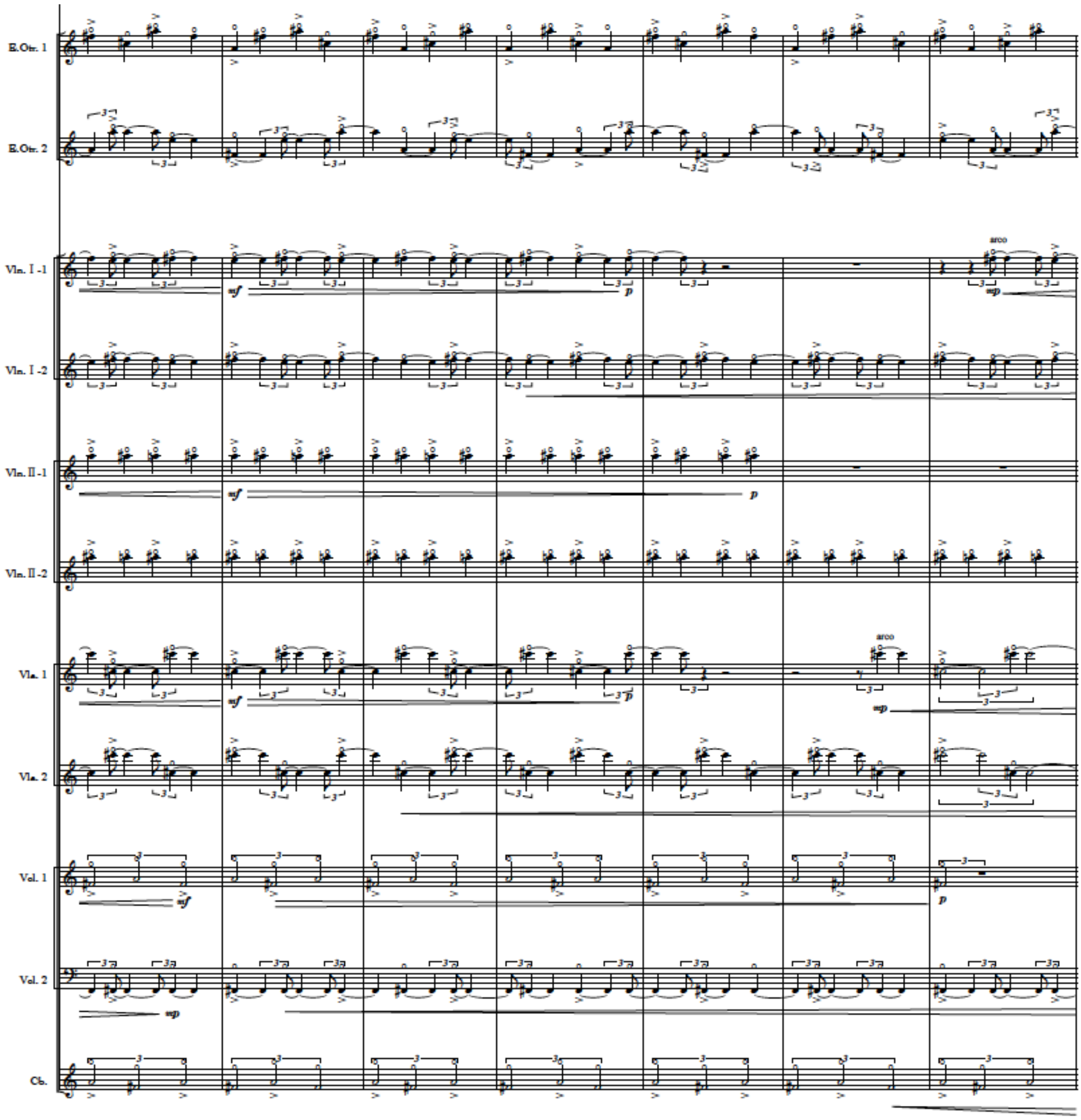
[8] *The score has not been published. The fragments shown here belong to the score made by the author and presented to the Gaudeamus Composition Prize in 2009*


E.Gtr. 1
E.Gtr. 2
Vln. I -1
Vln. I -2
Vln. II -1
Vln. II -2
Vla. 1
Vla. 2
Vcl. 1
Vcl. 2
Cb.
arco
mf
p
mp

Once again, a complete control of every gati/jathi combination by the different performers is of utmost importance if the subtleties of the different proportions provided by the different layers are to be perceived by the listener.

-Metrical Modulation

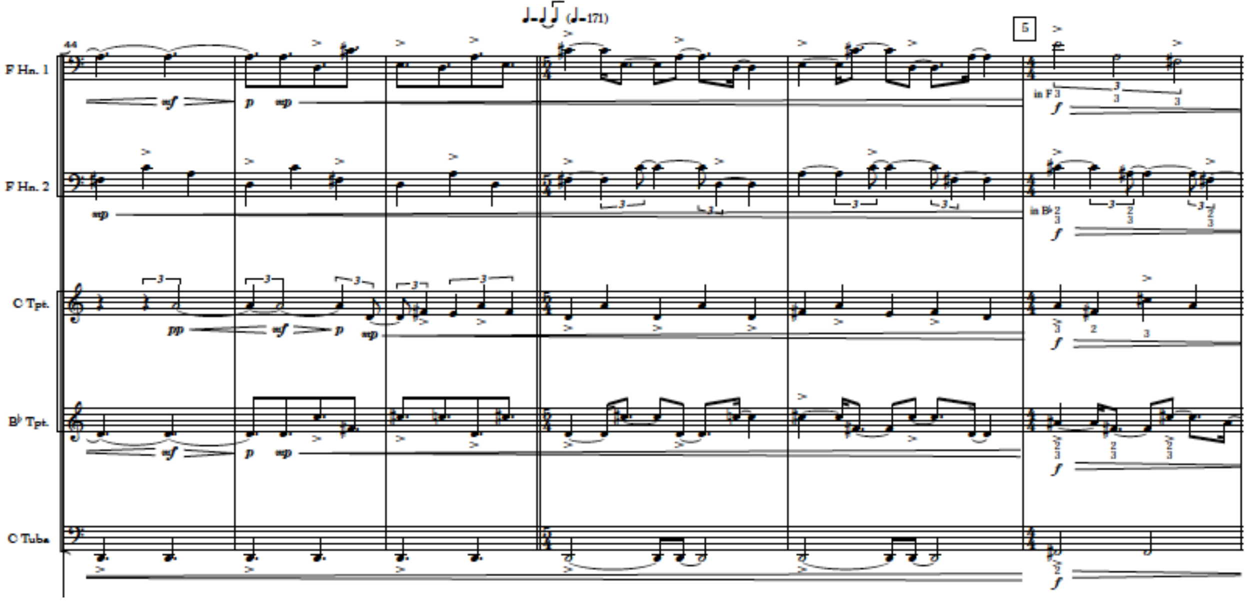
Another feature of this piece is the well-established (and predominantly) western concept of metrical modulation, a notion utilised abundantly since the 1950s. Although tempo changes occur sporadically in karnatic music, many elements explained so far can be of great help when trying to establish new tempi accurately.

There are two ways of expressing metrical modulations: the first is when there is some rhythmical element that produces a clear equivalence between the old and new tempi (Elliot Carter and Ligeti are clear exponents of this manner), and the second is when solely the new tempo is indicated, without giving any clues as to how a performer or conductor should move from one tempo to the other.

Often, the two elements (equivalence and tempo) are indicated, but the musical object that provokes the new tempo may not be as practical as a performer or conductor would like. For the next two examples I asked the conductor and flutist Jos Zwaanenburg[9] how he thought out the metrical modulations, considering that the equivalences proposed by the composer seemed to be rather cumbersome and more theoretical than practical.

The equivalence of 5 matras of tisra becoming the new beat in the new tempo ← 𝄾♩♩ (3) = ♩ → caused problems while rehearsing, since no layer was performing that particular figure. Zwaanenburg therefore resorted to using a karnatic frame that would help to transition from a 3/4 metre in ♩=102 to a 5/4 metre in ♩=171.

Using the *pratiloma* frame of 5:3♩ helped to crystallise the new tempo accurately. 102x5:3=170, which is a number very close to the one indicated by the composer. The conductor told me that he was already thinking of this frame for a few measures prior to the tempo change in order to assure the clarity and feeling when the music changed metre and tempo. Consequently, every ♩ of the 5:3♩ frame became the new beat.



For the next example Zwaanenburg similarly ignored the equivalence proposed by the composer (same as in the example above) and decided to use the notion of 'gati becoming jathi', explained as a creative tool for the 'Tree of gati bhedam'. Consequently, a unit of tisra becomes a unit of khanda ←♪ (3) = ♪ (5)→, although he was feeling all the matras in tisra prior the metrical modulation (thus feeling the laya), to subsequently take these three matras as the first matras of a khanda in the new tempo. All that was then needed was to add the two remaining matras of the gati to obtain the new tempo/beat in a practical manner. The calculations for arriving at the new tempo are the reversal of the first one: 170x3:5=102

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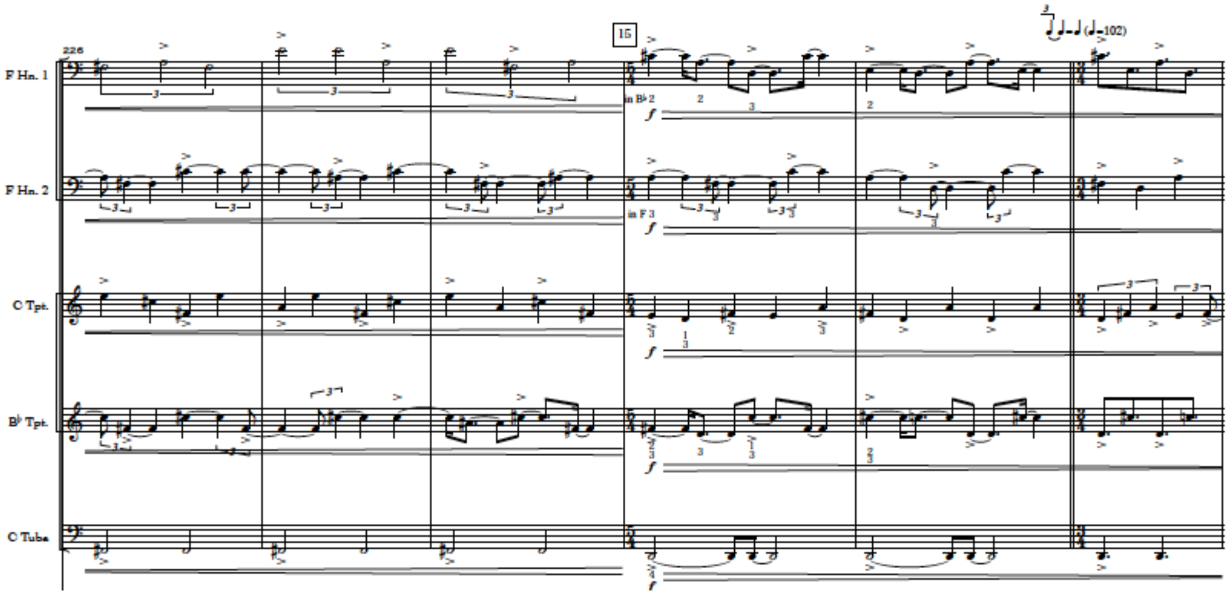
[9] *Jos Zwaanenburg also teaches the programme 'Contemporary Music through Non-Western Techniques', and is consequently well familiarised with karnatic music and concepts.*



8) Ten pieces for woodwind quintet (György Ligeti)[10]

The first chosen fragment of this piece seems to have been conceived in a fashion reminiscent of the notion of yati phrase (increasing or decreasing the length of a phrase in a systematic way). However, Ligeti adds one matra per beat, thus changing the gati.

Every layer (the fastest being the flute and the slowest the bassoon) increases the number of matras until they reach sankirna (9), chatusra 2nd speed anuloma (8), and misra (7) respectively in the second beat of measure 14. From the second half of measure 14, each layer takes a slower gati or speed per beat, until they reach a beat in tisra (in 2nd, 3rd and 4th beats of measure 15 respectively) to then perform long notes.

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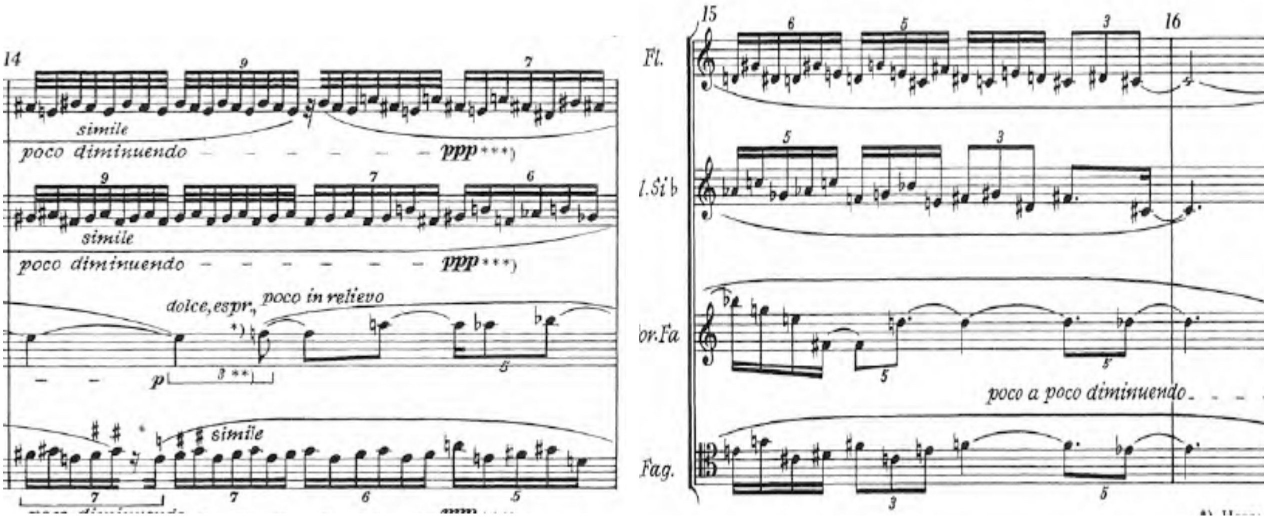
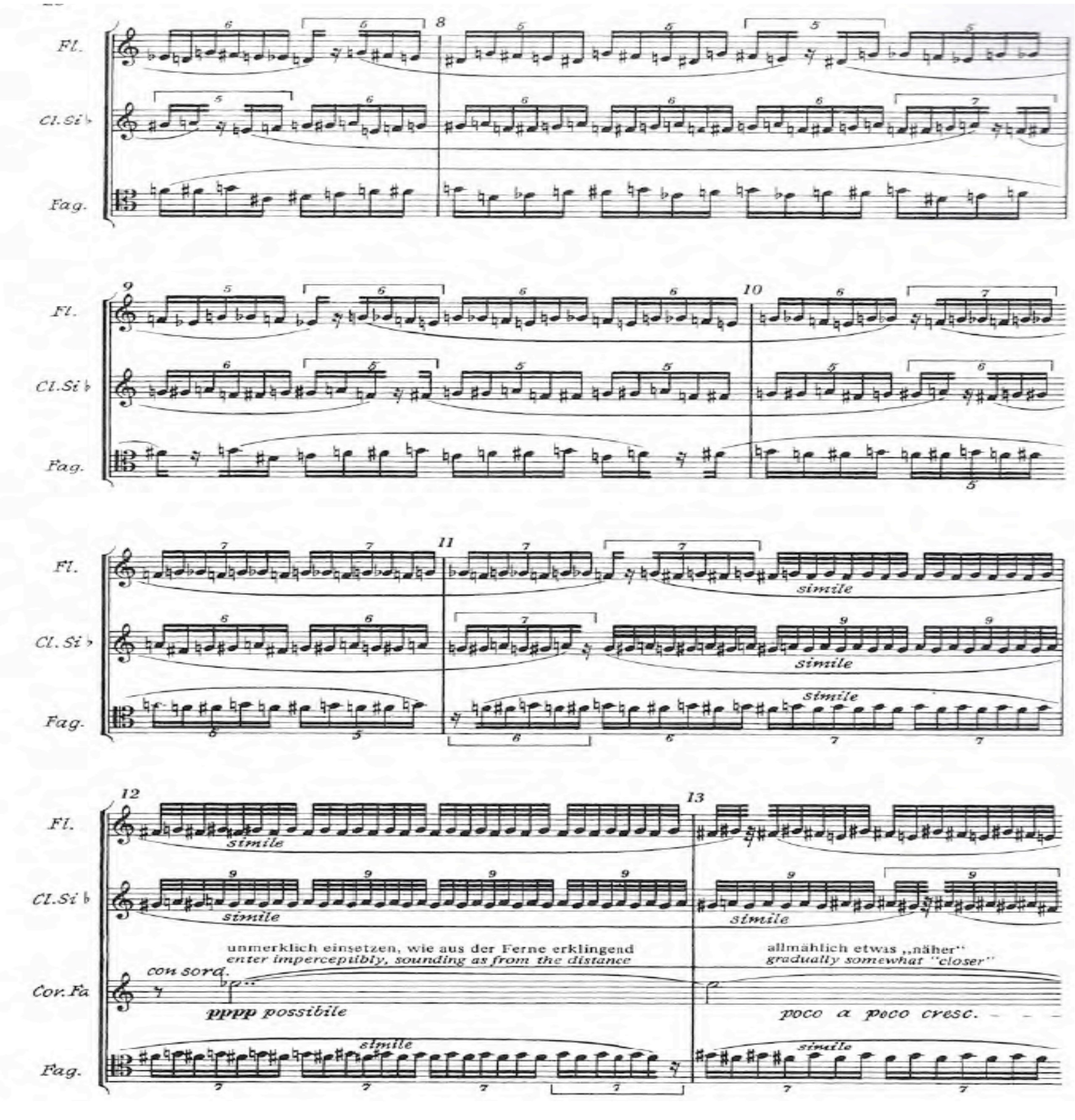
[10] *Published by Schott Music (1961)*


14
simile
poco diminuendo
ppp
dolce, espr.
poco in relievo
p
15
16
Fl.
Cl. Si♭
Cor. Fa
Fag.
poco a poco diminuendo

The increasing speeds passage looks like thus


Fl.
Cl. Si♭
Cor. Fa
Fag.
8
9
10
11
12
13
simile
con sord.
unmerklich einsetzen, wie aus der Ferne erklingend
enter imperceptibly, sounding as from the distance
pppp possibile
allmählich etwas „näher"
gradually somewhat "closer"
poco a poco cresc.

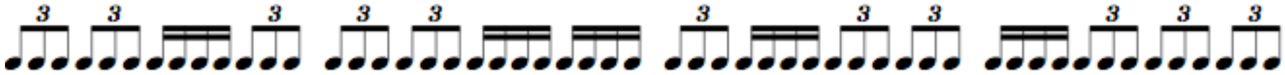
The second chosen fragment of this composition presents one of the rhythmical elements that have been utilised in western contemporary music with certain frequency. A parallel can be found in the concept of 'phrasing through gati changes', one of the recent developments in karnatic music, although as was explained in the relevant chapter, these gati changes are far from being random in South India.

This fragment, in comparison with many other pieces or composers using this rhythmical notion, is relatively simple, since throughout the whole passage Ligeti uses exclusively chatusra and tisra (except for the last beat in measure 6). Also, several times, a gati does not change for two or more beats.

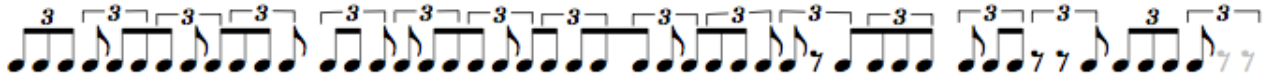
Needless to say that, in order to perform this passage with accuracy, any performer who has practiced the technique explained in chapter 28, could apply the steps proposed in the practice method section of that topic.

Summarising, the three steps to obtain complete accuracy with such a passage would be:

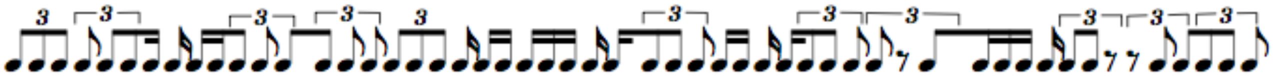
1) Sing the solkattu syllables of every gati, without any phrasing, until the changes are internalised.



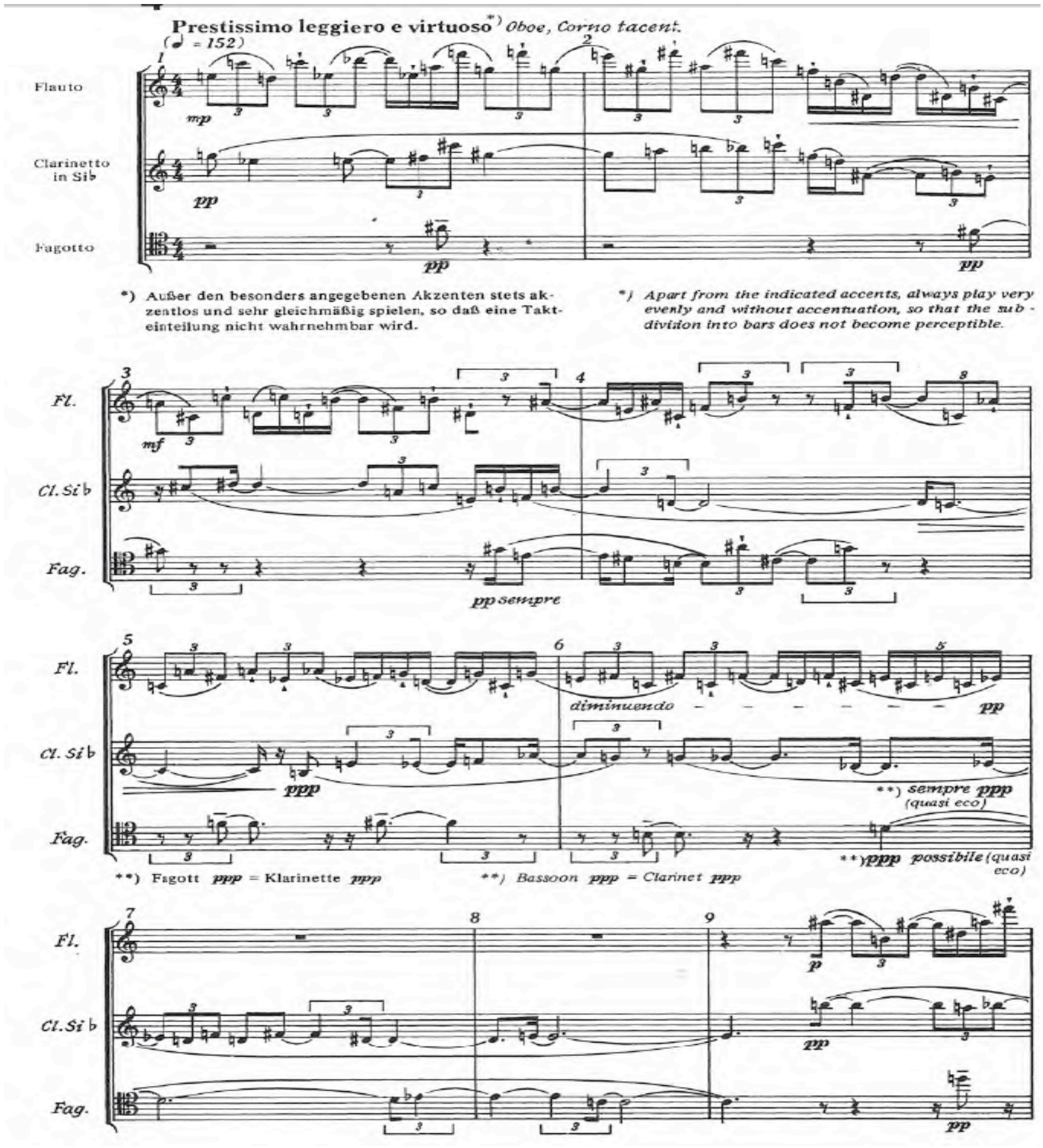
2) Re-write all the phrases in one gati (due to the predominance of tisra, this seems to be a better choice) to obtain a good feeling for the phrasing as such (and, in this case, the rests in between phrases) without the hindrance that the gati change may represent to start with.



3) Proceed to perform the passage as written, always keeping in mind the changes of speed provided by the gati changes, and treating the phrase as a unit that should not be broken by any gati change. In this way, the score will sound as the composer has written it.



Due to the fast tempo of the passage, it is quite important that the performer starts practicing in a much slower tempo so that the gati changes and the phrasing are better internalised, before gradually speeding up the tempo.


Prestissimo leggiero e virtuoso*) Oboe, Corno tacent.
(♩ = 152)
Flauto
Clarinetto in Si♭
Fagotto
mp
pp
*) Außer den besonders angegebenen Akzenten stets akzentlos und sehr gleichmäßig spielen, so daß eine Takteinteilung nicht wahrnehmbar wird.
*) Apart from the indicated accents, always play very evenly and without accentuation, so that the subdivision into bars does not become perceptible.
Fl.
Cl. Si♭
Fag.
mf
pp sempre
diminuendo
ppp
**) sempre ppp (quasi eco)
**) ppp possibile (quasi eco)
**) Fagott ppp = Klarinette ppp
**) Bassoon ppp = Clarinet ppp
p

9) Athena Keramitis (Jan Vriend)[11]

The following passage of this Dutch composer is an extreme example of this concept: gati changes occur in almost every beat and phrases are mostly written starting in one gati and continuing into the next one. The phrasing exclusively uses the matras of every gati and does not use different note values, as was the case with the karnatic examples presented in chapter 28. In order to perform this fragment accurately, the musician would need to apply the three steps explained previously for Ligeti's composition.

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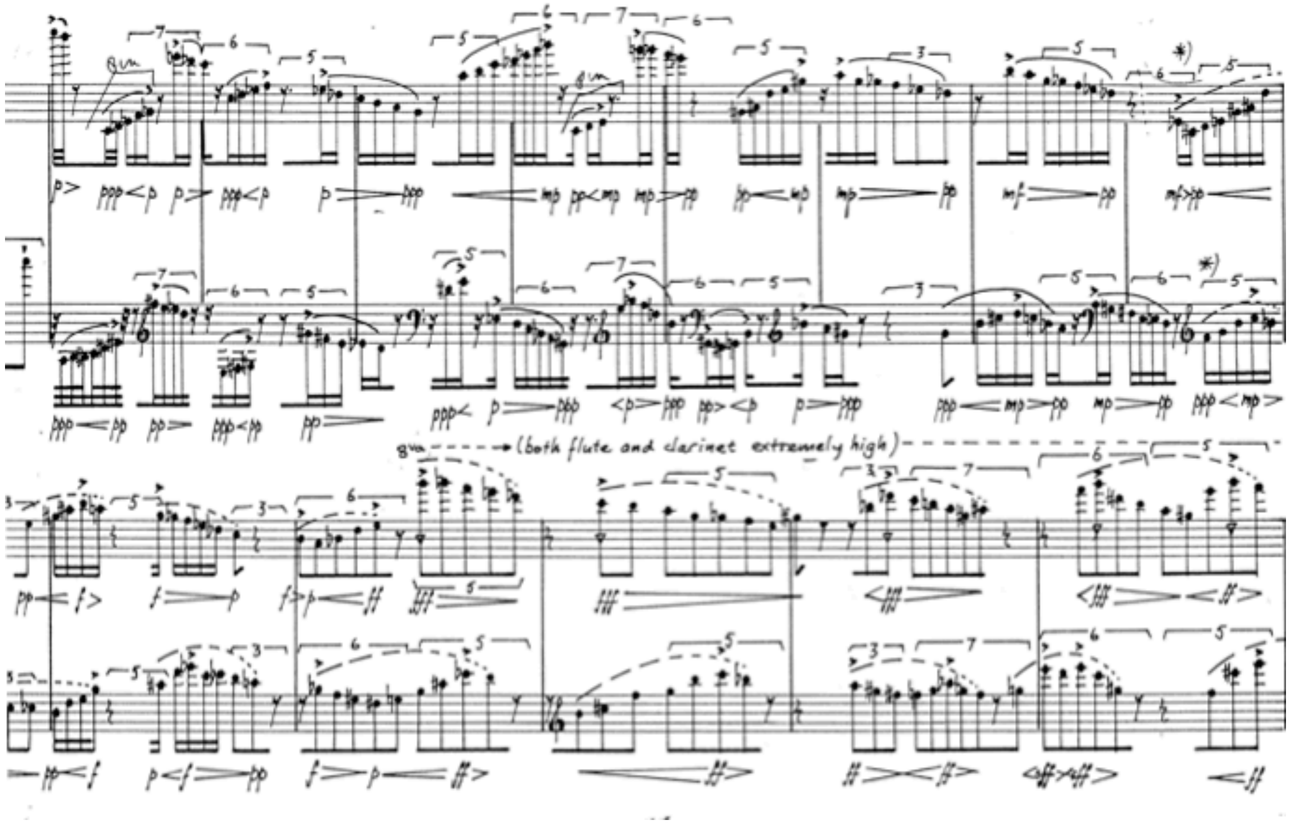
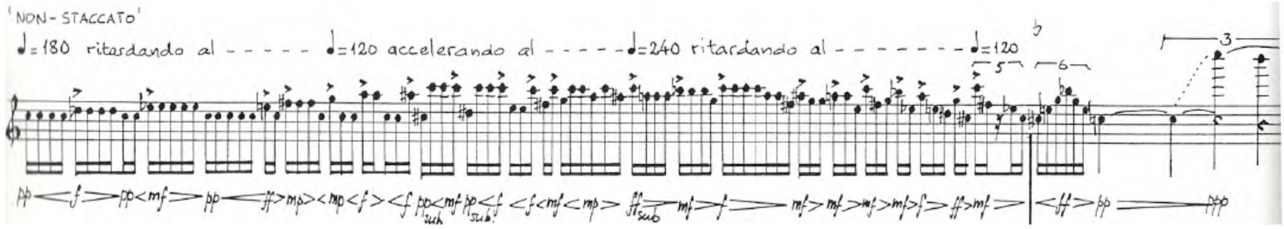
[11] *Published by Donemus (1986)*


8va
(both flute and clarinet extremely high)
*)

Also in this piece there is a fragment where the composer uses a jathi bhedam sequence, mostly in chatusra except for the final two beats in khanda and tisra 2nd speed respectively. However, there are several notes that, though beamed together, are accented and always attack a high C, presenting a notion of syncopation next to the phrasing of different lengths.

The numerical sequence is: Chatusra 4 4 2 5 5 2 4 3 2 3 4 4 3 2 6 4 4 7 3 3 3 2 3 2/
Khanda 3 2/Tisra 6


'NON-STACCATO'
♩=180 ritardando al - - - - - ♩=120 accelerando al - - - - - ♩=240 ritardando al - - - - - - - ♩=120

10) Symphony nr. 4 (Charles Yves)[12]

With one measure of this symphony I would like to introduce two clear examples of *nadai bhedam* that utilise the same notation as proposed in chapter 21 with the double bracket (or nested tuplet): the origin of the first bracket can be traced back to any gati/jathi combination, and the second bracket works essentially as the nadai did in karnatic music.

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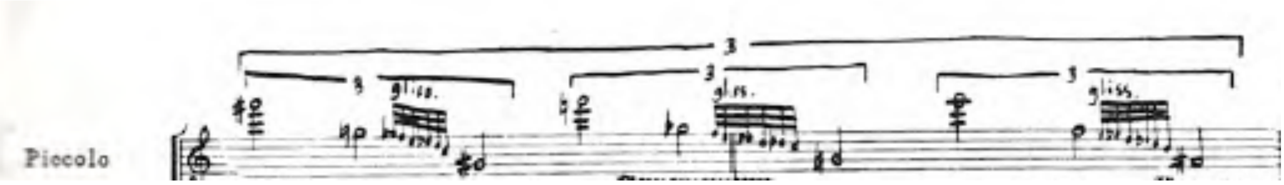
[12] *Published by Associated Music Publishers Inc (1927)*

This measure of the piccolo takes as first bracket a 3:4♩ (which, from a performance viewpoint, would be the result of applying tisra jathi 4 and isolating the accents), and on every ♩ of the first bracket, superimposes tisra nadai.

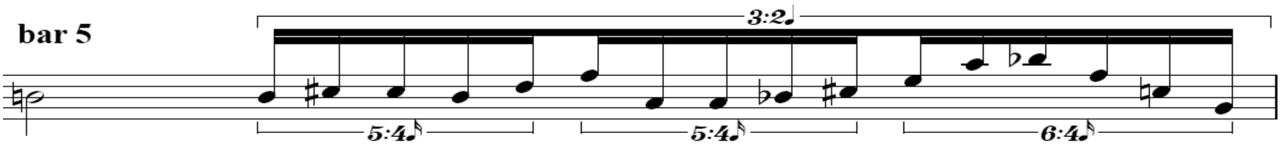


11) Black Page (Frank Zappa)[13]

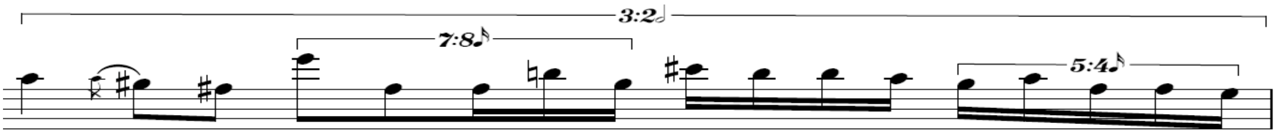
In this well-known composition by F. Zappa, the composer uses the notation proposed in the nadai bhedam chapter on several occasions.

First in measure 5, where in the last two beats a 3:2♩ is used as a first bracket, that is again the result of thinking of tisra jathi 2 and isolating the accents. However, as opposed to karnatic musicians, for whom nadai bhedam is exclusively a concept to produce polypulses, and therefore a constant nadai is used throughout a whole frame, on the first two ♩ of the first bracket, a khanda is superimposed followed in the last ♩ by a superimposed tisra.

From a performers' viewpoint, this change of nadai (or superimposed tuplet) should not represent a major obstacle, if during practice of this karnatic technique, a performer has consolidated one of the most important sets of exercises, namely keeping the same number of accents and beats and changing the nadai. In this fashion, all one needs to do is to apply this concept on the bracket. *(track 258)*



Later on Zappa writes a 3:2𝅗𝅥, which in my opinion can create certain confusion to begin with. Possibly, a 6:4♩ would have been more transparent, since there are six different groupings, although one of them (7:8𝅘𝅥𝅯) takes the time-span of two accents of the first bracket. *(track 259)*



Similarly to the previous example, applying the change of nadai on the same frame can produce the desired result and clarity in the performance. The only added difficulty is the 7:8𝅘𝅥𝅯 since it takes two of the six accents. In order to perform this particular element, the performer could start practicing regular misra on every accent, and then proceed to apply a jathi 2 to misra (as seen in chapter 9) and isolate the accents. In this way, the 7:2♩ (in karnatic thinking) is obtained and the 7:8𝅘𝅥𝅯 can accurately be played.

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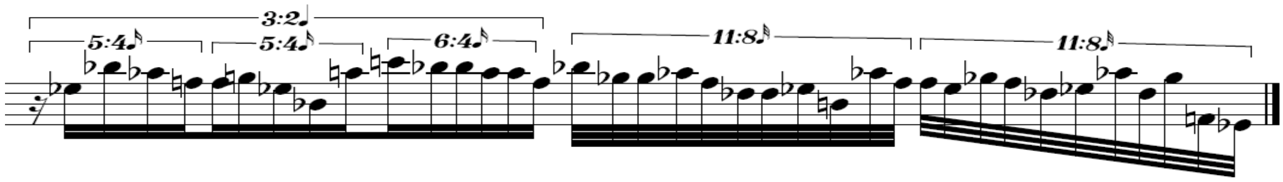
[13] *Published by Bachovic Music (1993)*

The last segment of this piece presents the same nadai bhedam as in measure 5 (3:2♩ as first bracket with two groupings of khanda nadai and a third one of tisra nadai) followed by two beats of 11. This gati is seldom used in western music. When utilised, it is usually without any phrasing, and in most cases, more as a sort of a fast group of 'grace notes' or arpeggio to a main note. This example does not propose any phrasing, although in my opinion and estimation of Zappa's intention regarding the creation and performance of rhythmical complexities, these two beats are written with the aim of being performed as a gati and not with the arpeggio or grace notes notion. *(track 260)*



12) Dmaathen (Iannis Xenakis)[14]

As already mentioned in the general introduction to this section, the significant differences in organising and developing 'complex irregular groupings' as established by nadai bhedam and combinations anuloma-pratiloma in karnatic music, simply do not exist in western music. What prevails in the west seems to be something more along the lines of 'numbers against numbers'.

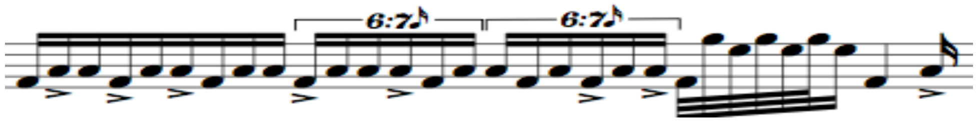
Therefore, the difference between the two previous examples of Ives and Zappa and the following examples of Xenakis and Castiglione are based exclusively on the different notations proposed by the composers rather than a real conceptual difference.

In the two previous examples, it was seen that the direct use of nadai bhedam could help to perform the passages as written. In the next two passages of Xenakis, as explained in the practice method section of combinations anuloma-pratiloma, the musician would need to resort to several techniques in order to perform the passage with absolute accuracy as follows:

-Dissect the different starting points of every grouping within a nadai bhedam frame and feel the distribution of all nadai matras within the given frame.

-Use mixed jathi nadai bhedam for the same purpose as well as for the displacements within the beat.

-Employ the exercises 'C' of combinations anuloma-pratiloma where displacements of ♩, ♪ and 𝅘𝅥𝅯 frames take place. *(track 261)*



In the first two measures of this example (in 4/4) the following process is suggested:

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[14] *Published by Editions Salabert (1976)*

a) Take the frame of each irregular grouping and make a short jathi bhedam sequence so that the performer knows exactly where every starting point of each irregular grouping falls within the beat. The sequence of this example would be 9 7 7 4 4 1, which gives 32 matras in chatusra (two measures of 4/4).

b) The first nine matras should not represent any problem to any musician since they simply are a phrase in chatusra jathi 9.

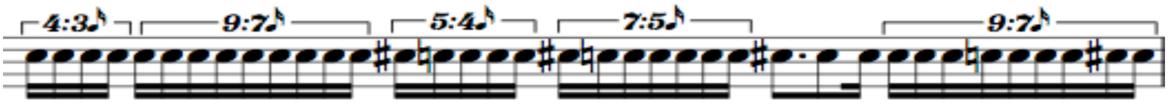
c) The first 6:7♪ starts on the second matra of the beat; this would be the initial point of the fourth accent of the nadai bhedam frame ⌐———**4:7♩**———¬
⌐**6**¬ ⌐**6**¬ ⌐**6**¬ ⌐**6**¬

All one need do is to review this particular combination and get the feeling for how the matras of a superimposed tisra are distributed in the last seven matras of the frame.

d) The second 6:7♪ starts on the downbeat; this would therefore be the initial point of the same nadai bhedam frame and, consequently, would finish on the 4th matra of the second beat.

e) What follows is a 4-matras phrase, starting and finishing on the last matra of the beat. Therefore, using a gati bhedam principle should suffice to perform this phrase. Lastly, a ♩ note attacked on the 4th matra of the beat and a ♪ closes the measure.

In the next two measures of the same composition by Xenakis, a similar process is suggested: *(track 262)*



a) Construct a sequence of jathi bhedam with the frames of the irregular groupings in order to establish where each one of them starts and finishes within the beat. The sequence for these two measures would be

3 7 4 5 6 7

b) Establish which accent of a nadai bhedam frame corresponds with the beginning point of every irregular grouping

-4:3♪ would be the first accent of a ⌐———**4:3♩**———¬
⌐**4**¬ ⌐**4**¬ ⌐**4**¬ ⌐**4**¬

-First 9:7♪, since starts on the 4th matra, would be the second accent of a ⌐———**4:7♩**———¬
⌐**9**¬ ⌐**9**¬ ⌐**9**¬ ⌐**9**¬

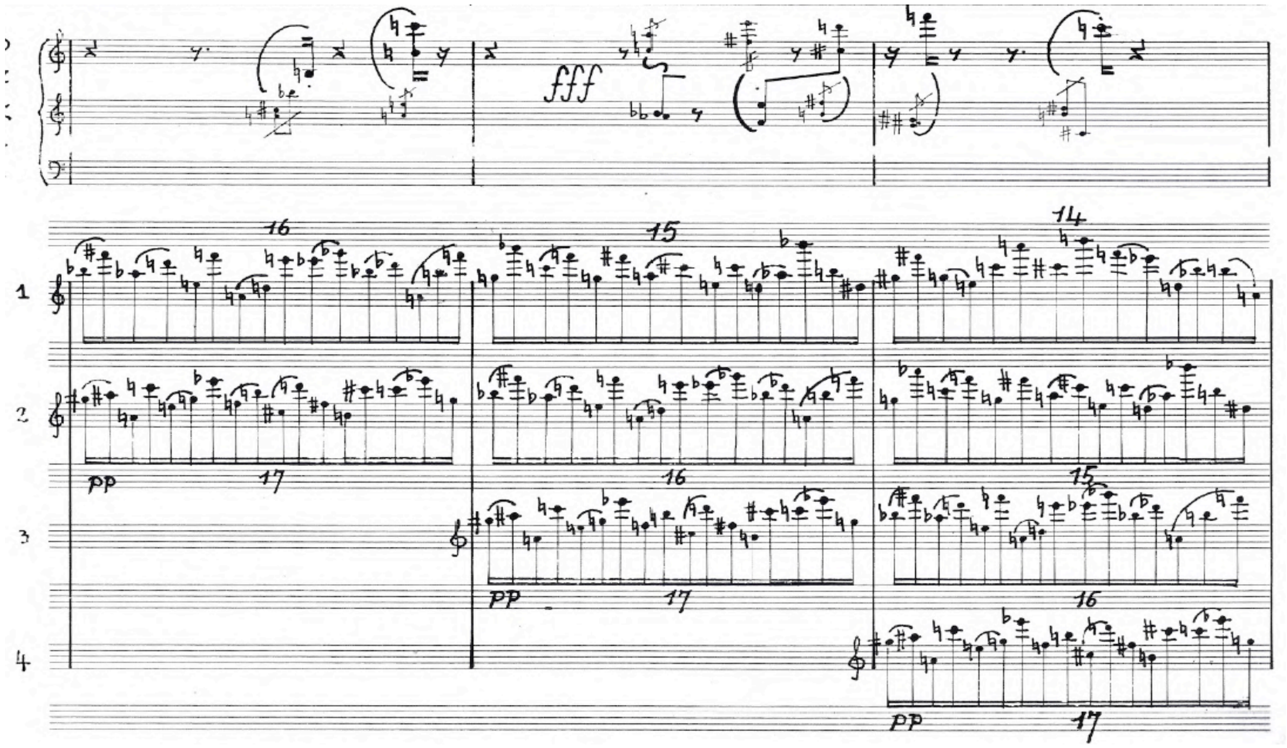
-5:4♪ is a regular khanda that starts and finishes in the second half of the beat. For this, practicing a regular khanda starting on the second half of the beat, or alternatively working on the exercises 'C' of combinations anuloma-pratiloma (regarding performing all regular speeds starting in every point of the beat), could give the desired result.

-7:5♪ starts consequently in the second half of the beat as well; the best way to perform it would be to use the distribution of matras of the third accent of a ⌐———**4:5♩**———¬
⌐**7**¬ ⌐**7**¬ ⌐**7**¬ ⌐**7**¬

-A phrase of chatusra jathi 6 follows suit, starting on the 4th matra of the beat. The last 𝅘𝅥𝅯 of the phrase does actually fall on the beat, but since the beaming suggests a chatusra jathi 6 phrase, this 𝅘𝅥𝅯 should not be emphasised because of its placement.

- Since the last 9:7𝅘𝅥𝅯 starts on the 2nd matra, it would be the fourth accent of a ⌐——— 4:7♩. ———¬
⌐9¬⌐9¬⌐9¬⌐9¬

13) Quod Libet (Niccolo Castiglione)[15]



(track 263, performing 17, 16, 15 and 14)

I chose this fragment of this piece because I thought that despite the fact that, the composer's intention was most likely to create a spider web of intricate irregular groupings in a sort of canon shape in which every layer slows down by one matra per measure, it could be a good opportunity to show how every 'complex number' could be approached using nadai bhedam or combinations anuloma-pratiloma to assure complete accuracy while performing.

Creatively, a parallel with the concept of yati phrase can be found, as with Ligeti's woodwind quintet. In every measure, each layer omits one matra and this omission produces a different irregular grouping. Simultaneously, since it keeps the frame of three beats throughout the passage, it could be argued that there is a parallel with the sixth developmental technique of combinations anuloma-pratiloma (keeping the same frame, changing gati and speed).

How every number can be analysed and approached from a performers viewpoint will now be explained. The time signature is 3/4, which implies that every number is performed against 3 beats (or 12 𝅘𝅥𝅯).

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[15] *Published by Ricordi Milan (1977)*

a) 17:12𝅘𝅥𝅯 would probably have been the most correct notation, although the notation Castiglione employs is sufficiently clear.

17, 19 or 23 (and any other prime number after 23), are the only numbers for which no frame of nadai bhedam or combinations anuloma-pratiloma can provide a direct answer as to how to perform them. However, I remember asking B.C. Manjunath if he could play 17 and 19 against 2, 3 or 4 beats as he had done with 11 and 13, even though karnatic musicians do not use any of them. To my great surprise, he sung for me 17 and 19 against these three frames without thinking twice and with complete accuracy.

What I deduced from this is that, once a musician has achieved a high degree of rhythmical precision and has a complete overview and understanding of the karnatic system, he is capable of facing elements that, while technically outside the scope of this system, he can nonetheless perform with complete naturalness and accuracy.

The way he subdivided the 17 was 9+8, with the following syllables:

Ta ka di na/ta di ghi na to – ta ke di mi/ta ka jha nu

Consequently, any western musician in turn, who achieves a good aptitude for rhythmical intricacies through studying the method proposed in this text, should be capable of working out this number 17 and treating it as an independent gati when necessary.

b) 16:12𝅘𝅥𝅯 is the result of superimposing a chatusra on the frame of 4:3♩ or, using karnatic notation, it would be the nadai bhedam frame ⌐———***4:3♩***———¬
⌐***4***¬ ⌐***4***¬ ⌐***4***¬ ⌐***4***¬

c) 15:12𝅘𝅥𝅯 is actually three times a regular khanda since the measure is 3/4.

d) 14:12𝅘𝅥𝅯 was a combination already studied in chapter 9 (introduction to Anuloma-Pratiloma); it is the result of superimposing misra 2nd speed anuloma within the 3rd speed pratiloma. Also the process of achieving it was explained in the practice method section relevant to that topic (essentially performing 7:6𝅘𝅥𝅯 twice).

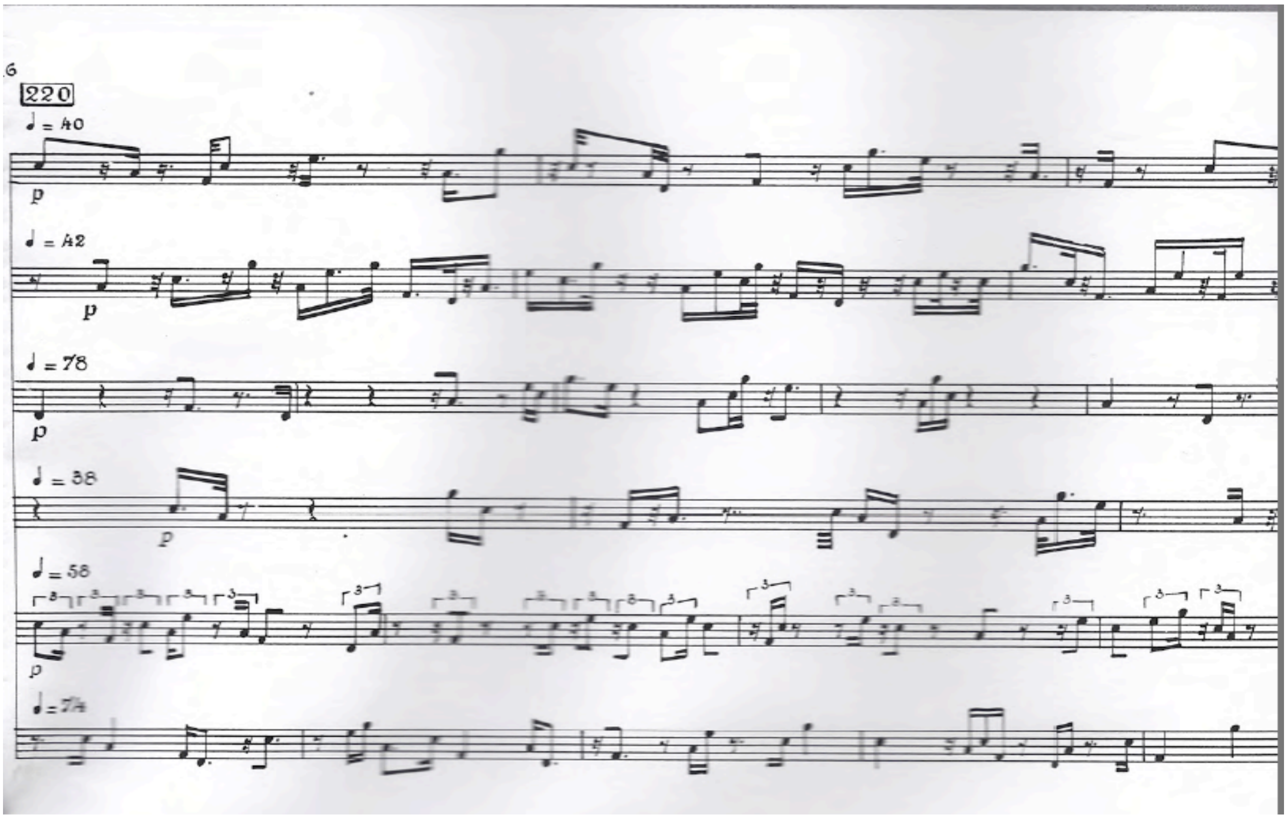
What makes this passage especially difficult, from a linear point of view, is the extreme proximity of each number to the following one. However, if every number or irregular grouping is first practiced separately until complete precision is obtained, the next step is to put the whole sequence together whilst keeping the independence from the other layers.

As mentioned before, although the construction of the passage may lead one to think that ultimately the composer does not pursue complete precision, practicing this passage and performing it with absolute precision will greatly help any musician to analyse, practice and perform passages of similar complexity where the intention is absolute precision.

14) Persephassa (Iannis Xenakis)[16]

If there is one rhythmical structure in western music that seems to create quite a few problems to performers and conductors, it is the concept of polytempi or polypulses.

Xenakis has used this concept in many of his compositions varying the notation from piece to piece. However, the one he seemed to favour the most, especially in his late pieces, was to give different tempo to each player.



Through my work with many percussion ensembles and percussion students of my programme, I came to realise what I had suspected long before: this notation usually brings forth a few major problems, the following being the most outstanding:

-To change tempo without any reference or equivalence while simultaneously, other players are also changing to different tempi.

-Not having a common reference of some sort means the musician has to 'guess' rather than knowing his relation to other players.

-In conducted pieces (such as Persephassa), the conductor is obliged to stop conducting during the entire passage, his sole role being to cue the performers when the next section arrives. Consequently, the unifying element that a conductor provides in western music disappears altogether.

A few years ago I had the chance to collaborate with percussionists in some Xenakis pieces that used the same concept and notation as Persephassa; although all of the musicians were very experienced with contemporary music, they all were rather frustrated with the passages of polytempi because they felt directionless.

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[16] *Published by Editions Salabert (1972)*

I proceeded to try to find ways with karnatic concepts that would enable them to have what karnatic music has at all times: a common reference in terms of tala and, more importantly in this context, tempo. Therefore, by keeping the previous tempo to the polytempi section in all players, and giving to each performer a frame of nadai bhedam or, alternatively, a rhythmical equivalence, they could practice and perform with a common tempo. This 'trick' subsequently enabled them to keep track of where they were and how they related to one another which provided, as a final result, a better sense of directionality and intentionality to their playing.

While I do not know if Xenakis had some equivalences in mind when he wrote the different tempi, or whether they conformed to other creative parameters, the reality is that it was not always possible to find an exact nadai bhedam frame or equivalence that would suit the tempo written by Xenakis. Sometimes it was necessary to deviate a couple of numbers from the written tempo so that the performer could use one of the devices. However, this deviation did not seem to affect the performance of that particular part and the player felt at ease and related to the whole structure. By giving them a rigorous system, I enabled them to deal with these minor 'mathematical' inconsistencies.

This is the case with Persephassa, where in two of the six tempi I had to deviate by two numbers from the written tempo. However, the passage could be conducted and every performer could relate to the conductor's tempo while keeping in mind a nadai bhedam frame or, in the case of this composition, other devices I created.

The previous tempo to this passage[17] is ♩=40. Therefore, I tried to relate all the parts to the old tempo so that the conductor would not need to change it, which would make the leap into nadai bhedam frames of many of the other parts easier.

-First percussionist stays in ♩=40, therefore no calculations or changes are required here.

-The indication for the third percussionist is that he should go to ♩=78. After many calculations failed to bear fruit I decided that this percussionist should simply double his tempo and go to ♩=80.

-The fifth percussionist should go to ♩=58; once again, I could not find an exact equivalence but felt that the closest (and easiest) equivalence would be in a ratio of 3:2. This would produce a tempo of ♩=60, but would enable the musician to fall every two beats with the conductor whilst feeling a simple 3:2♩ and superimpose tisra on every accent of the frame.

-The sixth percussionist needs to go to ♩=74; between 40 and 74 there is a ratio of 9:5. Consequently, the performer needs to think of a 9:5♩ (result of a gati/jathi combination of sankirna jathi 5) and superimpose chatusra. In this way, he would meet the conductor every five beats. *(track 264)*

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[17] *I reproduced here only the first page where the new tempi are written just to show the tempo of each performer. The whole passage is fairly long.*

-The second and fourth percussionists had the task of slightly speeding up and slowing down. Unfortunately, I could not find a frame that they could keep consistently. Rather, I found metrical equivalences for both that facilitated the transition to a new tempo although they had no meeting points with the conductor; nonetheless, these metrical equivalences proved beneficial and the performers could manage to realise the device and keep their tempi afterwards.

-The fourth player goes to ♩=38; I found that if the performer would think of a 15:16𝅘𝅥𝅯 (or expressed in nadai bhedam terms, a 3:4♩ with khanda superimposed), the value of the new 𝅘𝅥𝅯 when grouped every four matras would produce a tempo of ♩=37,5. Consequently, the performer creates a metrical modulation in his head by using a relatively easy nadai bhedam frame, and the 𝅘𝅥𝅯 of this 15:16𝅘𝅥𝅯 becomes his new chatusra matra that he needs to keep throughout the entire passage. The musician felt he had a tool to make the transition to the new tempo with relative ease and confidence. *(track 265)*

-For the second player the equivalence was slightly more complicated; this percussionist needed to go to ♩=42 but I could not find a known nadai bhedam frame that would allow him to do so. Finally, I thought that the matra or 𝅘𝅥𝅯 of a 17:16𝅘𝅥𝅯 would give the tempo ♩=42,5. Subsequently I instructed the player how to think of this rather difficult equivalence. The procedure would be the same as with the fourth percussionist: turn the 𝅘𝅥𝅯 of a 17:16𝅘𝅥𝅯 as a matra of chatusra and keep the new tempo throughout the whole passage. *(track 266)*

Although not easy to practice and perform, the different frames and equivalences finally enabled the ensemble to put together the whole passage within a few hours, after having spent several days working on it without any tangible result.

15) Mort Subite *(rhythmical grid)* (Brian Ferneyhough)[18]

In this piece by B. Ferneyhough, I selected the rhythmical grid he provided to the Dutch ‘Nieuw Ensemble’ as a guide. I thought that analysing this grid would help considerably to better understand the thinking behind.

In this rhythmical grid the composer uses different ways to express complex polyrhythms and polypulses, to each of which a karnatic technique can always be applied. Ironically, despite the very complex material utilised, the underlying notion is that of a cycle: every fragment is constructed around 10 beats, although both layers are using different gatis.

Ferneyhough divides this grid into what he calls ‘phases’.

Phase I

This first system uses a gati/jathi combination in the upper layer (chatusra jathi 5) which, as in karnatic music, is repeated 4 times to meet the beat (although, because he uses ♪, the third grouping already falls on the beat). In the second layer, he uses a notation in which the denominator is expressed in matras of khanda (5/10), or 5:2♩ using the karnatic way of thinking (10 is the number of matras that 5:2♩ will give in a 4/4 metre).

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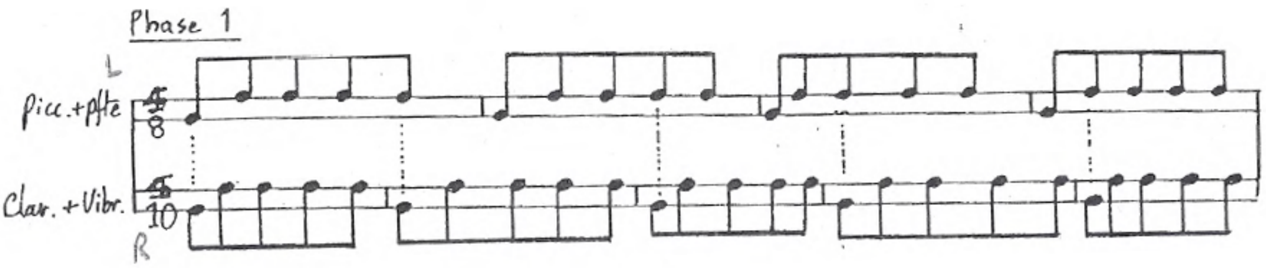
[18] *Published by Peters Editions (1990)*

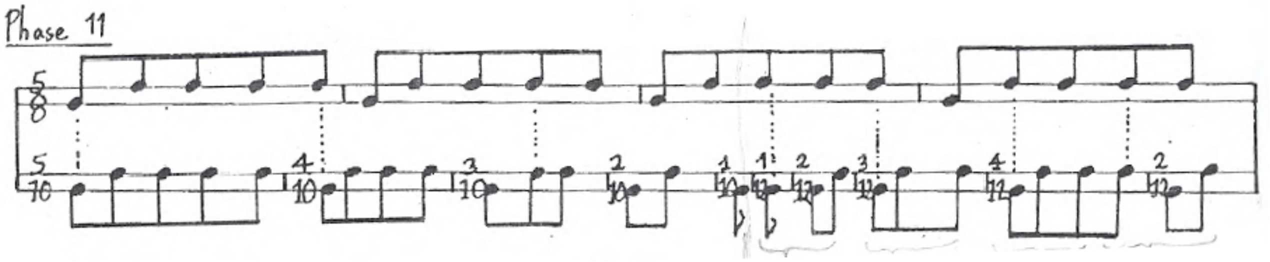
However, in this context, the 5 matras of khanda are actually going with the pulse every two beats. The effect is the same as explained in chapter 3: two different layers performing a phrase of 5 notes in different gatis, in this case chatusra and khanda. *(track 267)*


Phase 1
L
Picc.+pfte
5
8
Clar.+Vibr.
5
10
R

Phase II

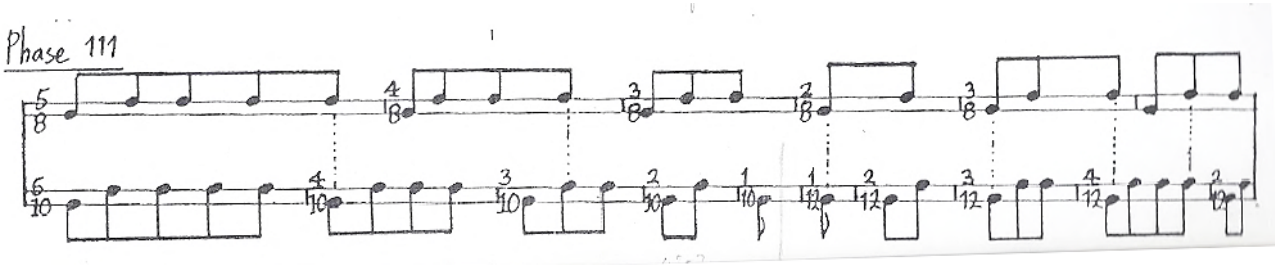
In the first layer there is a repetition of the same element (chatusra jathi 5).

In the second layer, the khanda realises a short jathi bhedam with the numbers 5 4 3 2 1, which ultimately gives 15 matras of khanda 2nd *speed pratiloma* (or three times a 5:2♩), and resolves on the 7th beat. This is followed by a short jathi bhedam sequence in tisra (the denominator changes to 12, which is the number of matras that a regular tisra would give in a 4/4). This sequence is 1 2 3 4 2, totalling 12 matras or 4 beats. Consequently, the two layers meet after ten beats, although each one of them has utilised different gatis, and in the case of the second layer, an incomplete number of matras turned into differentiated time signatures. *(track 268)*


Phase 11
5
8
5
10
4
10
3
10
2
10
1
10
1
12
2
12
3
12
4
12
2
12

Phase III

In this section the first layer remains in chatusra, although uses a short jathi bhedam sequence of the same length as the two previous phases (ten beats). The number sequence is 5 4 3 2 3 3. The second layer is constructed in an identical fashion to the previous segment. *(track 269)*


Phase 111
5
8
4
8
3
8
2
8
3
8
6
10
4
10
3
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1
10
1
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2
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3
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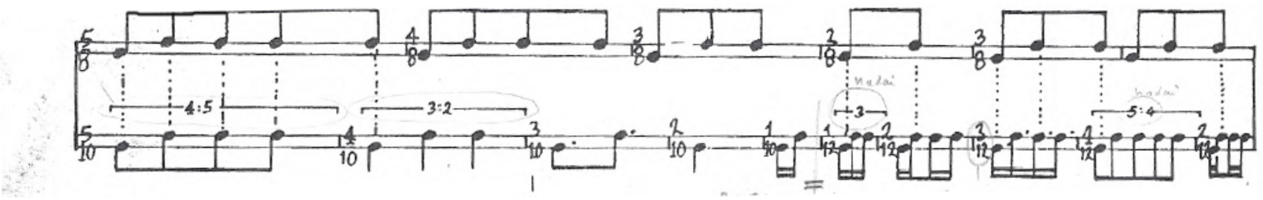
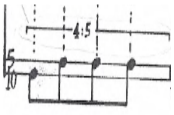
4
12
2
12

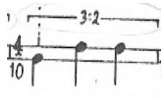
Phase IV *(track 270)*



It is from this moment that the composer starts using superimpositions on the metres created by the previous jathi bhedam sequence. The first layer is identical and on the second layer he uses four superimpositions. These superimpositions, within this context, can be approached as follows:



Although it looks quite complicated, this figure is actually the easiest one, since four ♪ in the place of five ♪ of khanda is actually four straight four ♪ in chatusra[19]. I can see the need to keep the notation as written because of the whole construction in khanda so that the consistency of the notation is kept throughout the whole passage.

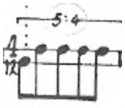


In order to perform this superimposition the musician could approach it with the following steps:

a) Think of a nadai bhedam frame of 5:4♩ but using the ♪ as the unit since the 4/10 metre is constructed on khanda 2nd speed pratiloma.

b) Superimpose a tisra on the resulting frame.

This irregular grouping on a metre with a khanda denominator is not different from the nadai bhedam frame ⌐———— ***5:4***♩————¬ but creates groups of four ♪ of chatusra in order to produce the 5:4♩
⌐***3***¬⌐***3***¬⌐***3***¬⌐***3***¬⌐***3***¬



This superimposition should be approached in exactly the same fashion as the previous one, but replacing the superimposed tisra for khanda, with the frame being 3:4♩. The nadai bhedam construction should thus be ⌐—— ***3:4***♩——¬
⌐***5***¬⌐***5***¬⌐***5***¬

Phase V

Both layers keep the same inner construction of different jathi bhedam sequences and almost the same superimpositions. The only novelty is that the first layer performs a 3:2♩ on the 4/8. If felt as part of a regular pulse, the 3:2♩ commences and ends on the second half of the beat. In order to perform this, instructions on how to approach a gati in regular speed displaced within the beat have been given for Xenakis' Dmaathen. *(track 271)*

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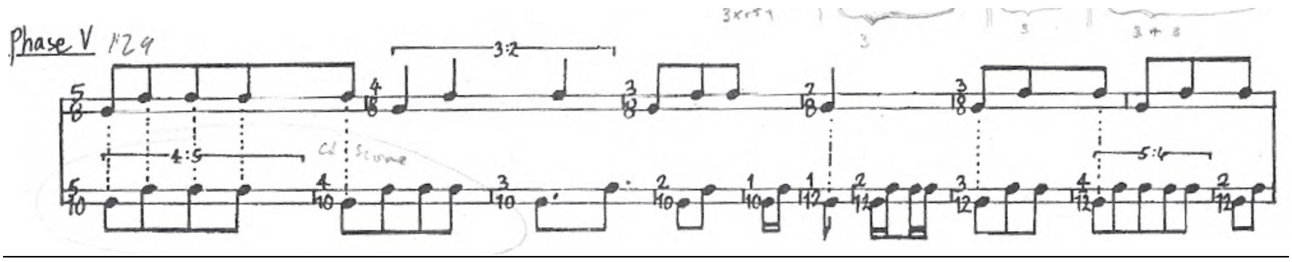
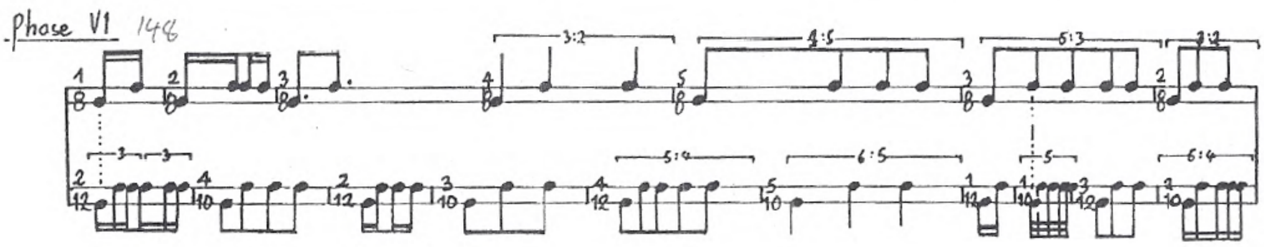
[19] *Ferneyhough does write a connecting dotted line between the two layers to help the performer to realise that this is ultimately what it is.*



Phase VI

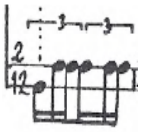
In this segment the level of complexity of both metric changes in the second layer and superimpositions, is increased significantly. I daresay that, possibly, this level of complexity is one of the highest that any performer would have to face in western music. The karnatic system can provide a solid method to approach the performance. However, as will be seen below, the shuffling of the different metres in different gatis in the second layer renders this passage extremely difficult. *(track 272)*



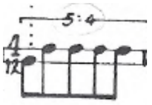
Indeed, the numbers used in both layers are the same that have been used in all previous fragments, but the composer combines them in a different order, and, in the case of the second layer, he mixes metres that are derived from different jathis in two different gatis, alternating them systematically. The second layer's metric construction becomes 2/12, 4/10, 3/12, 3/10, 4/12, 5/10, 1/12, 1/10, 3/12 and 2/10.

This is the first level of complexity that those performing the second layer would have to face. In order to perform this first element of complexity, the musician needs to have a very strong sense for the matra speed of regular tisra as well as 5:2♩, and then proceed to perform the incomplete metres derived from the jathi bhedam sequence while constantly changing the feeling between tisra and khanda.

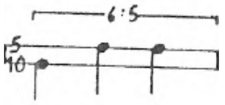
In addition to this continuous change of metres and gatis, the composer has written superimpositions in a few metres. I will try to provide the necessary resources as far as the karnatic system can theoretically go, so that a performer could attempt an accurate performance of this passage.



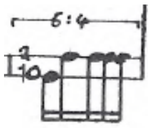
These are two groups of tisra superimposed on every matra of a regular tisra speed. This is no different from the way the 3rd speed pratiloma (9) was approached while practicing the different speeds of tisra in combinations anuloma-pratiloma.



This figure was explained in page 329.

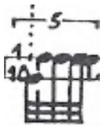


In fact, this rhythmical figure, as was the case with the 4:5♪. in the 5/10 of phase IV, is far easier that its notation may imply; in reality this is a regular 3:2♩ since the 5/10 actually takes two entire beats.



In order to perform this khanda on a 2/10 one should think of a superimposed khanda on the first accent of a 5:4♩ frame.

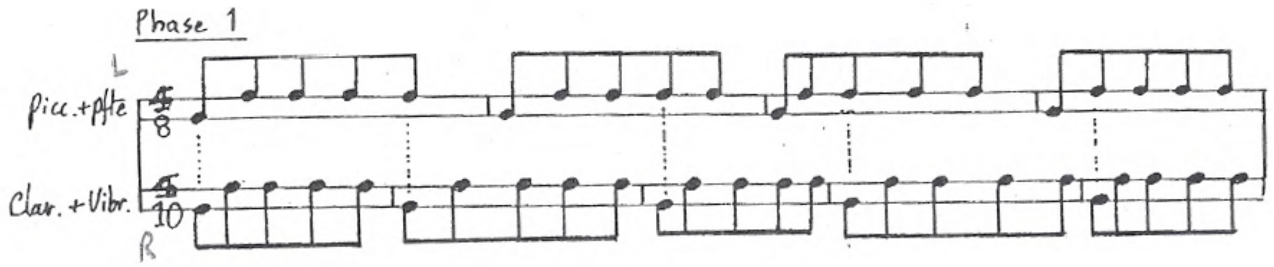
Consequently, the nadai bhedam frame ⌐———— *5:4*♩————¬ would greatly help to play this figure.
⌐*5*¬⌐*5*¬⌐*5*¬⌐*5*¬⌐*5*¬

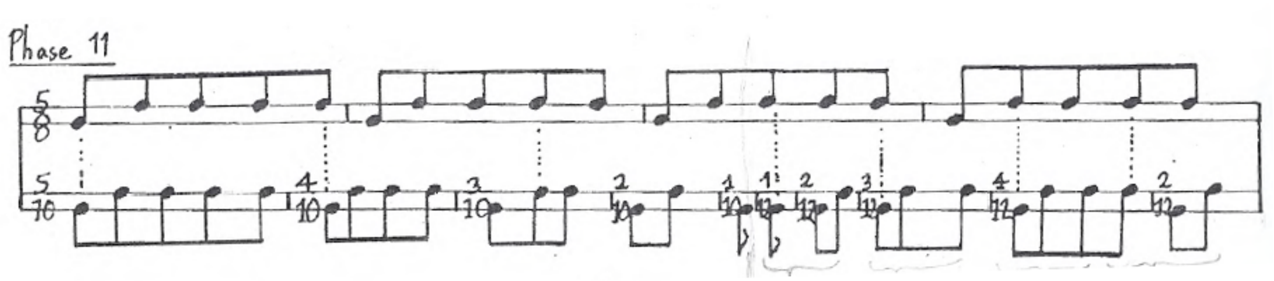


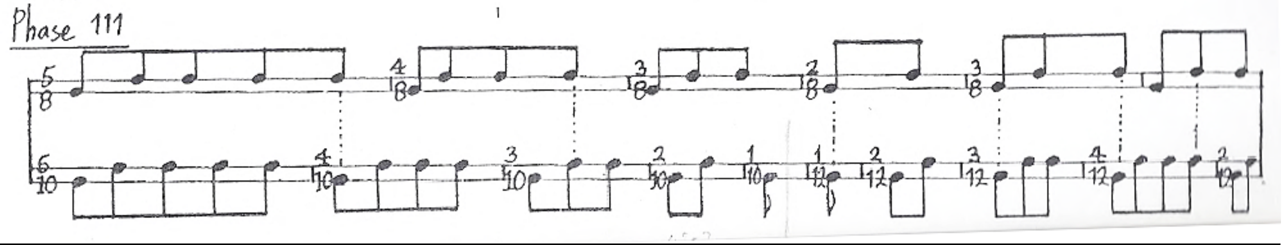
Once the previous figure is clearly felt, the performer needs to play this khanda on a 1/10 (twice as fast as the previous element).

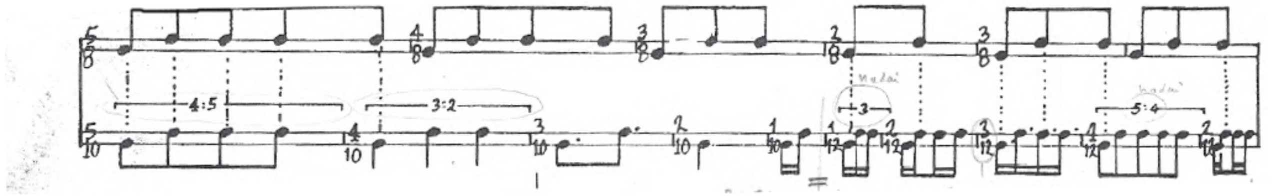
Needless to say, any performer needs to practice every figure separately, whilst practicing the metre sequence as well, before any attempt is made to combine both levels of complexity.

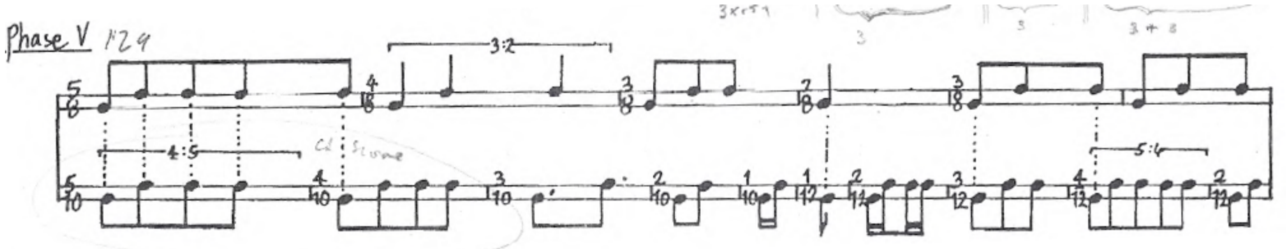
Here the whole grid is presented:

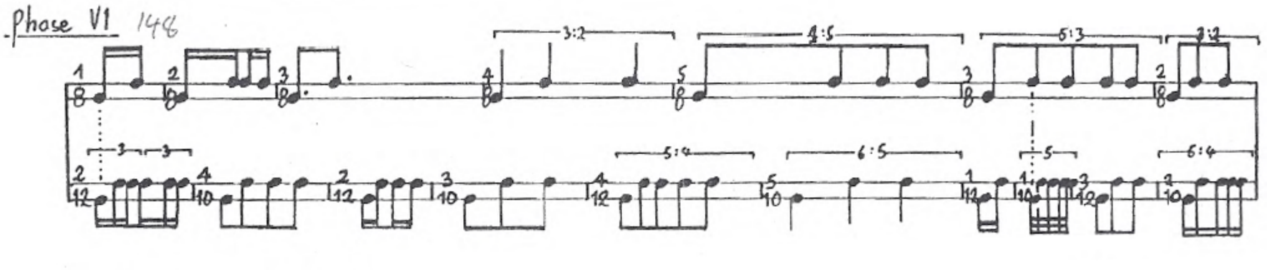

Phase 1
L
Picc.+pfte
Clar.+Vibr.
R
5
8
5
10


Phase 11
5
8
5
10
4
10
3
10
2
10
1
10
1
12
2
12
3
12
4
12
2
12


Phase 111
5/8
4/8
3/8
2/8
3/8
6/10
4/10
3/10
2/10
1/10
1/12
2/12
3/12
4/12
2/12


5/8
4/8
3/8
2/8
3/8
4:5
3:2
3
5:4
5/10
4/10
3/10
2/10
1/10
1/12
2/12
3/12
4/12
2/12

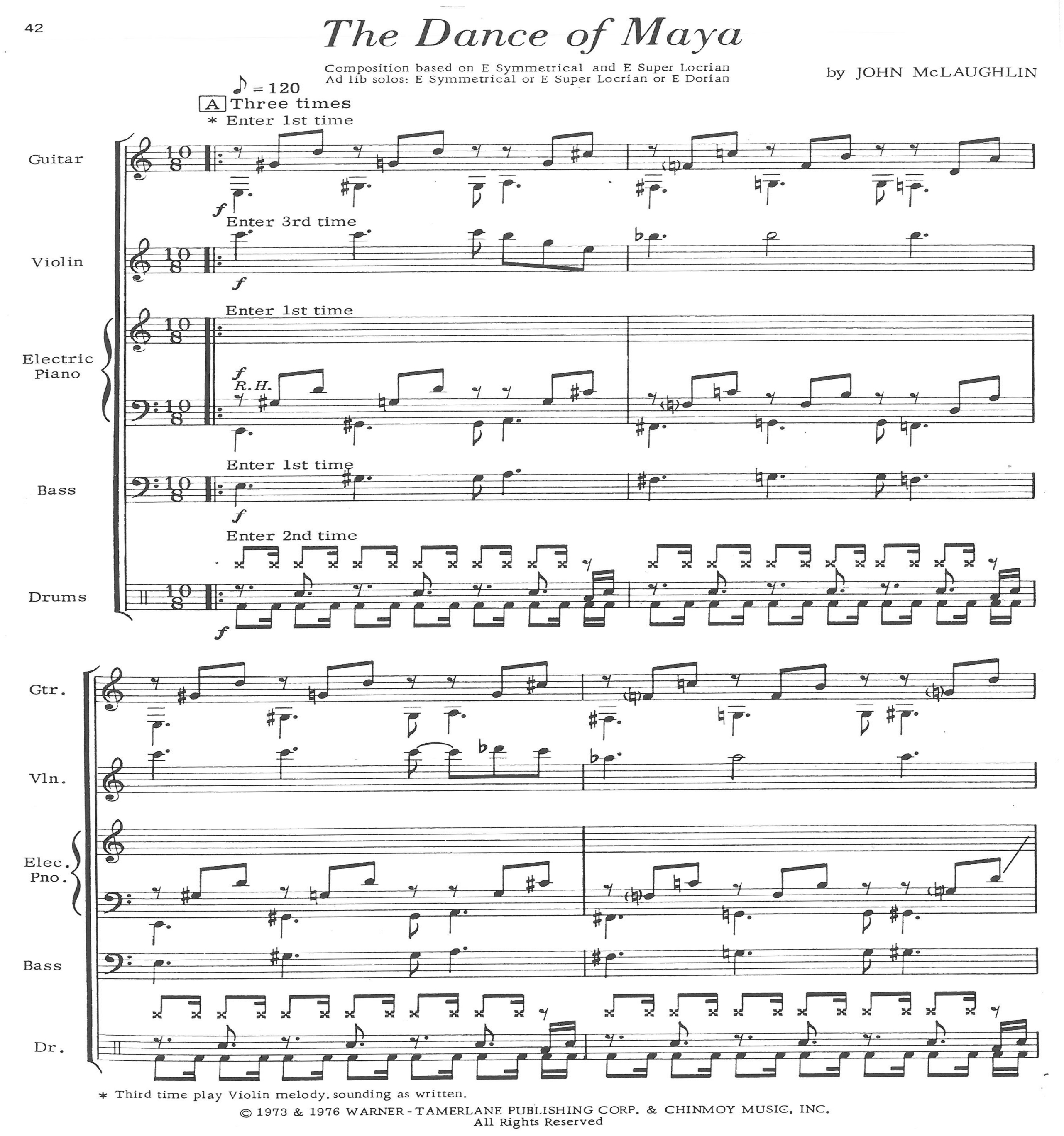

Phase V 129
3:2
5/8
4/8
3/8
2/8
3/8
4:5
5:4
5/10
4/10
3/10
2/10
1/10
1/12
2/12
3/12
4/12
2/12


Phase V1 148
3:2
4:5
5:3
3:2
1/8
2/8
3/8
4/8
5/8
3/8
2/8
3
3
5:4
6:5
5
6:4
2/12
4/10
2/12
3/10
4/12
5/10
1/12
1/10
3/12
2/10

1) Dance of Maya (John Mclaughlin)[20]

With this 'classic' of the jazz-fusion era, I begin the analysis of parallels between karnatic music and jazz pieces of the last 50 years. The emphasis in the analysis of these pieces lies more in the creative parallels between both worlds, rather than in giving instructions as to how the pieces could be performed.

The chosen fragment of this piece is set to a metre of 10/8, divided 3 3 4 (parallel to the notion of using a constant tala), which the electric guitar and bass articulate. Against this framework the drum pattern plays six groups of chatusra jathi 3 and a figure of two matras closing every measure. The violin's melody is constructed within the boundaries of every 'cycle' of 10/8. *(track 273)*


42
The Dance of Maya
Composition based on E Symmetrical and E Super Locrian
Ad lib solos: E Symmetrical or E Super Locrian or E Dorian
by JOHN McLAUGHLIN
♪ = 120
A Three times
* Enter 1st time
Enter 3rd time
Enter 1st time
R.H.
Enter 1st time
Enter 2nd time
Guitar
Violin
Electric Piano
Bass
Drums
Gtr.
Vln.
Elec. Pno.
Bass
Dr.
f
10/8

* Third time play Violin melody, sounding as written.

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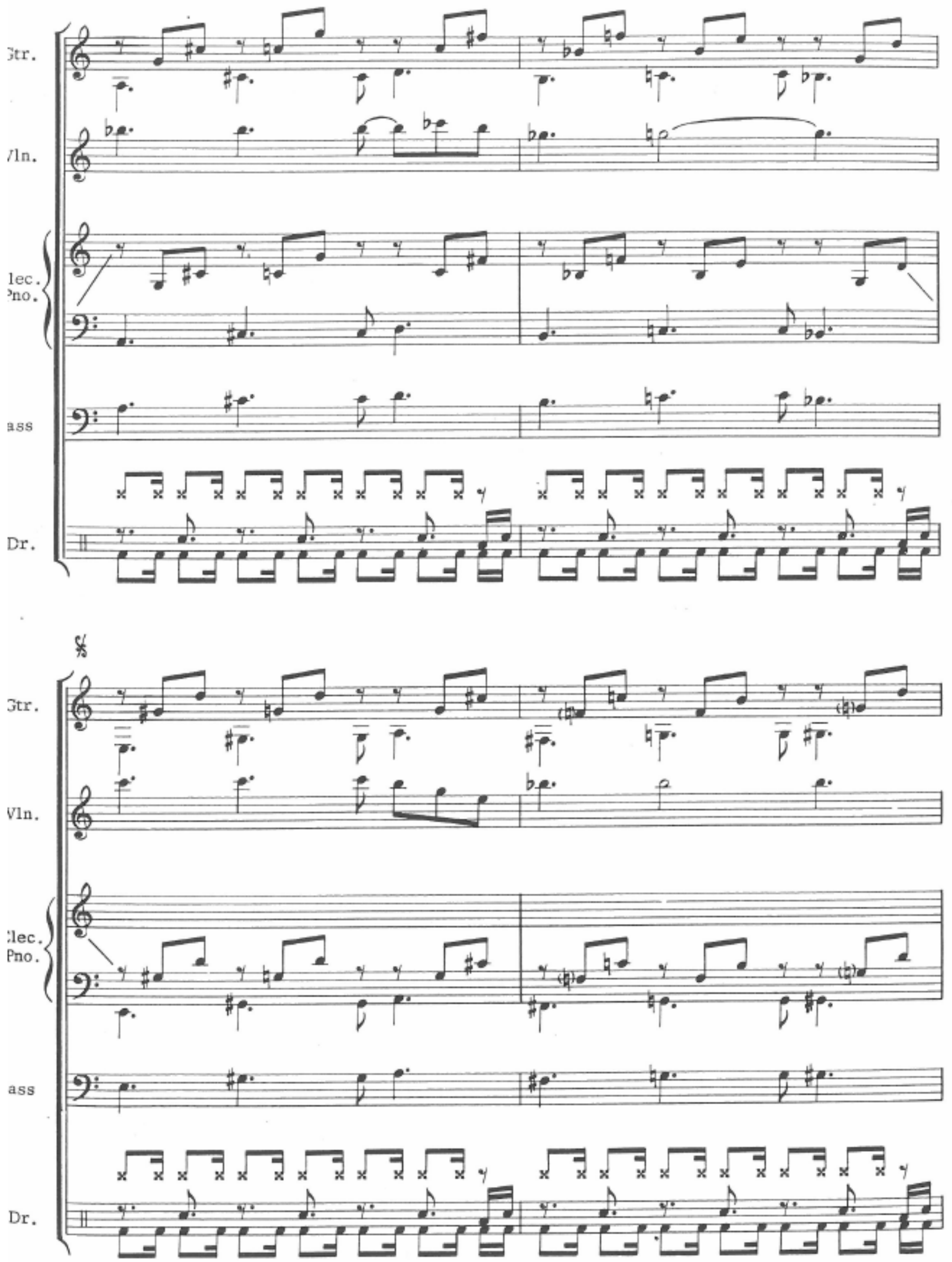
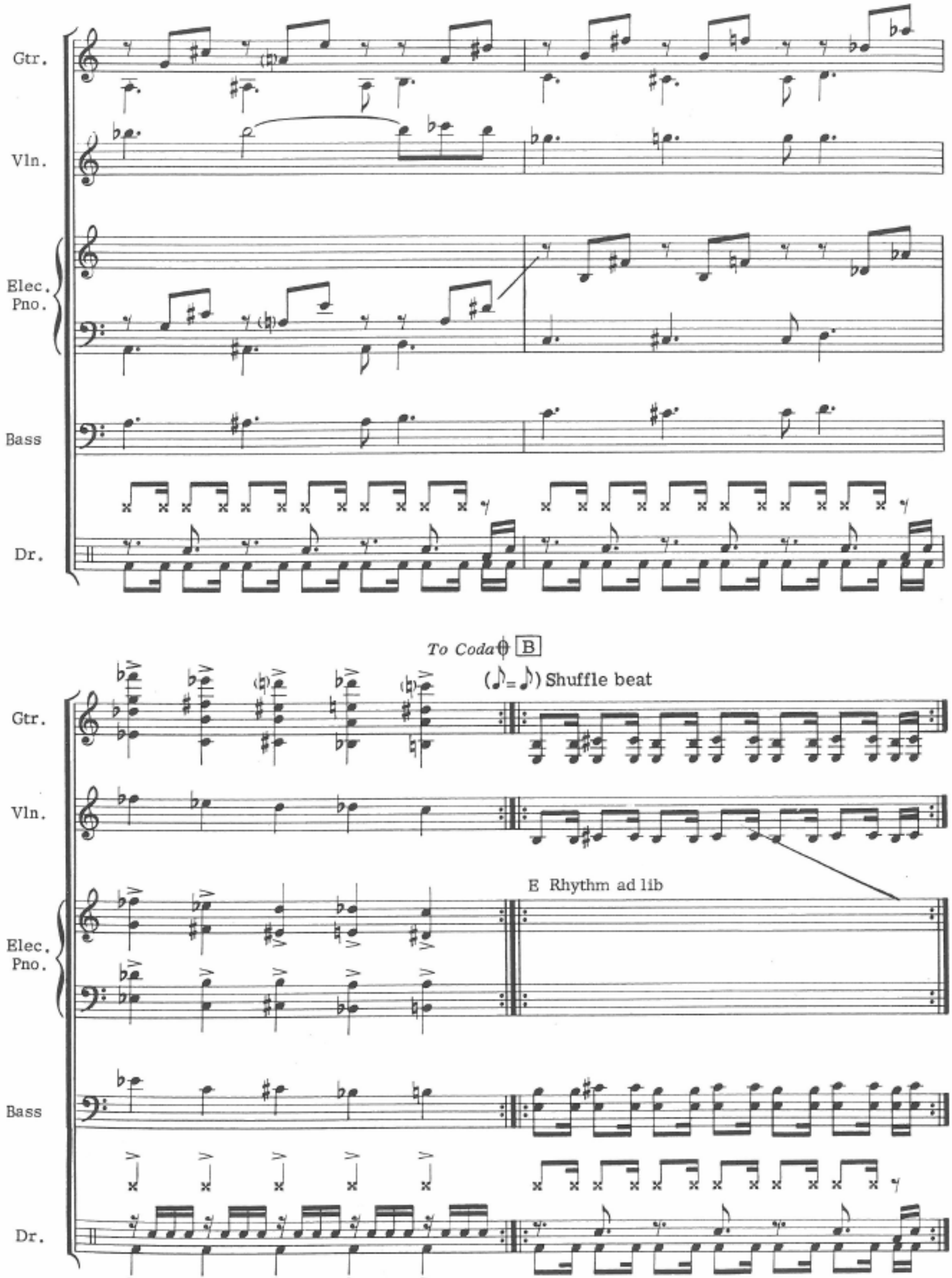
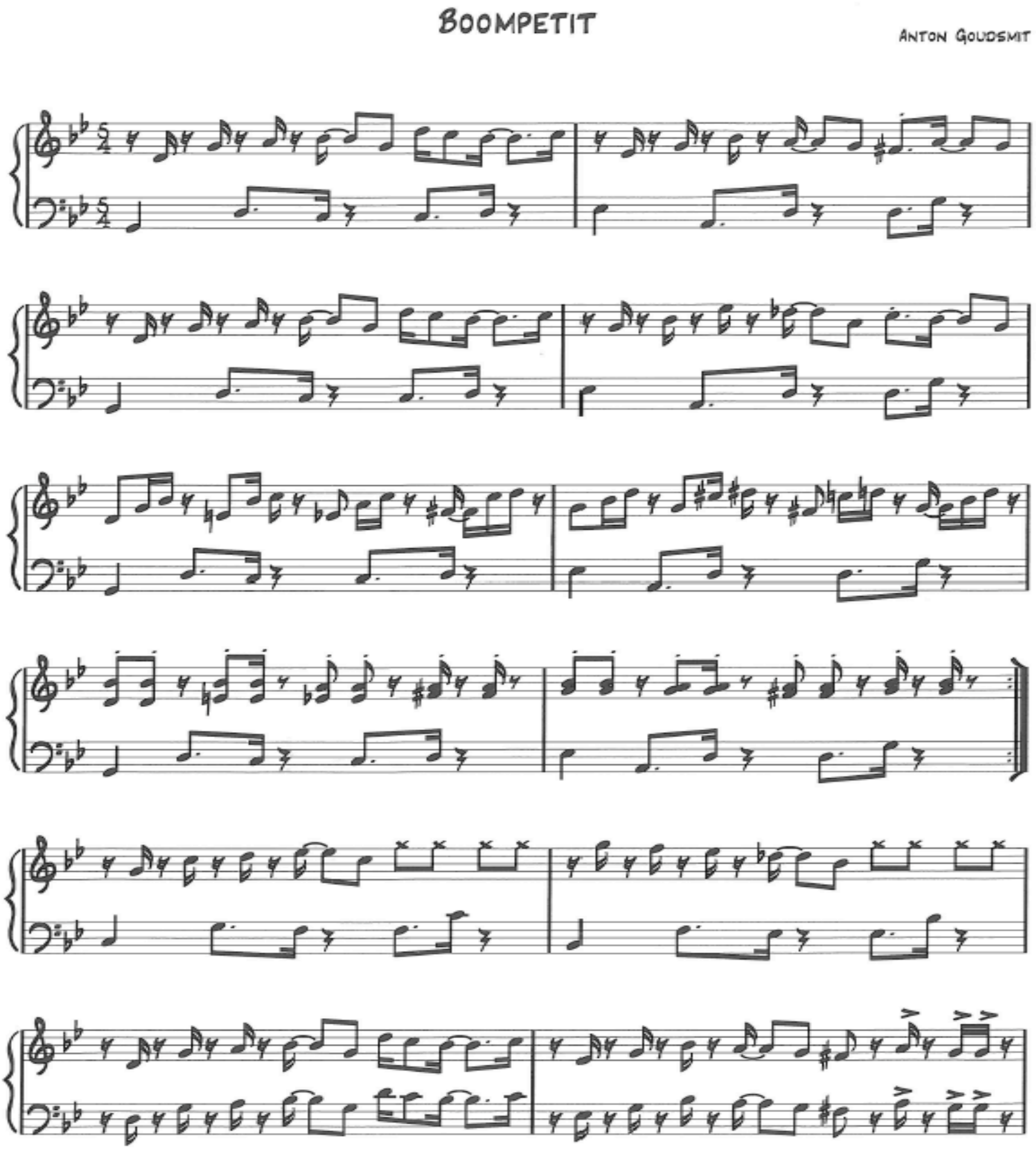
[20] *Published by Warner-Tamerlane Publishing Corporation and Chinmoy Music Inc (1976)*


tr.
Vln.
lec.
Pno.
ass
Dr.
tr.
Vln.
lec.
Pno.
ass
Dr.


Gtr.
Vln.
Elec. Pno.
Bass
Dr.
To Coda
B
(♪=♪) Shuffle beat
E Rhythm ad lib

2) Boompetit (Anton Goudsmit)[21]

As alas is the case with many jazz pieces or transcriptions, the notation of this composition by the Dutch jazz composer A. Goudsmit is rather confusing, although once dissected and re-written, I can see the parallel with the idea of gati/jathi combination, and even a possible polypulse. However, while listening to it one has the feeling that what is heard is not clearly represented in the sheet music of the melody and piano parts. *(track 274)*



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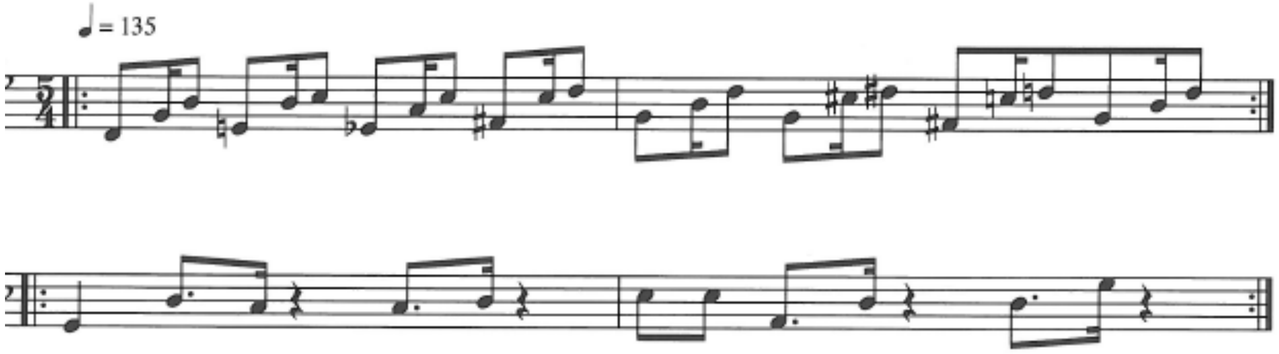
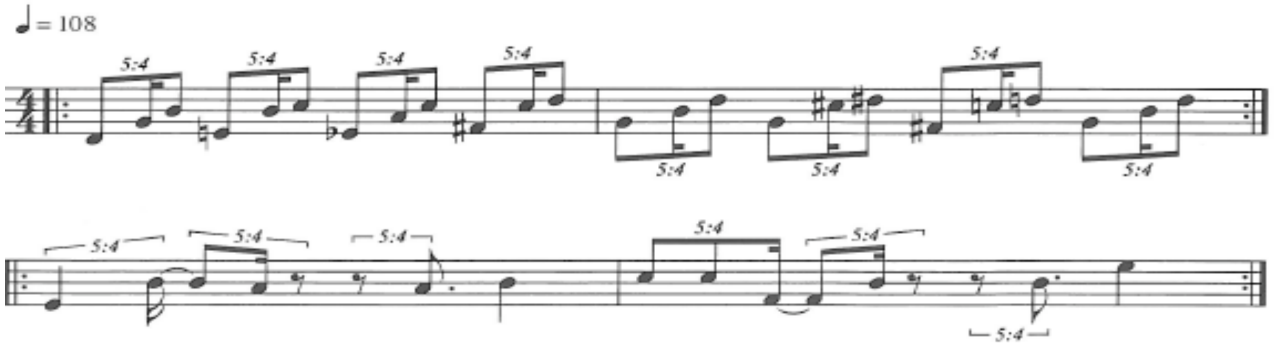
[21] *Score is not published. What is reproduced above is the manuscript sheet music provided by the author (2004).*

What follows are four different versions of the main parts, each re-written in a different manner, which in my view, would provide more notational clarity.

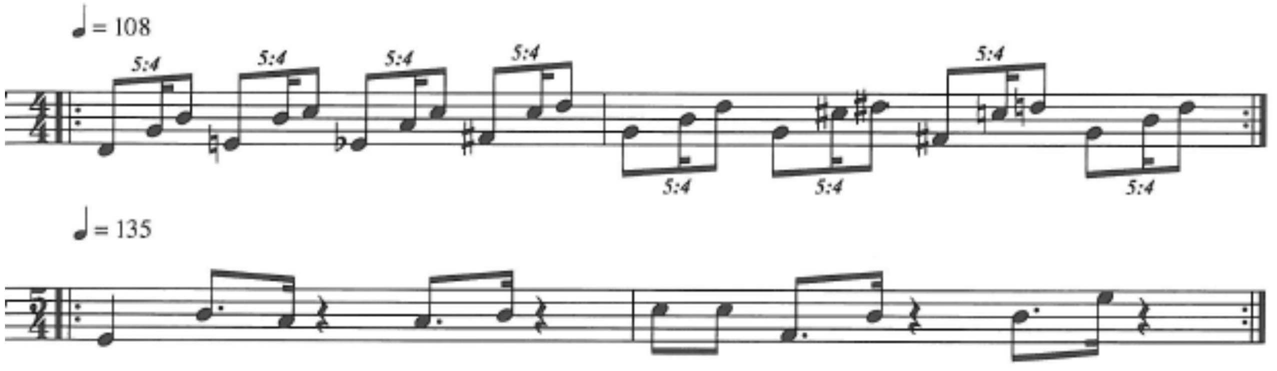
1) The first option represents in a more transparent manner what the phrasing of the guitar is all about: groups of 5 matras. Therefore, I beamed the melody using chatusra jathi 5 while the piano, time signature and tempo remain intact.



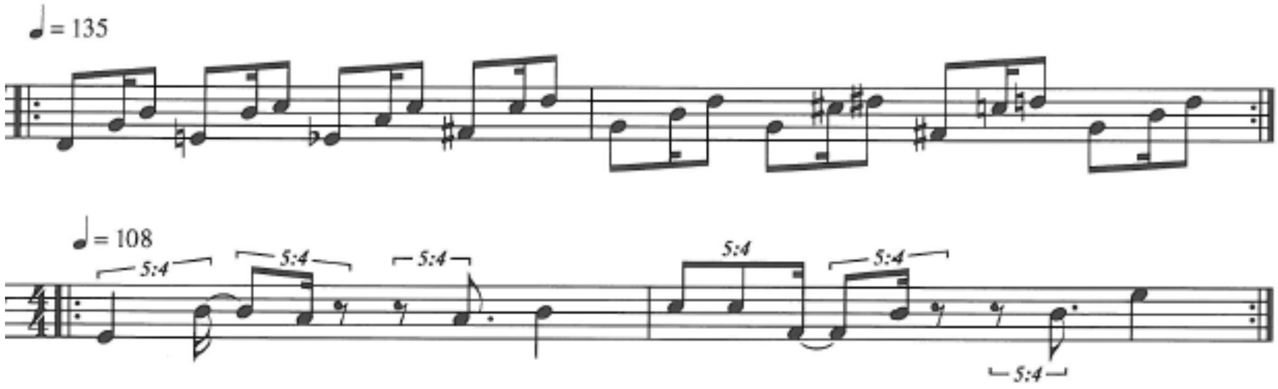
2) An alternative version is notating both layers in khanda while slowing down the tempo to ♩=108 (result of 135x4:5=108). Also the metre is changed into a 4/4, so the 20 matras of the original melody and piano parts remain untouched. Possibly this notation may provide a more solid performance of the melody since every group of five matras goes along the pulse. Also, the syncopated feeling of the piano seems to be better represented with this notation.



3) In the following two versions, I introduce a more complex notation, combining the different tempi and time signatures presented in the previous two options. Firstly, I re-wrote the guitar part in 4/4 and in khanda as well as changing the tempo into the slower one of ♩=108. The piano part remains as in the original.



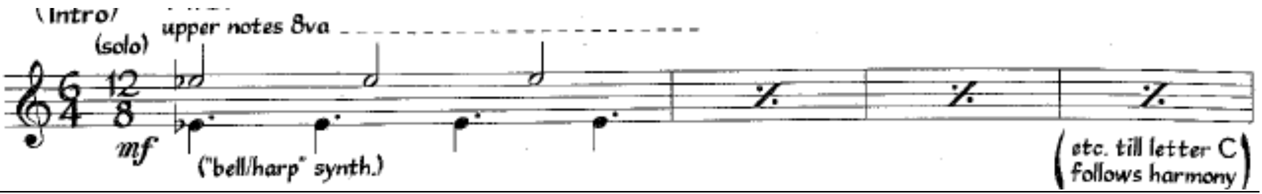
4) In this last option I reverse the role of khanda, 4/4 metre and slower tempo, giving it to the piano part whilst the guitar is written in 5/4 and chatusra jathi 5.



3) Sightseeing (R. Ferrante, J. Haslip)[22]

This composition revolves around two layers: one in 6/4 and another one in 12/8. Although both metres contain the same number of beats, the layer in 6/4 maintains a chatusra feeling whilst the layer in 12/8 stays in a tisra feeling.

This is manifested from the very beginning when two 'metronomes' (performed by two synthesised sounds), outline both metres providing the impression of polyrhythm or even polytempi.



The percussion and drums have a key function in outlining both pulses. After this exposition of the two 'metronomes', the percussion performs a clear 12/8 (or tisra feeling), marking every down-beat of the measure. This 12/8 feeling is kept throughout.

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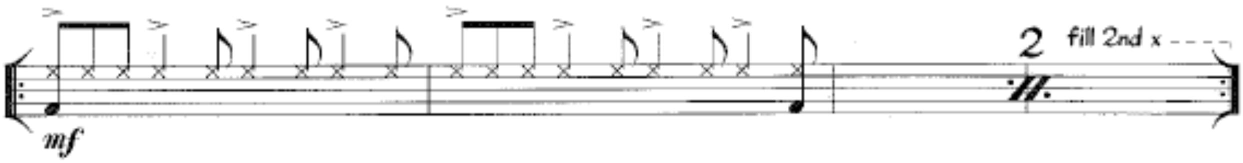
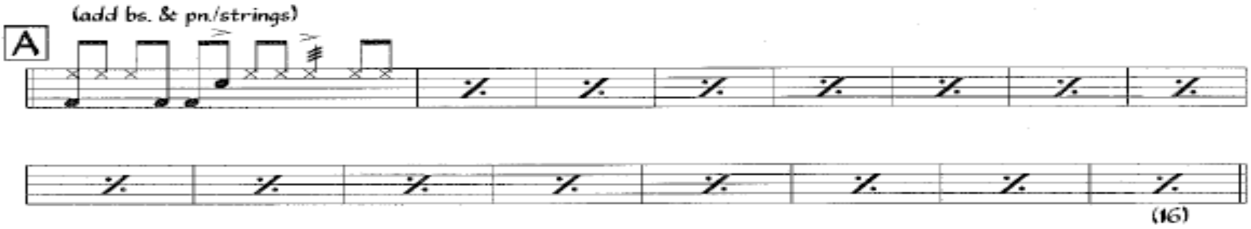
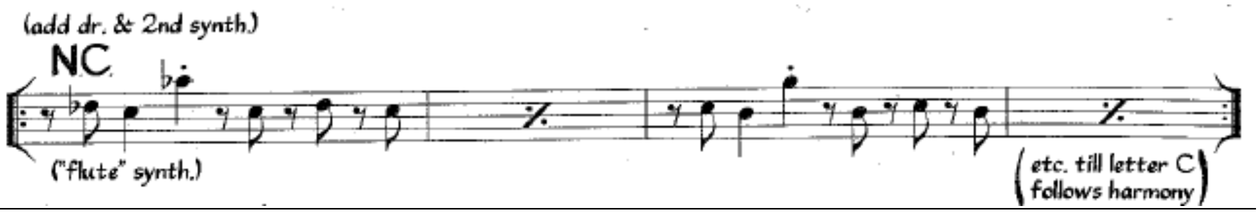
[22] *Score is a transcription by Hal Leonard (1987)*



After the introduction, the drums play a clear 6/4 pattern, with an off-beat stroke on the snare on the sixth ♪ of the measure, while the bass drum articulates the first, fourth and fifth ♪ of the 6/4 bar. This pattern adds to the general feeling of ambiguity that, in my opinion, is one of the main elements sought after in the piece.



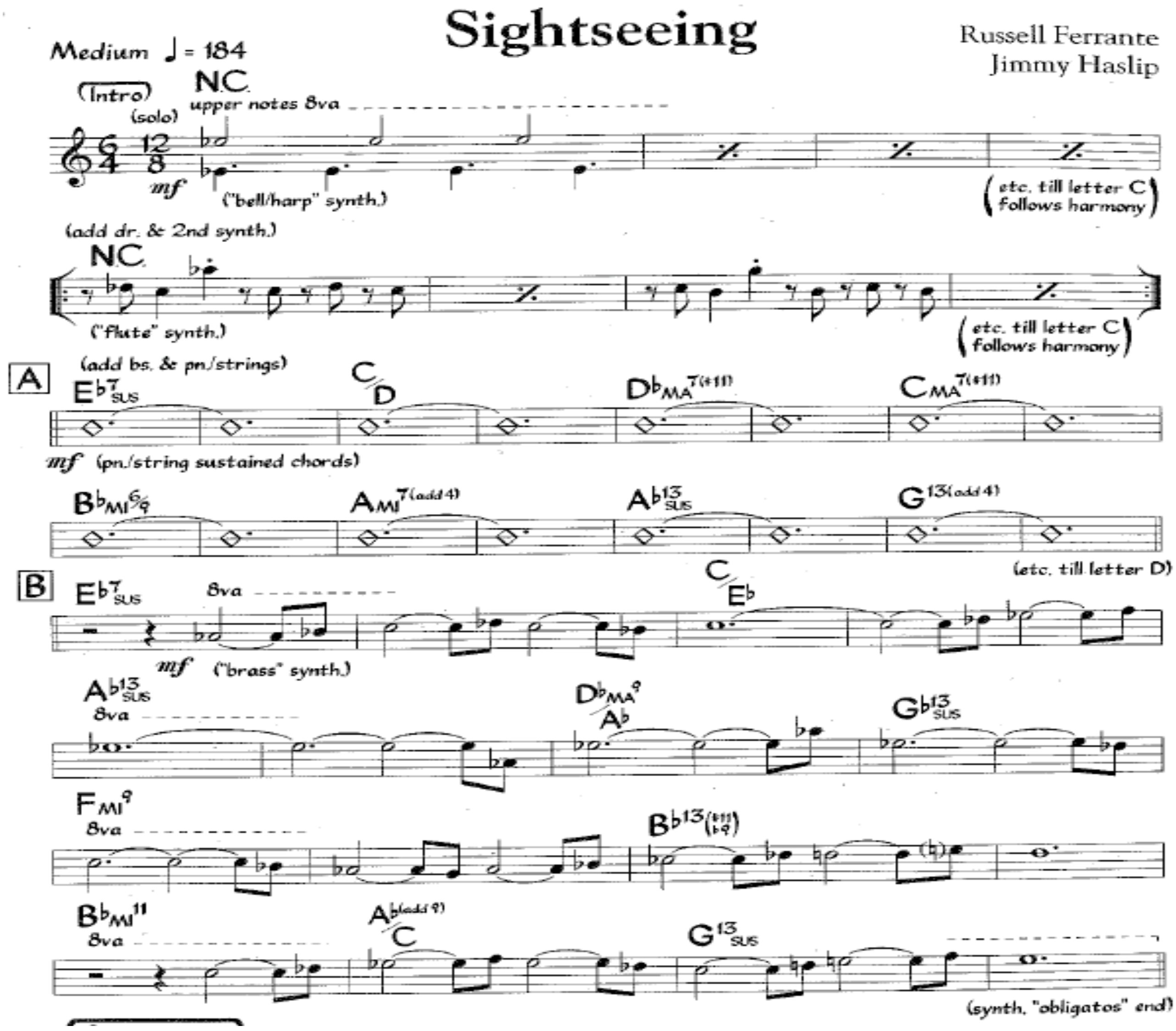
This pattern clearly creates a counterpoint with the vamp performed by another synthesised sound in the introduction, featuring a highly syncopated phrase that is even notated ambiguously (it can be read as any of the two metres).



All these five different elements comprise the backdrop against which the other instruments (sax, piano and bass) continuously move from one feeling to the other.

The parallel I find with karnatic music is that there is often a similar idea here of two gatis continuously playing against each other (usually chatusra and tisra, as in this example) and creating the impression of being in two different talas or tempi.

The lead sheet of the piece looks like this: *(track 275)*


Sightseeing
Russell Ferrante
Jimmy Haslip
Medium ♩ = 184
Intro
(solo)
N.C.
upper notes 8va
mf
("bell/harp" synth.)
etc. till letter C follows harmony
(add dr. & 2nd synth.)
N.C.
("flute" synth.)
etc. till letter C follows harmony
A
(add bs. & pn./strings)
Eb7sus
C/D
DbMA7(#11)
CMA7(#11)
mf (pn./string sustained chords)
BbMI6/9
AMI7(add 4)
Ab13sus
G13(add 4)
(etc. till letter D)
B
Eb7sus
8va
mf ("brass" synth.)
C/Eb
Ab13sus
8va
DbMA9/Ab
Gb13sus
FMI9
8va
Bb13(#11/b9)
BbMI11
8va
Ab(add 9)/C
G13sus
(synth. "obligatos" end)

4) Falling in between (Toto)[23]

This piece with a clear (hard) rock feel uses quite a few elements that resemble some of the karnatic concepts seen in the first part of the text.

-The introduction is written as a compound metre of 12/8, 2/4, 9/8 and 4/4. This pattern is performed four times, although in the fourth time the last 4/4 is shortened by an ♪ to produce a 7/8 measure.

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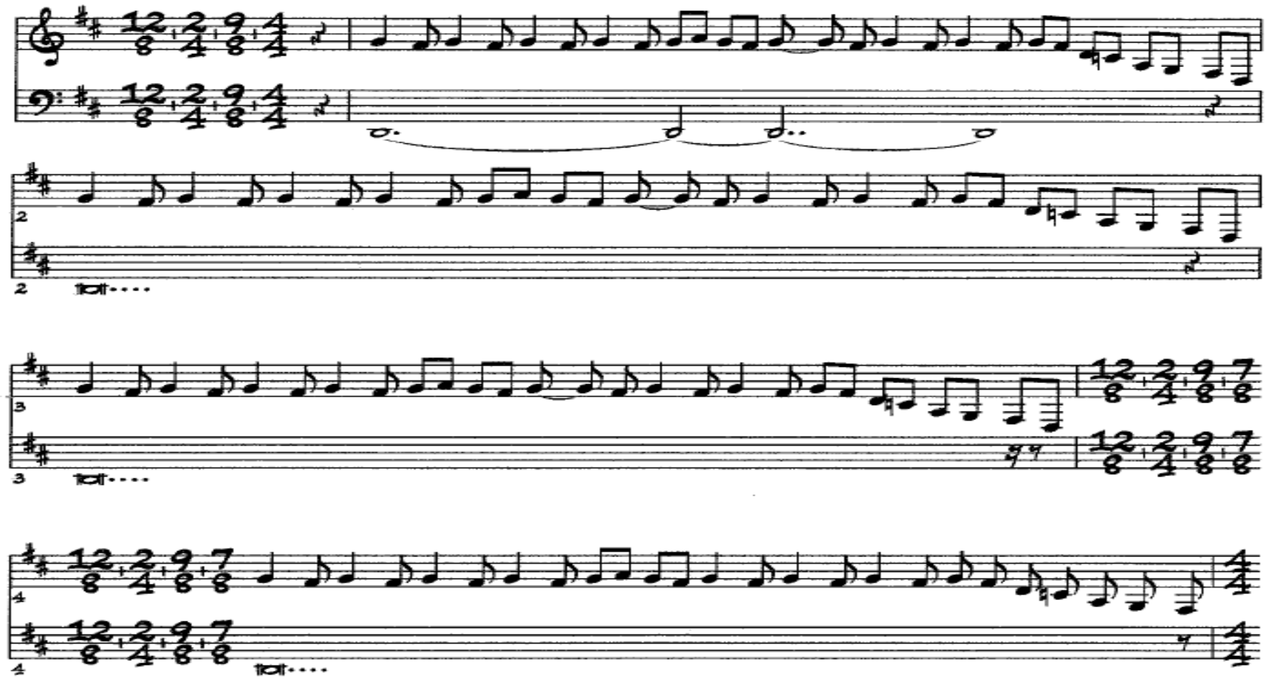
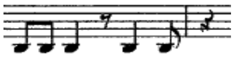
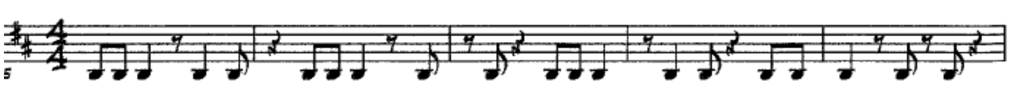
[23] *Published by Hudmar Publishing (2006)*

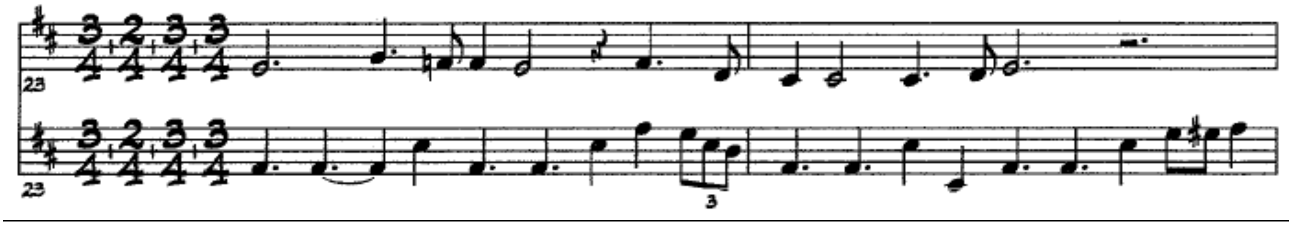


This idea strikes a parallel with the shadanga talas or the tala combination constructions seen in chapter 27 (Tala Prastara), resulting in a metre of 33/8.

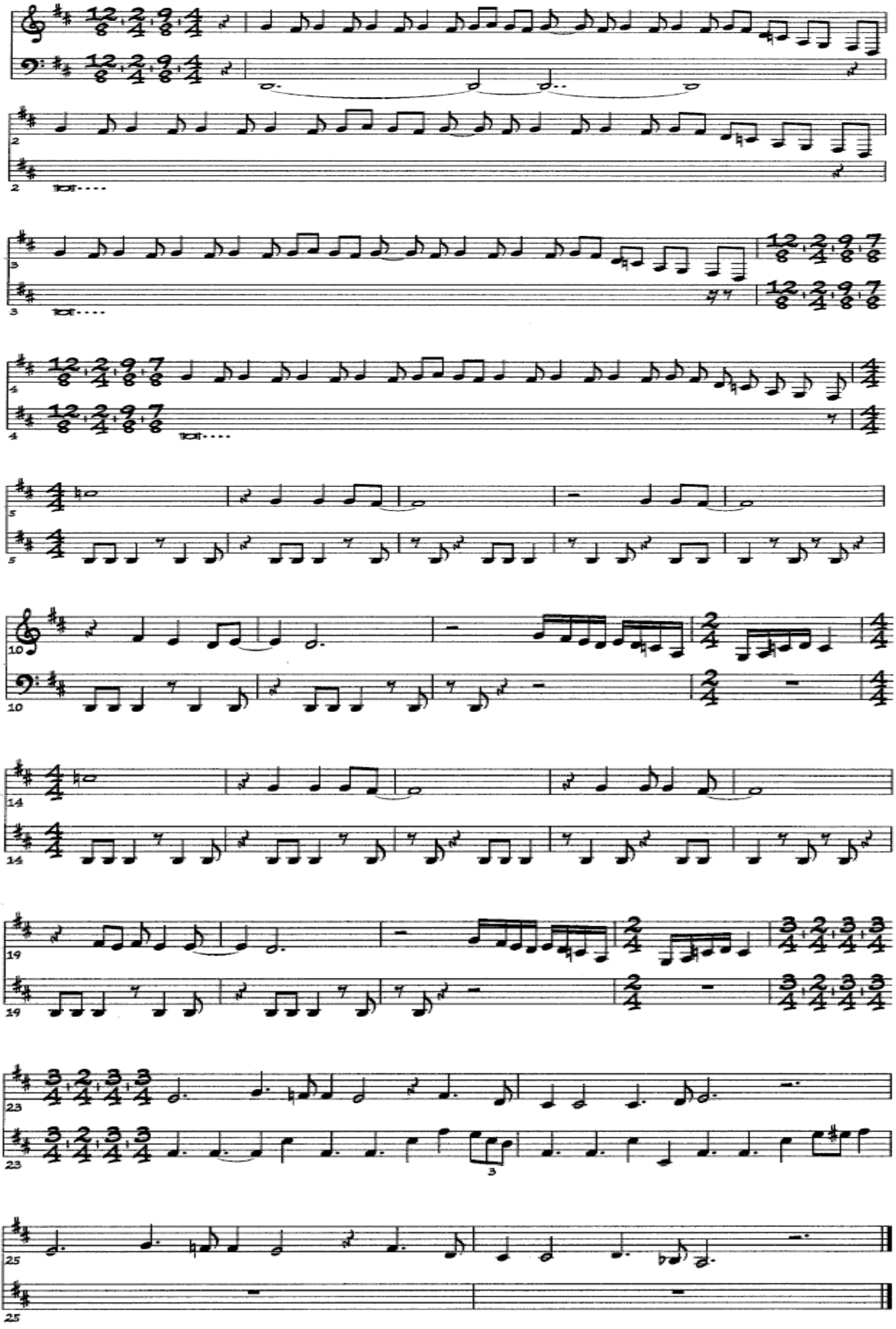
Another way of looking at it would be as a sequence of gati/jathi bhedam within the metre: the phrase is built around the numbers 3 3 3 3 2 2 3 3 3 4 4 with the last number being replaced by a 3 in the fourth repetition of the entire construction.

-This introduction is followed by a 5-measure verse in 4/4 (quite an unusual length in this style of music where blocks of four or eight measures seem to be the norm), in which the melody and drums articulate the measure and the electric guitar and bass play a pattern in chatusra jathi 5 (possibly the reason why the fragment is five measures long) . The same pattern can be seen displaced one beat at a time in every cycle (2nd, 3rd and 4th beats in measures two, three and four). The entire fragment of the guitar and bass looks thus: 

-Lastly, the chorus follows the construction of the karnatic tala Dhruva tisra (11 beats in L3 D L3 L3), or expressed in western time signatures, 3/4, 2/4, 3/4, 3/4.



The entire fragment of this composition is thus *(track 276)*

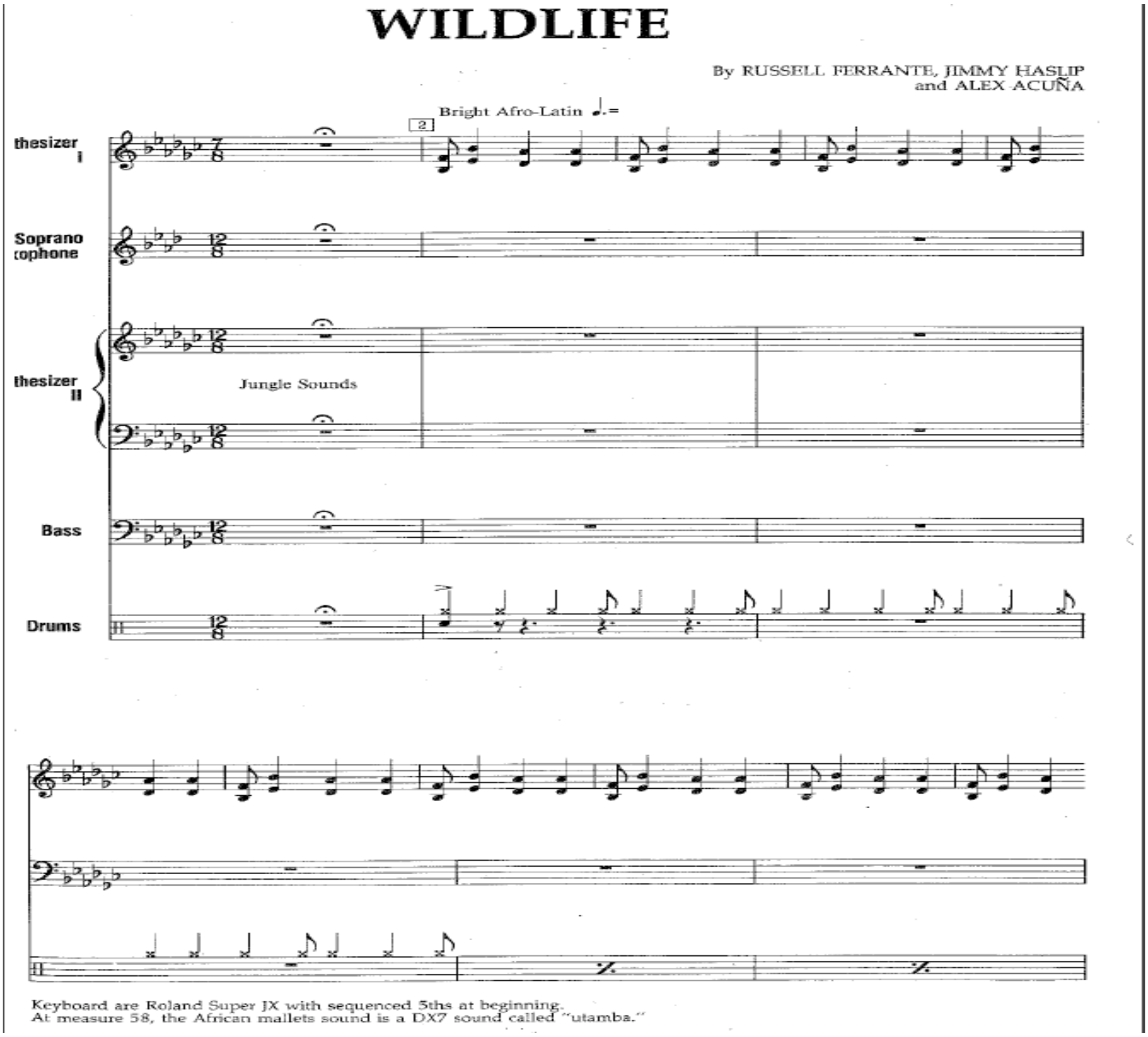


5) Wildlife (Yellow Jackets)[24]

The notation of this piece somehow denotes the African idea of polyrhythms where two different layers use different time signatures and meeting points occur at regular intervals throughout the piece. In this composition a 7/8 in the synthesiser plays against a 12/8 in the rest of the group.

From a karnatic viewpoint, the cycle would be of four beats and all layers would use tisra. The 7/8 idea would then become a tisra jathi 7 that would require seven beats to resolve. The other layer would play regular tisra and both layers would meet every 84 matras of tisra or 28 beats. (Therefore, as was explained in chapter 3, tisra jathi 7 would need to be performed twelve times and the 12/8 measure would be played seven times in order to meet).

This concept would produce a different notation which, in my opinion, would be more transparent than the one used by the composers - a 4/4 metre with tisra in all layers and beaming the layer of jathi 7 every seven matras. As the score currently appears, it is practically impossible to know where both layers meet. *(track 277)*


WILDLIFE
By RUSSELL FERRANTE, JIMMY HASLIP and ALEX ACUÑA
Bright Afro-Latin
2
thesizer I
Soprano cophone
thesizer II
Jungle Sounds
Bass
Drums
Keyboard are Roland Super JX with sequenced 5ths at beginning.
At measure 58, the African mallets sound is a DX7 sound called "utamba."

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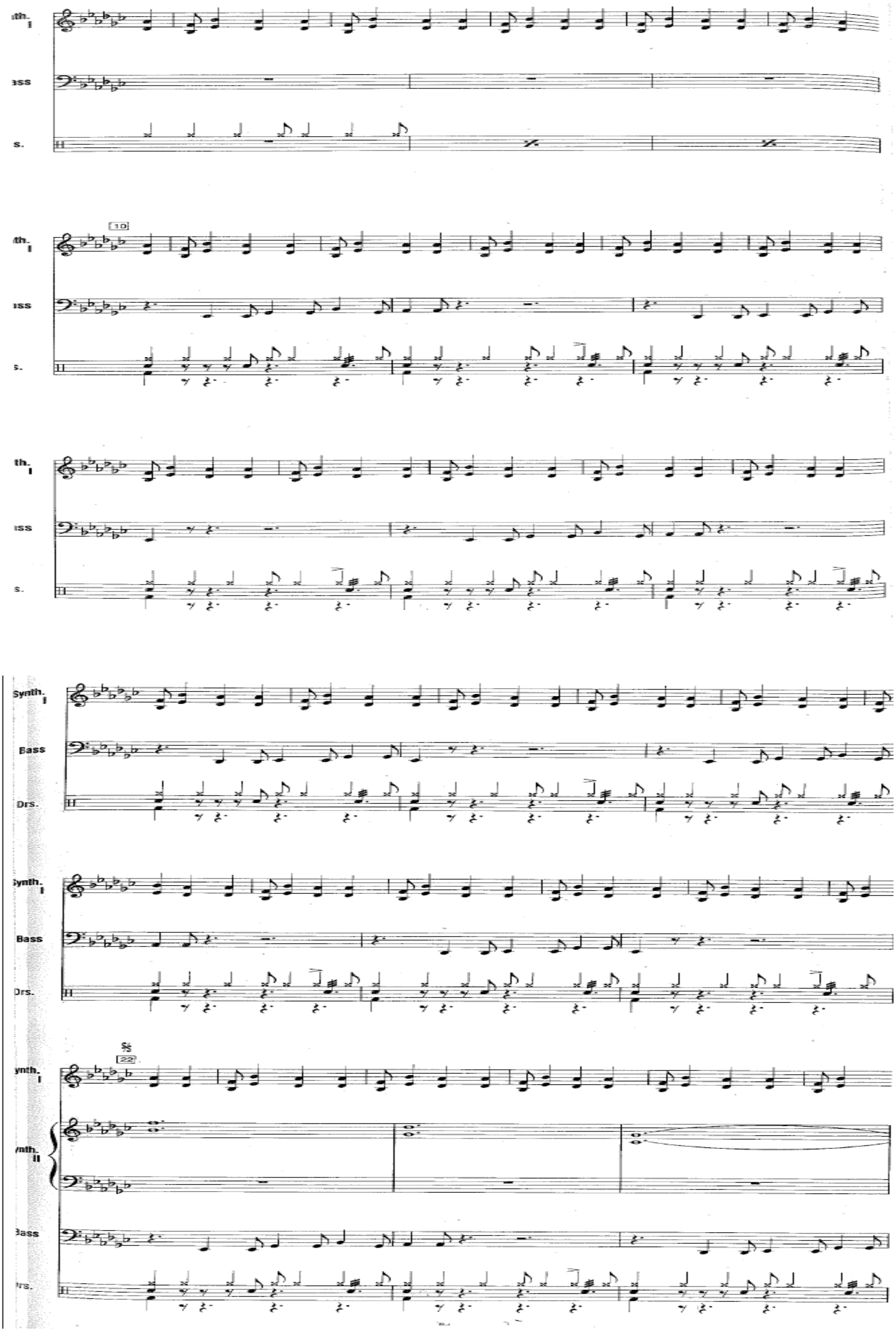
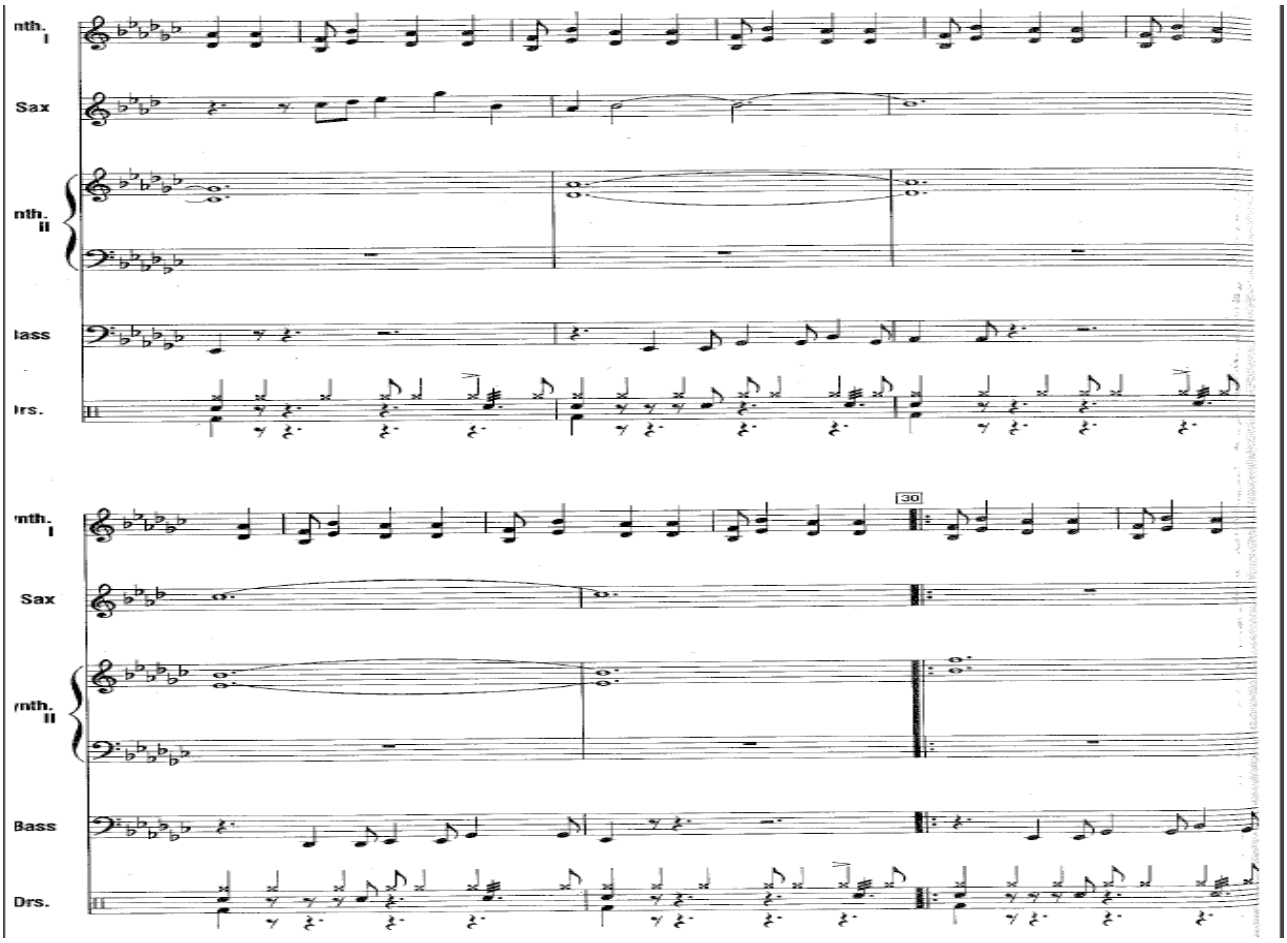
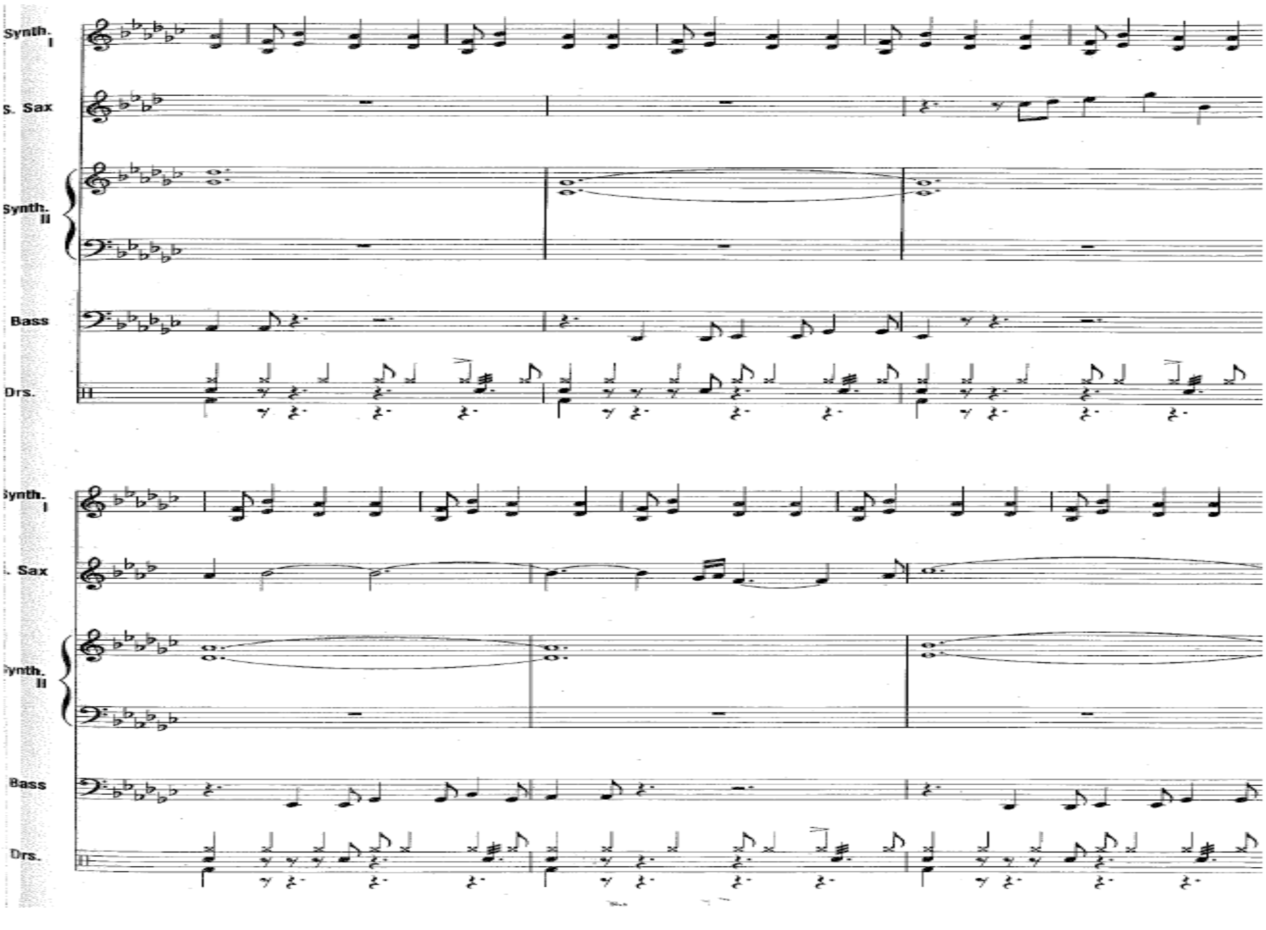
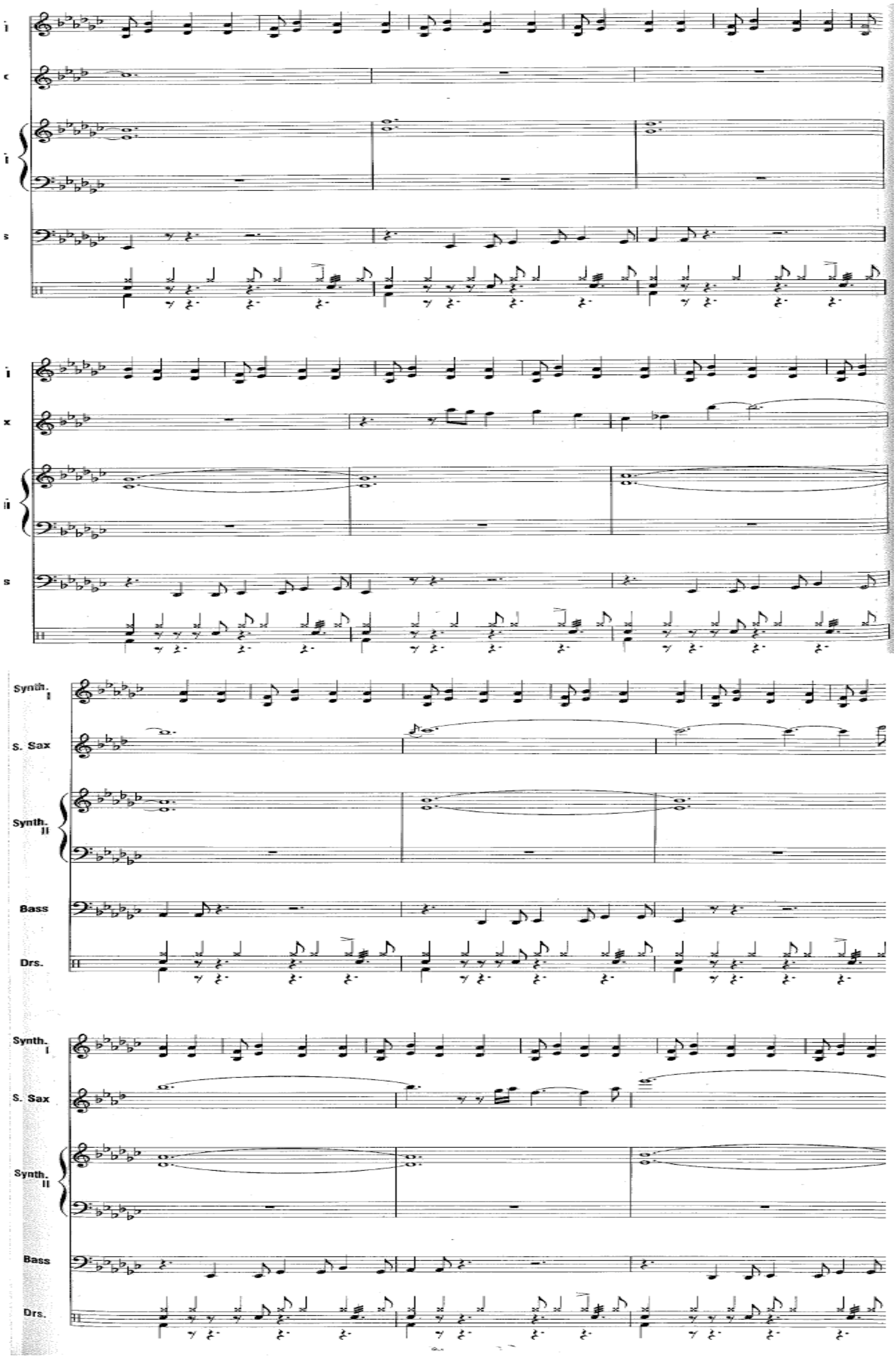
[24] *Score is a transcription by Hal Leonard (2008)*


Synth. I
Bass
Drs.
10
22
Synth. II


nth. I
Sax
nth. II
Bass
Drs.
30
nth. I
Sax
ynth. II
Bass
Drs.


Synth. I
S. Sax
Synth. II
Bass
Drs.
Synth. I
S. Sax
Synth. II
Bass
Drs.

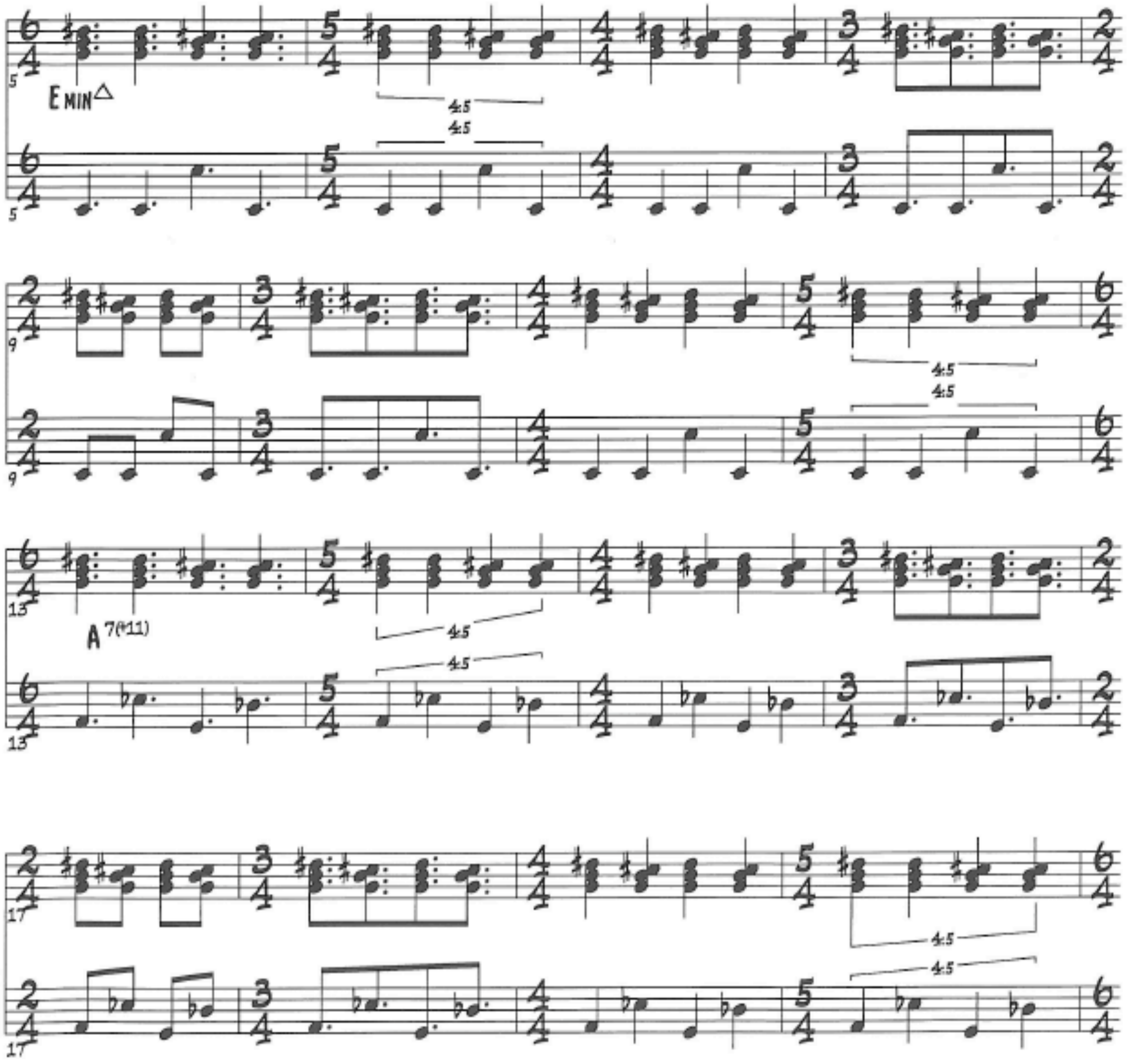

Synth. I
S. Sax
Synth. II
Bass
Drs.
Synth. I
S. Sax
Synth. II
Bass
Drs.

6) Matter of time (Stormvogel)[25]

In this composition there are a few concepts that remind me considerably of recent developments in karnatic music.

-The first is the metre structure that it is repeated with a cycle feeling. The construction is 6/4, 5/4, 4/4, 3/4, 2/4, 3/4, 4/4 and 5/4. This structure is, in a way, similar to the manner in which many talas are being constructed nowadays in South India after the shadanga talas were re-introduced in the 1960s.

-The other element is the use of one of the developmental techniques of combinations anuloma-pratiloma (same gati and speed, different frame). It is interesting to see in this piece how the rhythm section always plays 4 notes against every frame, thus creating a 4:6♩, 4:5♩, 4:4♩, 4:3♩, 4:2♩, 4:3♩, 4:4♩, 4:5♩, and also how this continuous change of frame and, somehow, tempo feeling, does not affect an element considered important in much of jazz music: the ‘groove’. On top of the rhythm section (including piano) there are different solos; I show only one of the fragments with a sax solo over it. *(track 278)*



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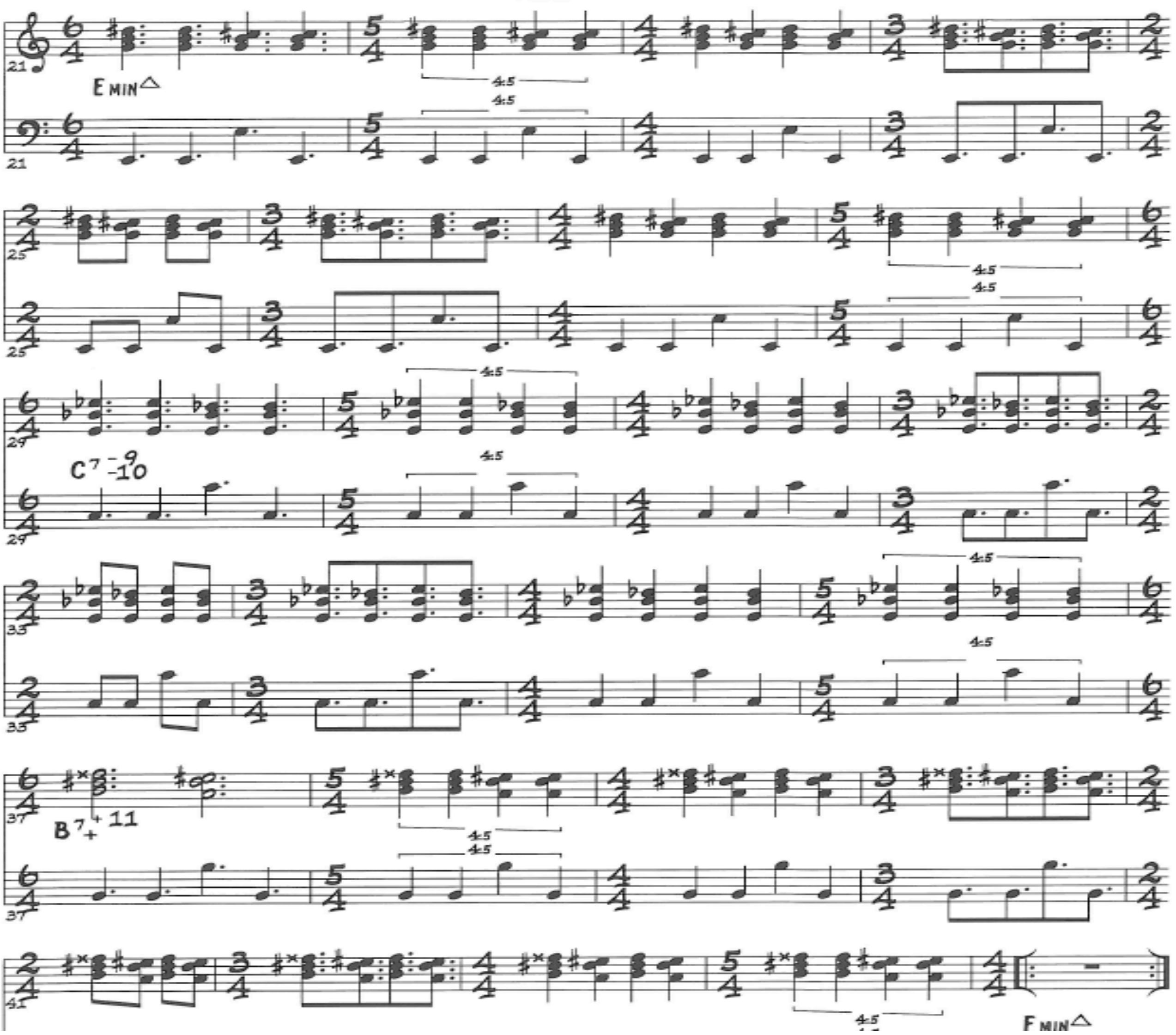
[25] *Score is the sheet music provided by David de Marez Oyens, bassist of the group that recorded the piece (2011).*



7) Spiral (Miles Okazaki)[26]

In this piece there are several elements that hold a clear parallel with karnatic concepts:

-Use of controlled accelerando and rallentando by means of going through contiguous gatis in several segments - the drums intro, during the theme development and its resolution. All instruments go through all main gatis seen in the karnatic part of the text.

-Whilst the guitar plays all the matras of every gati without accents, the drum-set is continuously using gati/jathi combinations and using all possible combinations in every gati.

-The drums part contains the information as to which accents are used. It is quite interesting to note that the ending of every gati is closed with a combination of accents that greatly resemble the concept of mukthay. Also, the end of the theme sounds quite similar to a 3-fold mukthay.

The development of the drum part is presented first so the reader can see the way it is structured, followed by the first fragment of the piece.

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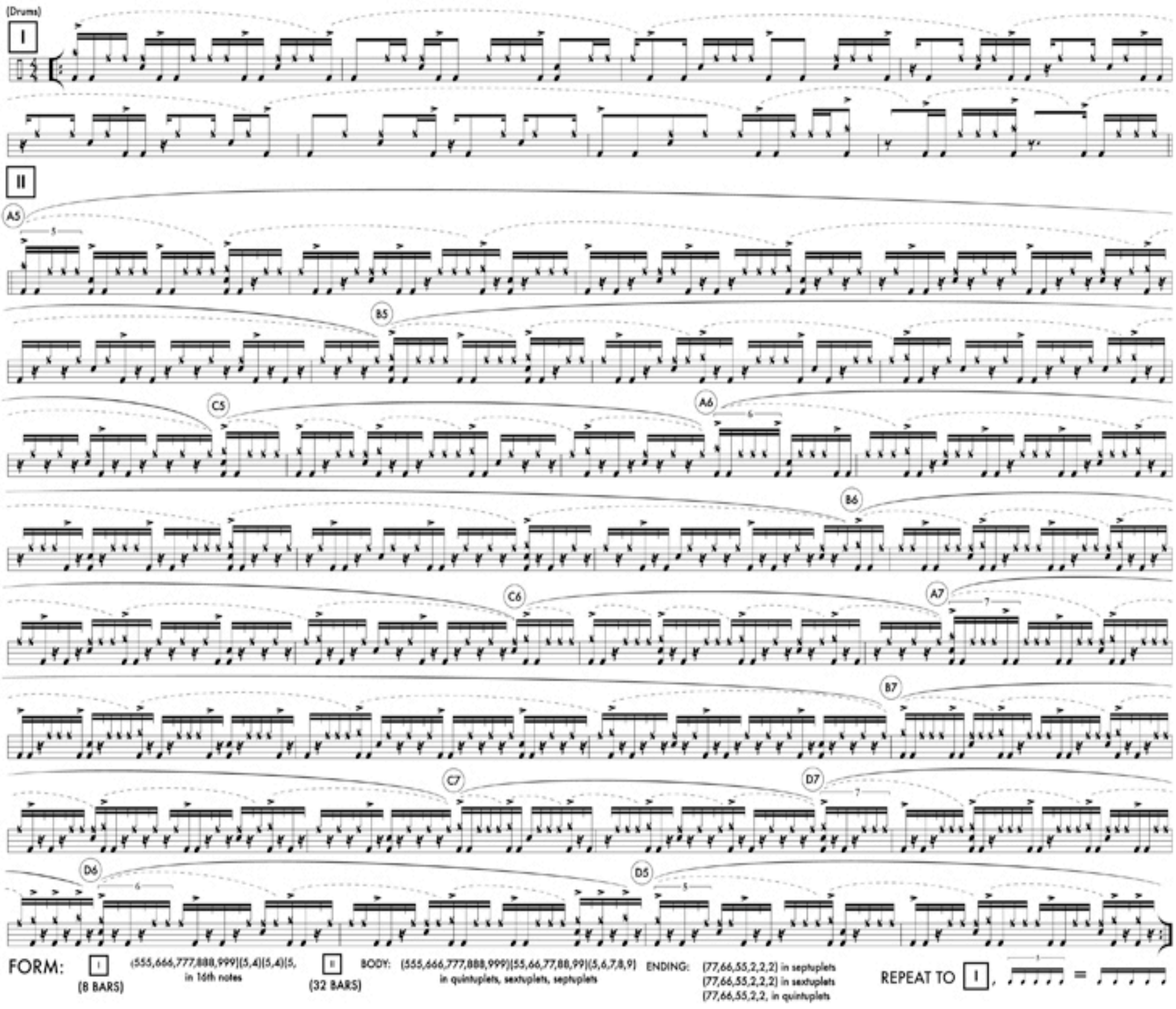
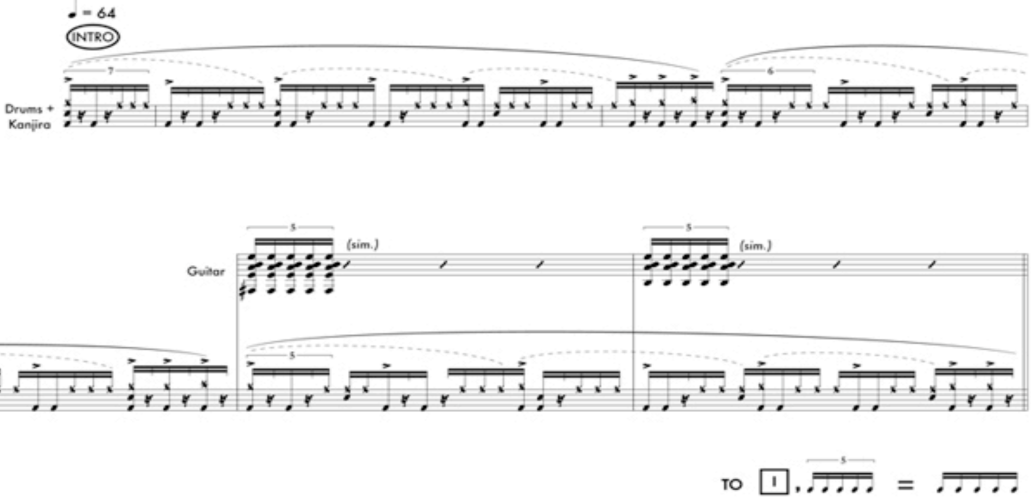
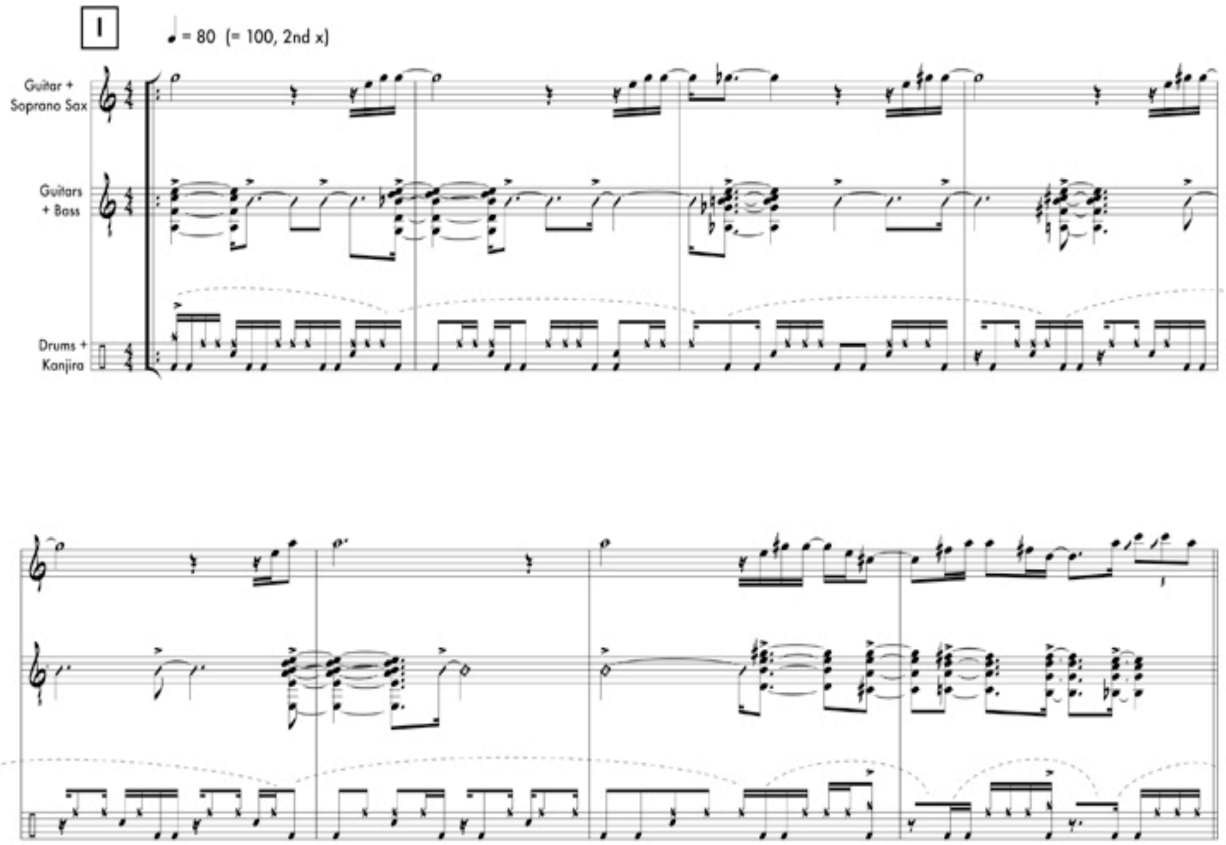
[26] *Score is not published. What is reproduced here is the piece as written by the author for his own group and obtained online (2006).*

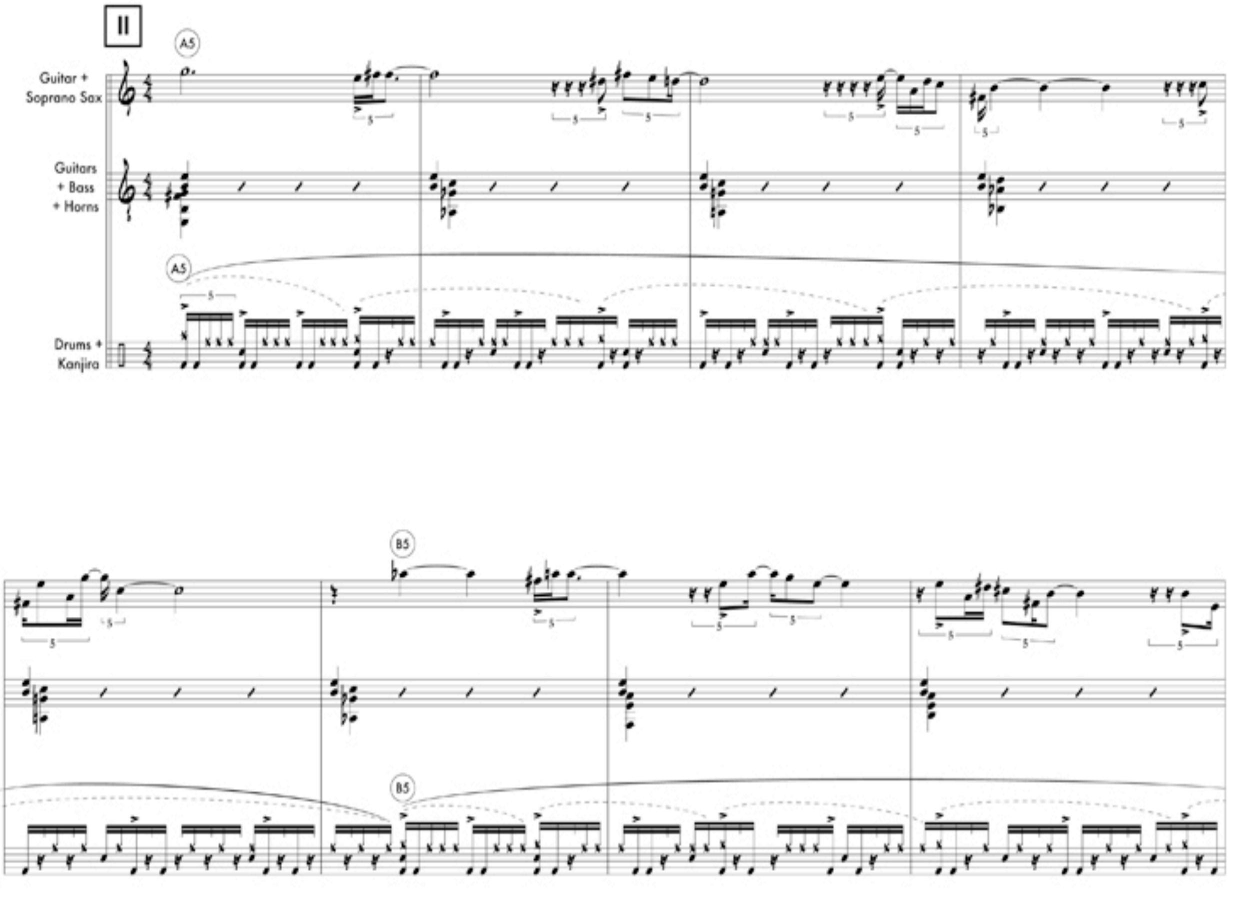

(Drums)
I
II
A5
B5
C5
A6
B6
C6
A7
B7
C7
D7
D6
D5
FORM:
I
(8 BARS)
(555,666,777,888,999)(5,4)(5,4)(5,
in 16th notes
II
(32 BARS)
BODY: (555,666,777,888,999)(55,66,77,88,99)(5,6,7,8,9)
in quintuplets, sextuplets, septuplets
ENDING: (77,66,55,2,2,2) in septuplets
(77,66,55,2,2,2) in sextuplets
(77,66,55,2,2, in quintuplets
REPEAT TO I,
=

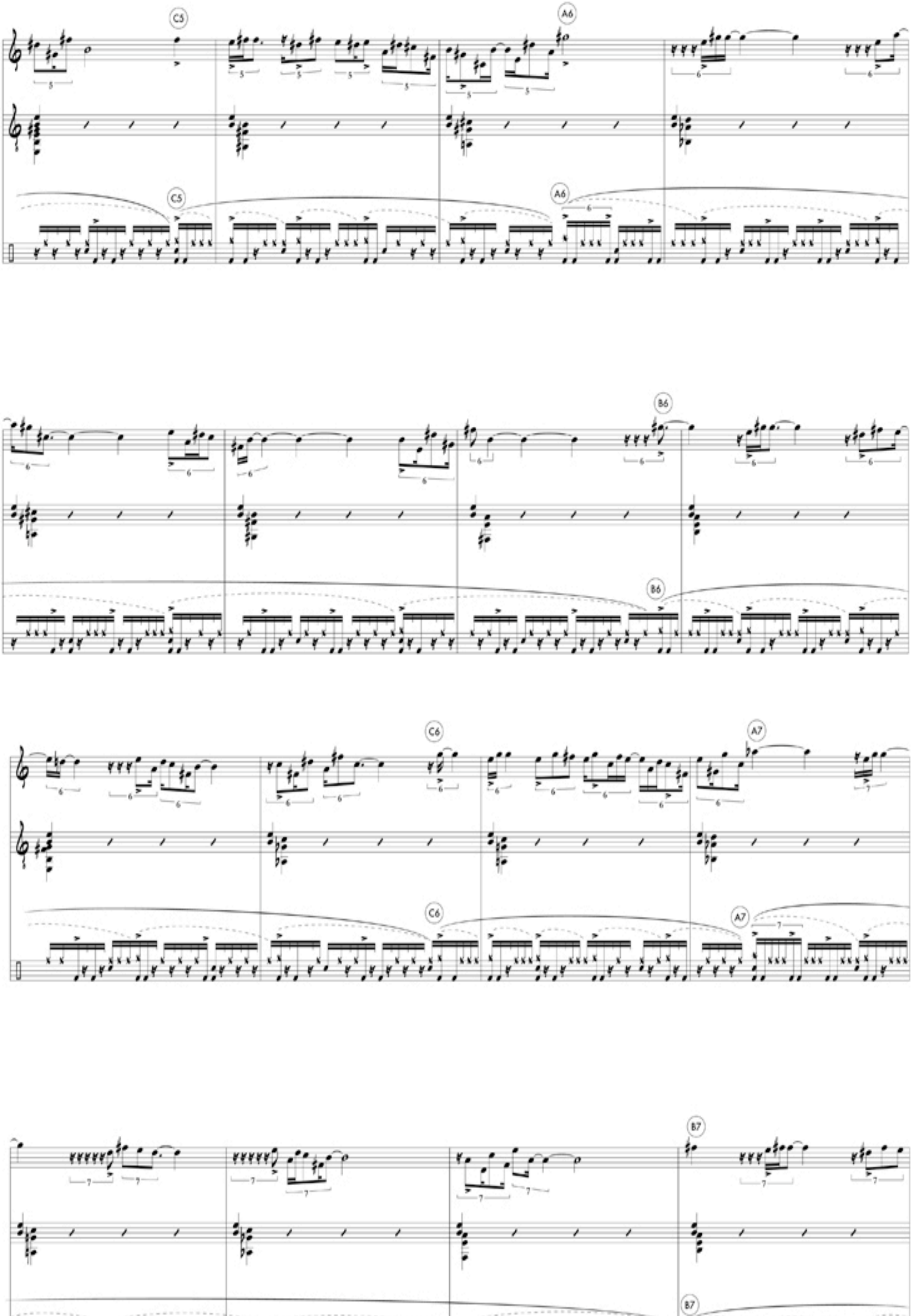
(track 279)

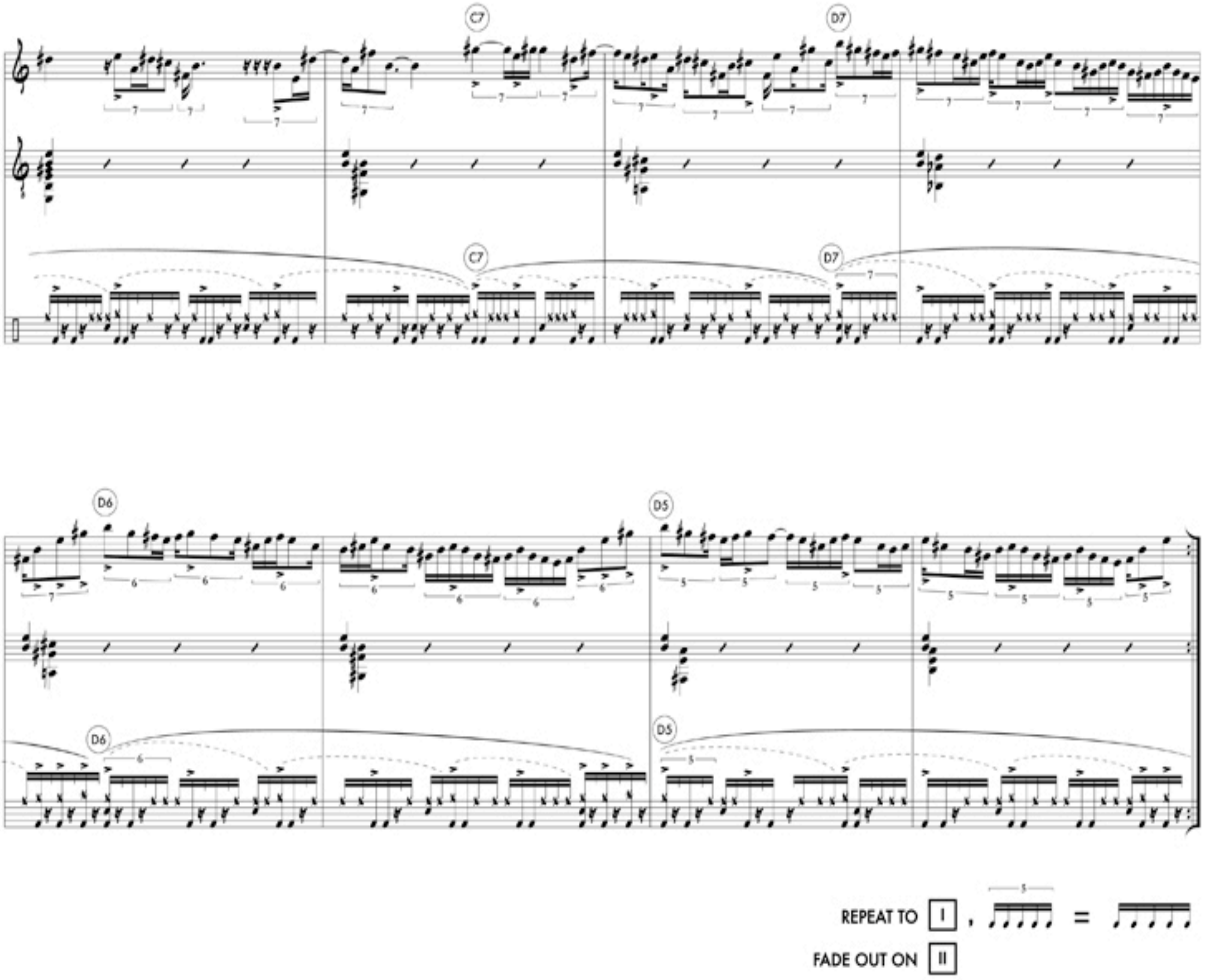
SPIRAL


♩ = 64
INTRO
Drums + Kanjira
Guitar
(sim.)
(sim.)
TO I,
=


I
♩ = 80 (= 100, 2nd x)
Guitar + Soprano Sax
Guitars + Bass
Drums + Kanjira


II
A5
Guitar + Soprano Sax
Guitars + Bass + Horns
A5
Drums + Kanjira
5
B5
B5


C5
A6
C5
A6
B6
B6
C6
A7
C6
A7
B7
B7



8) Three Oceans (Fabrizio Cassol-Aka Moon)[27]

This piece plays with the notion of rhythmical sangati as its main creative source.

A melody of 30 matras is performed simultaneously in three different gatis and the three layers meet every 30 beats.

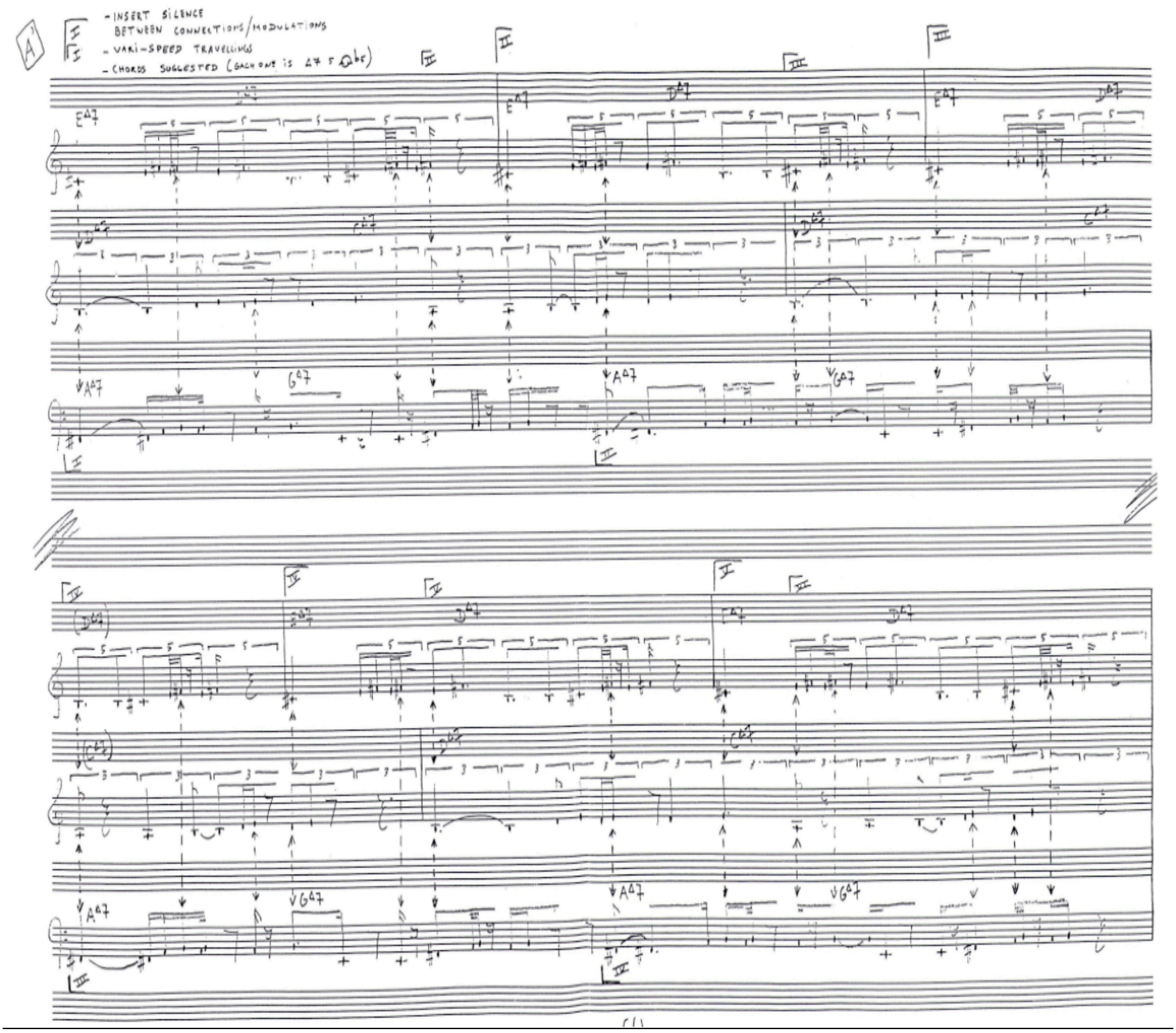
The first layer, in khanda, is performed in 6 beats, thus repeated five times. The second layer, in tisra, needs 10 beats to complete the same melody and therefore is played three times. Lastly, the third layer is performed in chatusra, each repetition lasting 7 + ½ beats; consequently is played four times.

The bass improvises freely over these three layers.

---

[27] *Manuscript provided by the author (2002)*

(track 280)[28]


A'
- INSERT SILENCE BETWEEN CONNECTIONS/MODULATIONS
- VARI-SPEED TRAVELLINGS
- CHORDS SUGGESTED (EACH ONE IS Δ7 5 ♮ abc)
E^Δ7
D^Δ7
C^Δ7
A^Δ7
G^Δ7

9) Accelerando (Vijay Iyer)[29]

This composition by the New York-based, South Indian musician V. Iyer features some of the concepts explained in the last chapters of the karnatic part.

Firstly, he employs a metre that has a clear parallel with the kala system of the shadanga talas. It is a time signature made up of a 5/16 followed by a 4/4 and this frame is used quite explicitly throughout the fragment presented here.

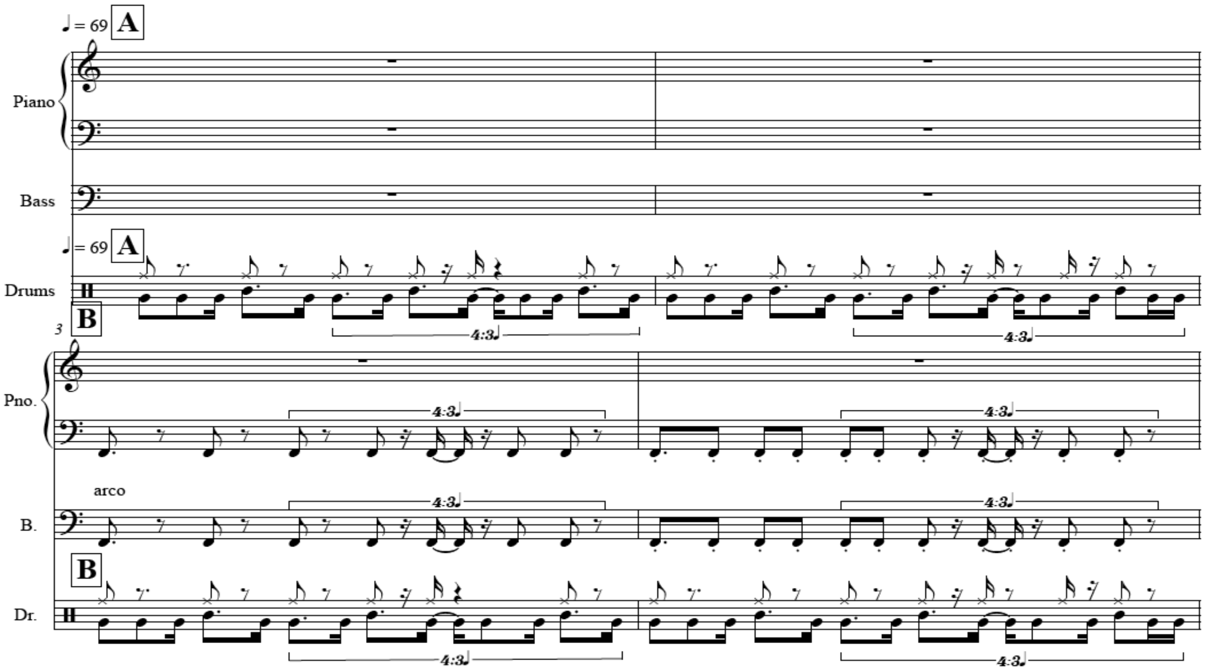
The second element actually combines several features; the beginning point is the overall concept of using chatusra as a constant gati whilst the frame changes continuously, as seen in combinations anuloma-pratiloma. A 4:5♪ is systematically used on the 5/16 part of the metre and the next beat uses a regular chatusra.

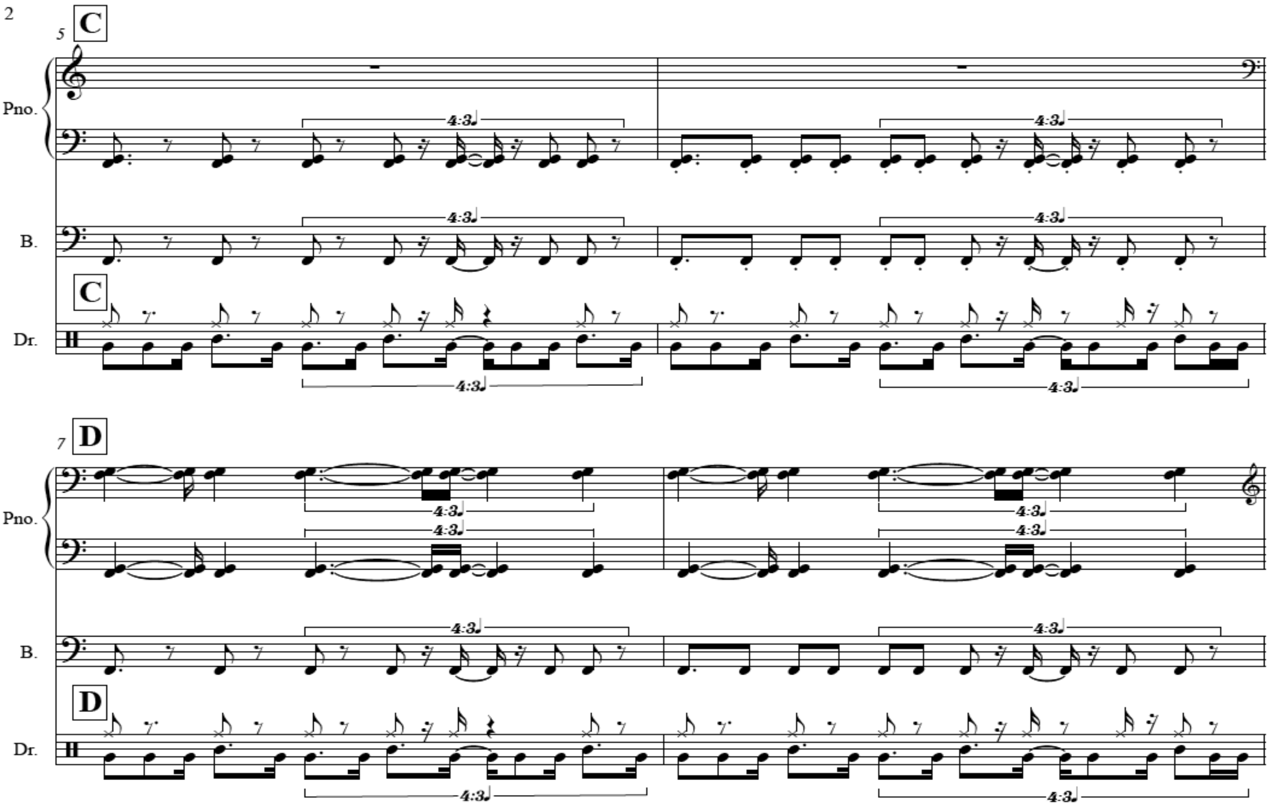
---

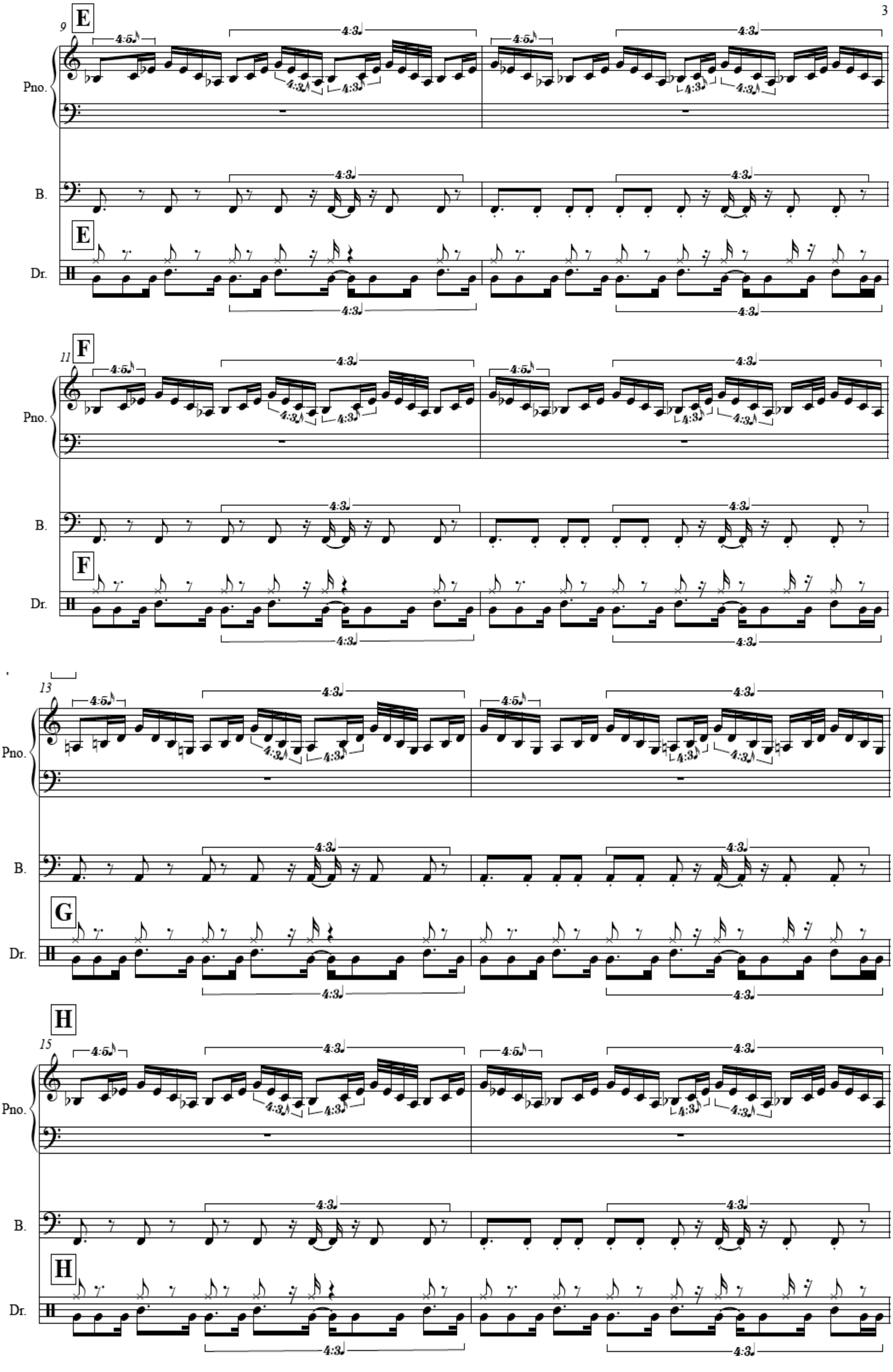
[28] *The feeling that the sound at the beginning of the piece is of bad quality is actually a decision taken by the group while recording. After approximately 30 seconds the sound is what anyone would expect from a CD recording.*

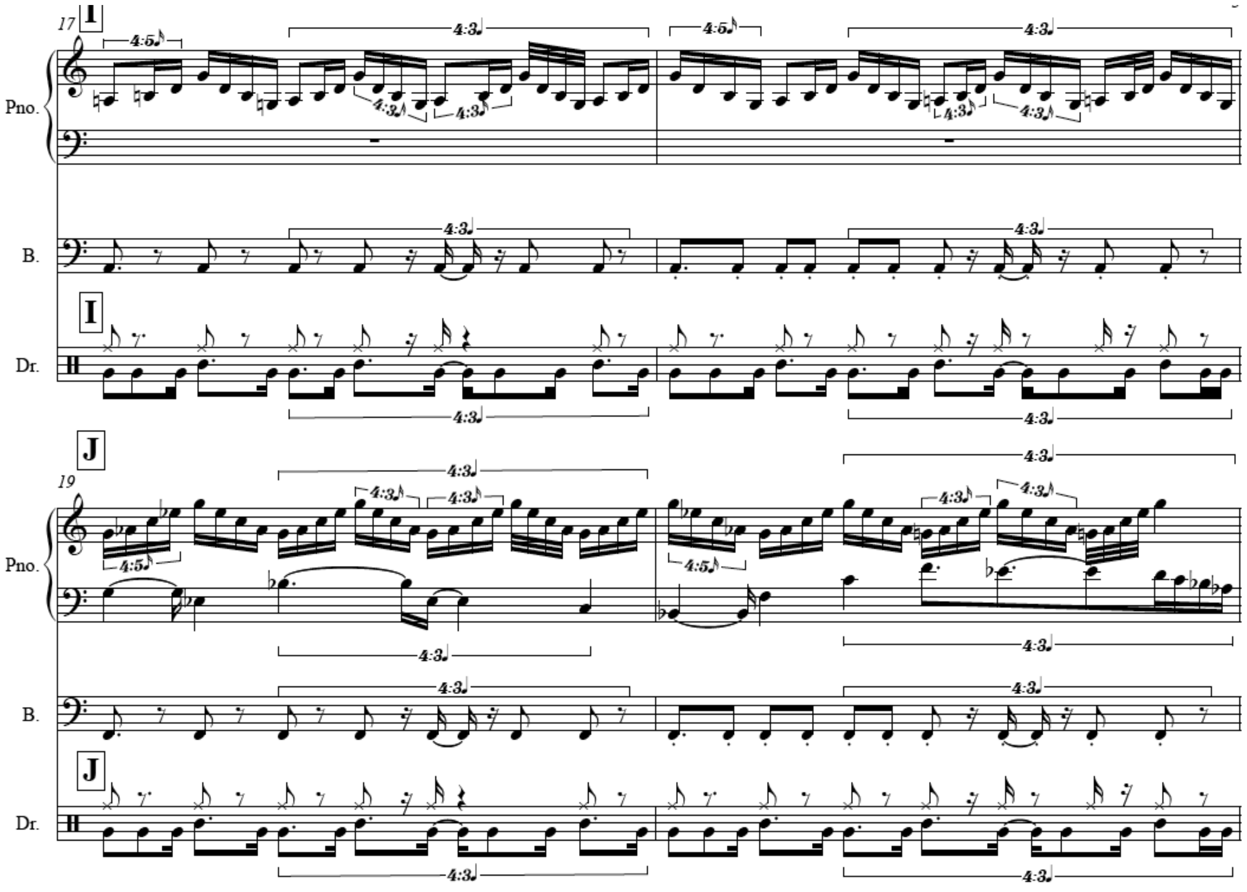
[29] *Score is not published. What is reproduced here is the piece as written by the author and provided by him as well (2012).*

This is followed by a 4:3♩. with chatusra nadai as second layer of the bracket. The 16 matras are further divided into a short jathi bhedam structure of 4 3 3 2 4. These numbers are subsequently utilised as frames to superimpose a third layer of chatusra, subtly hinted by the drums at the beginning of the piece. *(track 281)*

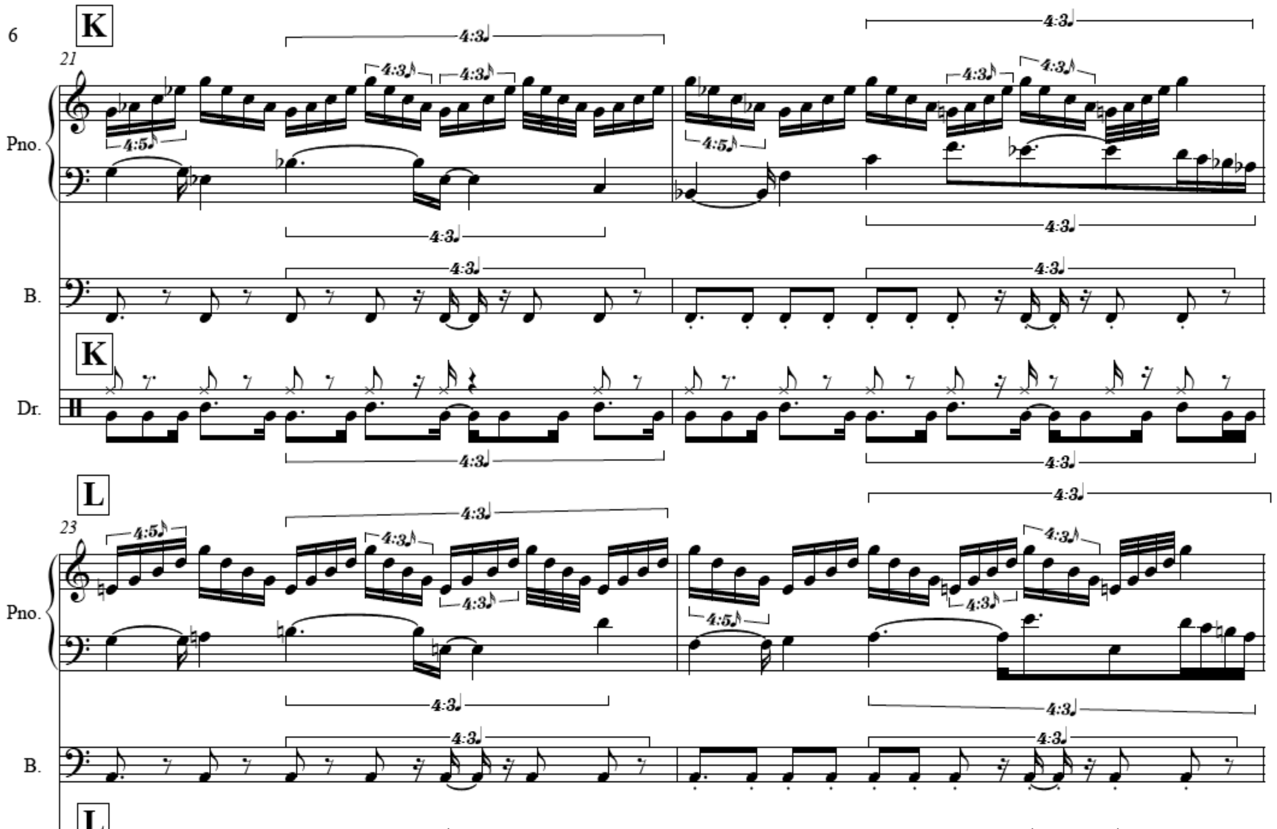





E
9
Pno.
4:5♪
4:3♩
4:3♪
B.
Dr.
F
11
13
G
H
15


I
17
4:5♪
4:3♩
4:3♪
Pno.
B.
Dr.
J
19

6


K
21
4:5♪
4:3♩
4:3♪
Pno.
B.
Dr.
L
23

Section B

STUDENTS' PIECES

This final section presents four compositions written by students who have followed the programme I teach at the Amsterdam Conservatoire. These creators utilise the techniques and concepts in their own way and combine them with their own background, aesthetics etc. Two of these pieces have a very clear jazz influence whilst the other two can be classified as contemporary classical music. The performers of these pieces are exclusively students who have studied three or four years of the performers programme.

Whilst the previous three sections of this part 2 of the text attempted to provide a solid foundation for performers as to how to practice and apply the karnatic techniques to existing western repertoire, this section tackles how to use the concepts and techniques described in part 1 in a creative manner. It should be reiterated once again that the goal of using these karnatic concepts is always the expansion of possibilities within a western framework and never as a way of creating karnatic music as such.

Firstly, I present an explanation by each composer as to how he conceived the piece and how his previous musical knowledge and background have interacted with karnatic techniques, and vice versa how these concepts have influenced his music. An analysis of the main techniques utilised then follows, punctuated by some comments I find pertinent *(written in blue)*. A concise final comment on the piece as a whole closes the analysis, followed by the entire score and a recording.

1) Sorry to interfere… anyone cares? (Andys Skordis)

for Clarinet, Percussion, Piano, two Violins and Cello

> *"I tried to use the instrumentation in two groups. The first group (clarinet, piano and percussion) and the second group (string instruments) work somehow like a double trio. Interfering means in this context that one group 'clashes' with the other one by using contrasting elements.*
>
> *Even though I used the techniques in a polyphonic manner, where every technique might not be audible as a technique itself due to the created texture, I felt that the whole piece always had something holding it together. As karnatic musicians see it, the whole development is somehow like a tree, where a seed brings forth branches, sub-branches etc. I feel the same way about this piece - that every section or even single voice is just another branch of a tree.*
>
> *I personally relate these techniques with literary writing. Words are like cells, sentences are like short phrases (yati phrases, jathi bedham, anuloma-pratiloma), paragraphs are like organised techniques (mukthay combination, moharas, jathis kalpana) and, finally, the book is the mosaic produced by all these concepts together.*
>
> *This piece has been the starting point of a musical journey. Previously I tried various ways to create polyrhythmic structures, but I always had the sensation that an organic part that would make it feel complete was missing. By using karnatic techniques, I felt that the result was very different, more*

> *harmonious. The relationship that every rhythmical cell has with the following or the preceding one is like a spider's web and I tend to believe that this relationship is something you may even feel at an unconscious level. Everything is related to everything else and therefore there is an organic essence in the entire piece.*
>
> *Besides the polyrhythmic structures, karnatic techniques helped me to develop a better sense of phrasing. I realised how many more possibilities I had to create phrases with a specific rhythmical concept or technique in mind, rather than mixing everything, as I used to (in the past, I composed phrases that would start with 𝅘𝅥𝅯, then a quintuplet, and then perhaps an 11𝅘𝅥𝅯:4𝅘𝅥𝅮). This ultimately frustrated me because not only could I never feel the phrase, but I also 'knew' that it would be very difficult to perform. With nadai bedham I can create many more complex phrases, but which, because of the way they are constructed, become much easier to feel and perform. So, ultimately, not only the result is something I find more interesting than the phrasing ideas I used before, but it is also much easier to perform and understand.*
>
> *Because of my western background I like using these techniques in a 'polyphonic' way rather than monophonic. What I mean by polyphonic is that various voices perform different rhythmical structures or devices simultaneously, which, if used with pitched instruments, can also create a different harmonic flow".*

The piece is composed in a tala of ten beats. However, because the inner structures for tala 10 in the suladi tala system (L4 D L4 or L7 A D) were not suitable for the composer's structures, he decided to make up a tala 10 divided L5 L5.

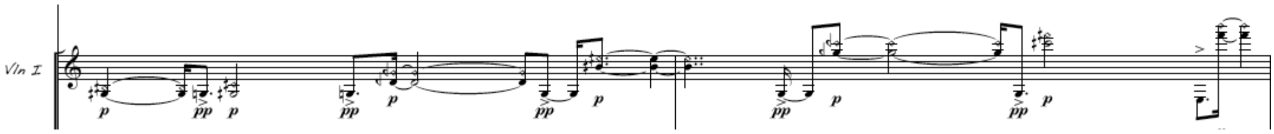
He used the karnatic notion of resolving techniques and phrases on tala and anga sam in order to provide a feeling of cycle, although now and again the resolution might not fall on a strong beat.

The following karnatic techniques have been used.

Yati Phrases

1) Measures 29-30 – Violin I: a mridangamyati following the palindrome construction.

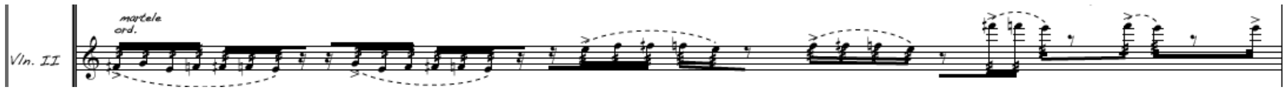
Chatusra: 5 (3) 8 (3) 11 (3) 14 (3) 11 (3) 8 (3) 5



This yati phrase does not add any cells to a previous phrase, but rather uses the numbers of the sequence to increase and decrease the length of each of its notes. The duration of the gap is utilised for a three matras long note.

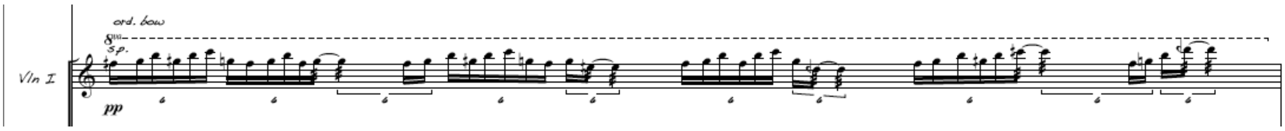
2) Measure 32 – Violin II: a srotovahayati, omitting one matra per pala and a silent gap.

Chatusra: 7 (2) 6 (2) 5 (2) 4 (2) 3 (2) 2 (2) 1



3) Measure 23 –Violin I: A gopuchayati

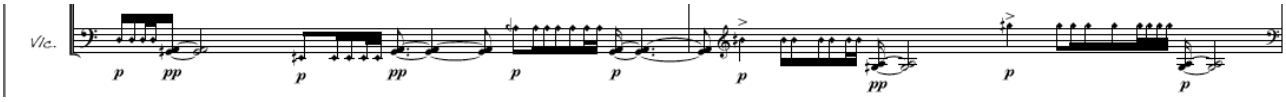
Tisra 2nd speed: 11 (5) 9 (5) 7 (5) 5 (5) 3 (5)



I find quite interesting the manner in which the gap is emphasised by using a tremolo on the 5 matras long note as well as the way this yati phrase could also be interpreted as a yati prastara; because of the last 'gap' placed at the end of the sequence, this gap could be analysed as a sama yati instead, yielding thus a gopuchayati interspersed with a sama yati.

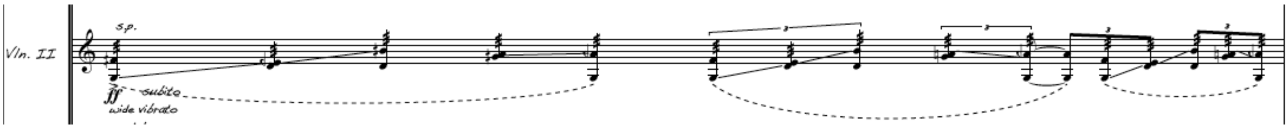
4) Measures 29-30 – Cello: a srotovahayati that combines adding notes from the middle with elongating note values. The gap is an attacked note.

Chatusra: 3 (9) 5 (9) 7 (9) 9 (9) 11



Tirmana

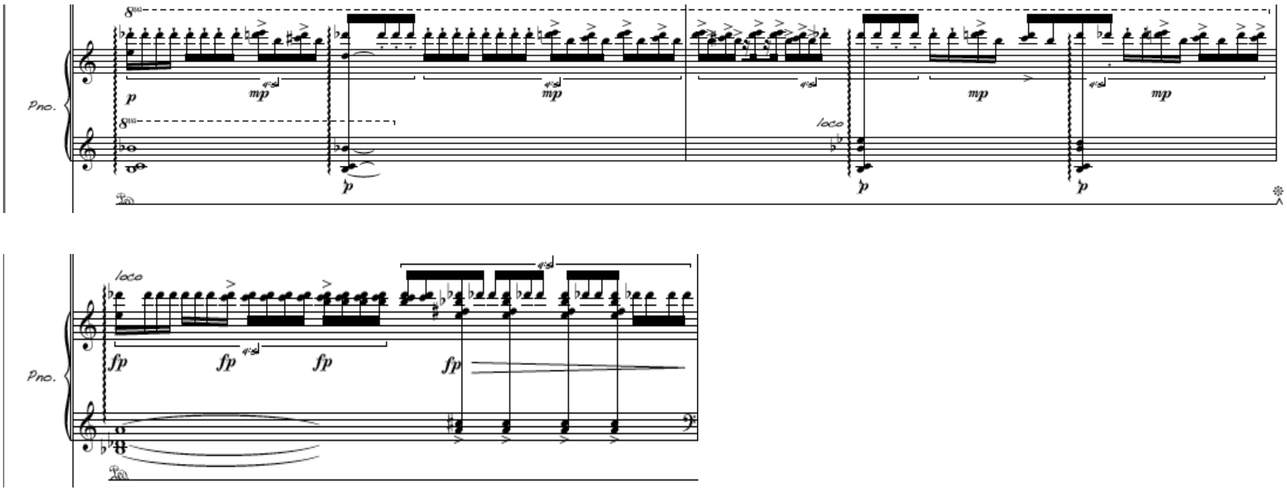
Measure 31 – Violin II: calculations are: 5x3, 5x2, and 5x1.



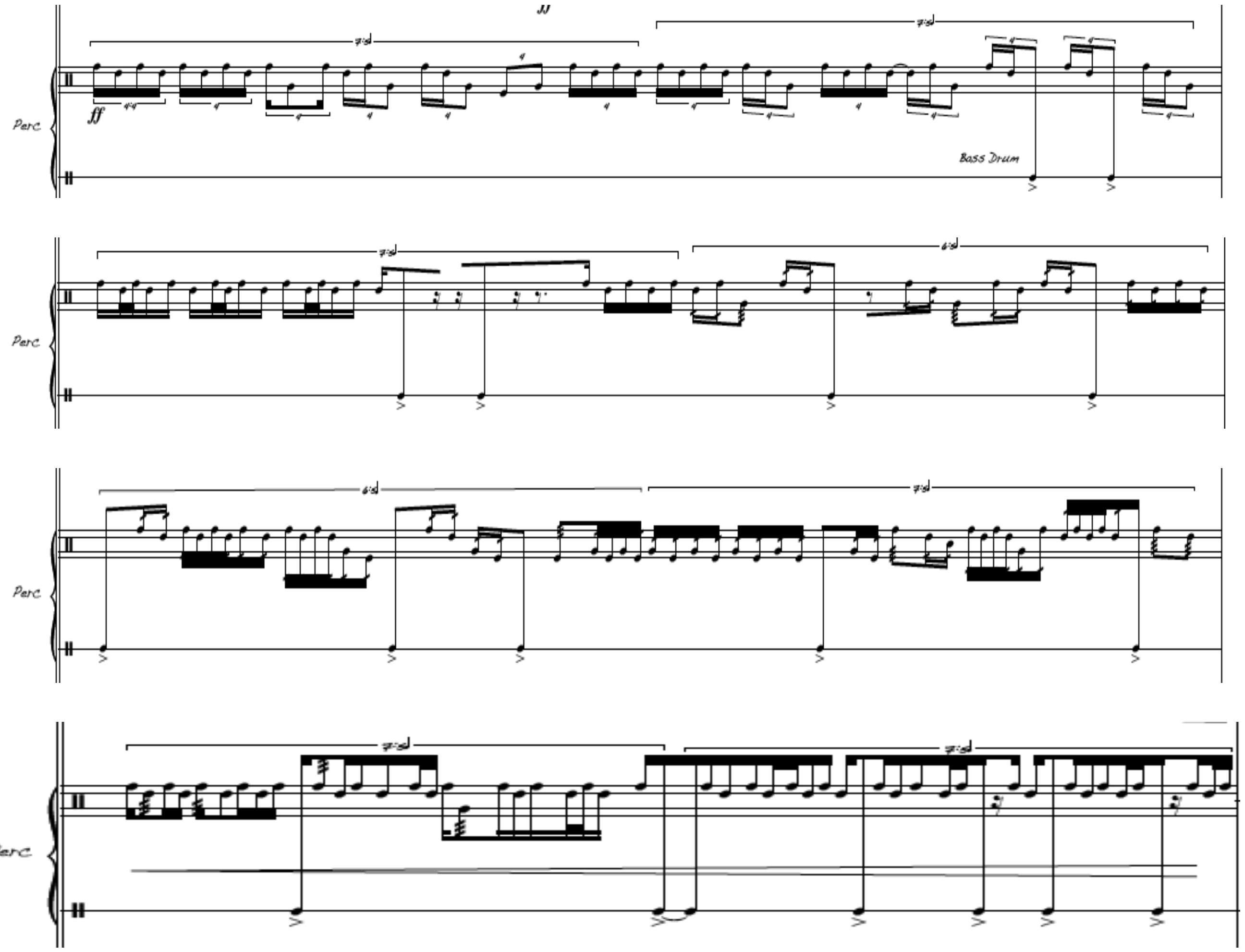
An unusual tirmana since it is constructed in tisra. The first five ♩ are thought out as a ♩. in tisra 1st speed

Nadai Bedham

1) Measures 16-18 – Piano: the frame is 4:5♩ with chatusra nadai.



2) Measures 60-63 – Percussion: in this segment, the composer utilises an uncommon frame based on misra[1]. The composer switches between 7:5♩ and 6:5♩ and the nadai is always chatusra.



Mixed gati mohara

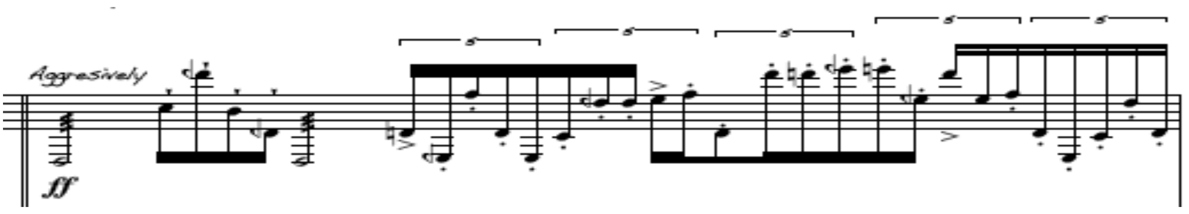
Measures 35-42 – Clarinet: this technique is developed in eight cycles.

-A +B + C + D (twice)

-A + B + C + 1/2D + 1/2A

-1/2A +1/2D + C + Mukthay

The inner construction of the phrases is
A: Chatusra 8, 4, 8 B: Khanda 8, 9, 8



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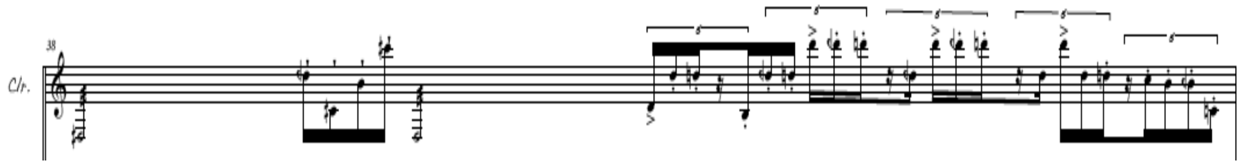
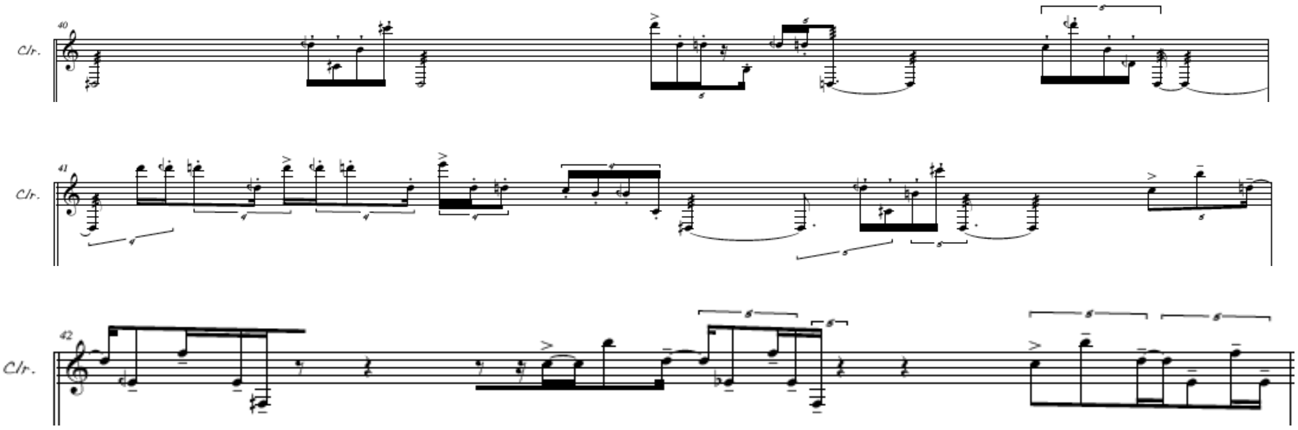
[1] *It was explained in the chapter on nadai bhedam that frames based on misra were seldom used in karnatic music due to the speed in which the accents occur; this could greatly limit the phrasing possibilities and karnatic music favour frames based on the other gatis.*

C: Chatusra 8, 4, 8 D: Khanda 7, 5, 5, 8



In the last three cycles, following the characteristic pattern of moharas, phrases get shortened, displaced and rhythmical sangatis take place. At the end (starting in the last beat of the second cycle below) there is a mukthay that begins in khanda, changes into chatusra and returns to khanda once again. The calculations are 11 (9) 11 (9) 10+1

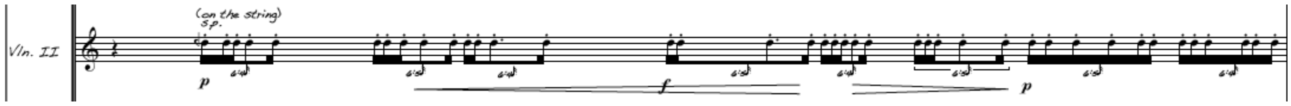


The construction follows scrupulously the rules given in chapter 20 (Moharas). However, as it seems to be a pattern throughout the piece, a few numbers are used for long notes rather than for phrasing. He combines the two notions (notes lasting the duration of the inner division and phrases within those numbers) well thought out in order to enable the displacements of the fragment ½ D, A, ½ D, C, Mukthay to take place with the flow of the created phrase. The unusual choice of the long gap for the final mukthay (9 matras), together with the two gati changes that take place, create a lot of tension.

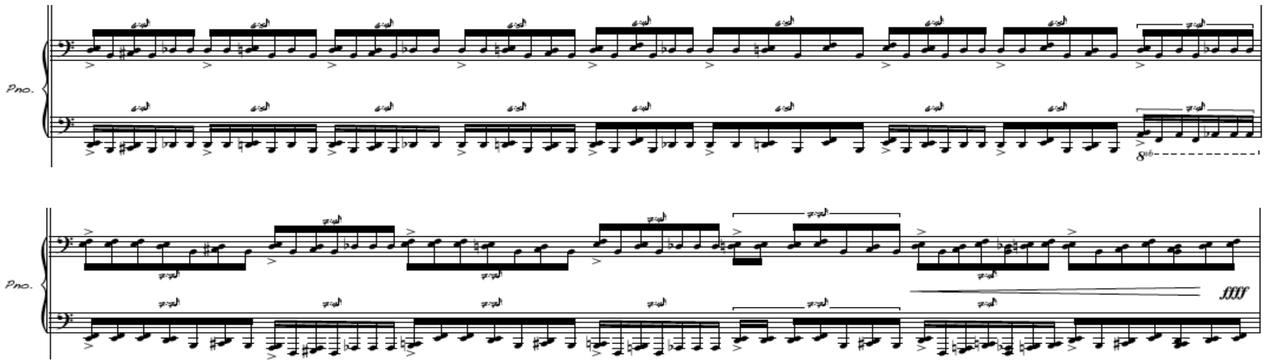
Mixed Jathi Nadai Bhedam

1) Measure 24 – Violin II: the composer took the double accent 4+5 and superimposed tisra nadai (6:4♪ + 6:5♪)

This combination needs nine beats to resolve. In order to resolve on tala sam, the device starts on the second beat of the cycle.



2) Measures 55-56 – Piano: the second time the technique spreads over two cycles, starting and finishing on tala sam. There are two sequences, one of 4+5 followed by a frame of 4+7.

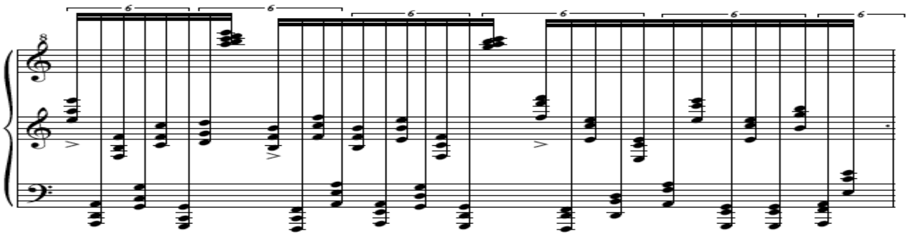


This combination (9+11 beats, the result of 4+5 and 4+7 respectively) fits into the two cycles of the tala 10. The first frame takes tisra nadai whereas the second one utilises misra nadai. I find this a very creative use of this device (in karnatic music any mixed jathi nadai bhedam would first resolve on tala or anga sam before proceeding to another combination).

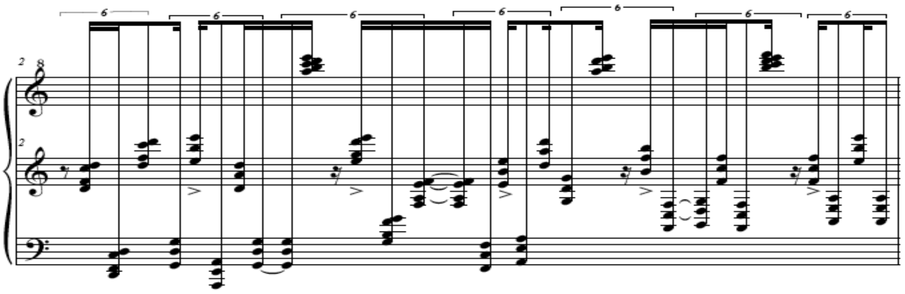
Mukthay Combination

Mm 38-42 – Piano: this elaborated mukthay is based on a triple mukthay made up of a srotovahayati, a sub-mukthay and a tirmana. The calculations are:

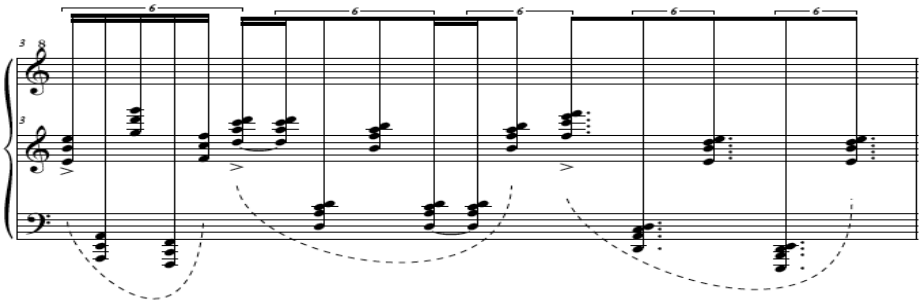
1st pala: -Srotovahayati 7 (1) 10 (1) 13



-Sub-mukthay: 5, 6 (2) 5, 6 (2) 6 (2) 6



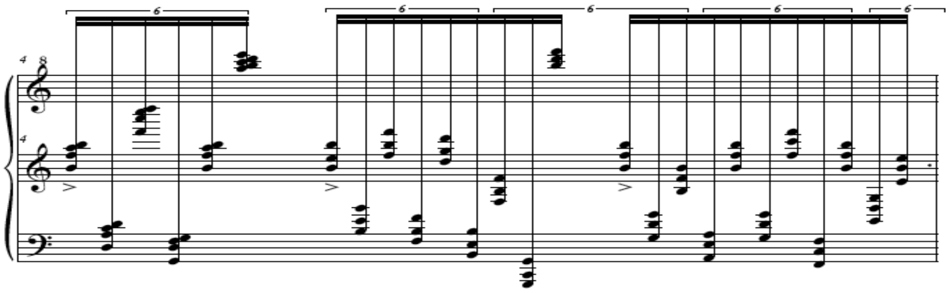
-Tirmana (in tisra): 5x1, 5x2, 5x3



The matra for the gap in the srotovahayati and sub-mukthay is attacked in a very high register of the piano: rather than giving the impression of silence or resolution, the gap produces small climactic points at irregular intervals.

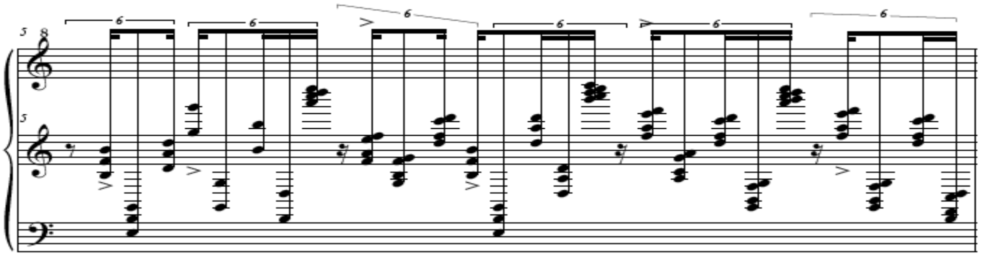
The tirmana is actually a viloma version of the regular construction, since it starts with the shortest distance between notes.

2nd pala: -Srotovahayati that has decreased its length by two matras: 5 (1) 8 (1) 11

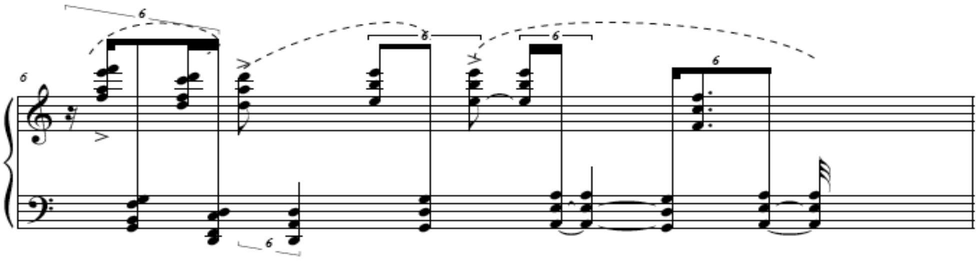


-Sub-mukthay that, similarly, has decreased by one matra. There is also an overlapping of mukthays, as the last pala of the sub-mukthay is simultaneously the first pala of the tirmana-compound that follows.

4, 5 (2) 4, 5 (2) 5 (2) **5**

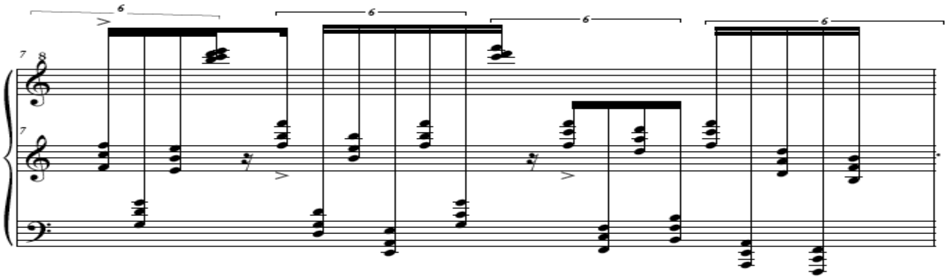


-Tirmana: **5x1** 5x2 5x3. The first pala is simultaneously the last pala of the previous mukthay.

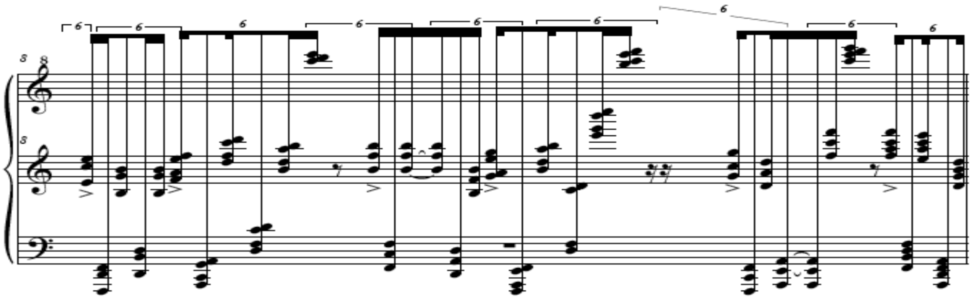


The original tirmana of 5 matras gives way to a tirmana-compound mukthay concept with a 4 note phrase: the second note is twice as long as the rest. Calculations are kept as in the first pala, but the phrase construction modifies the notion of tirmana.

3rd pala: -Srotovahayati that has decreased its length once again by two matras 3 (2) 6 (2) 9

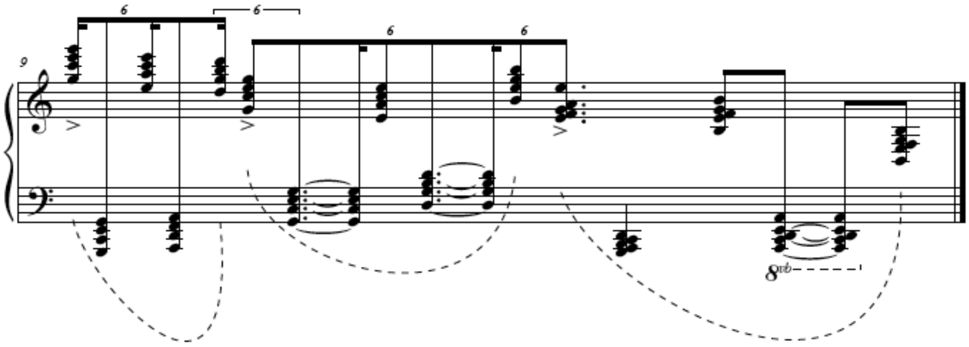


-Sub-mukthay is an increased version of the first pala: 6, 7 (3) 6, 7 (3) 7 (3) 7



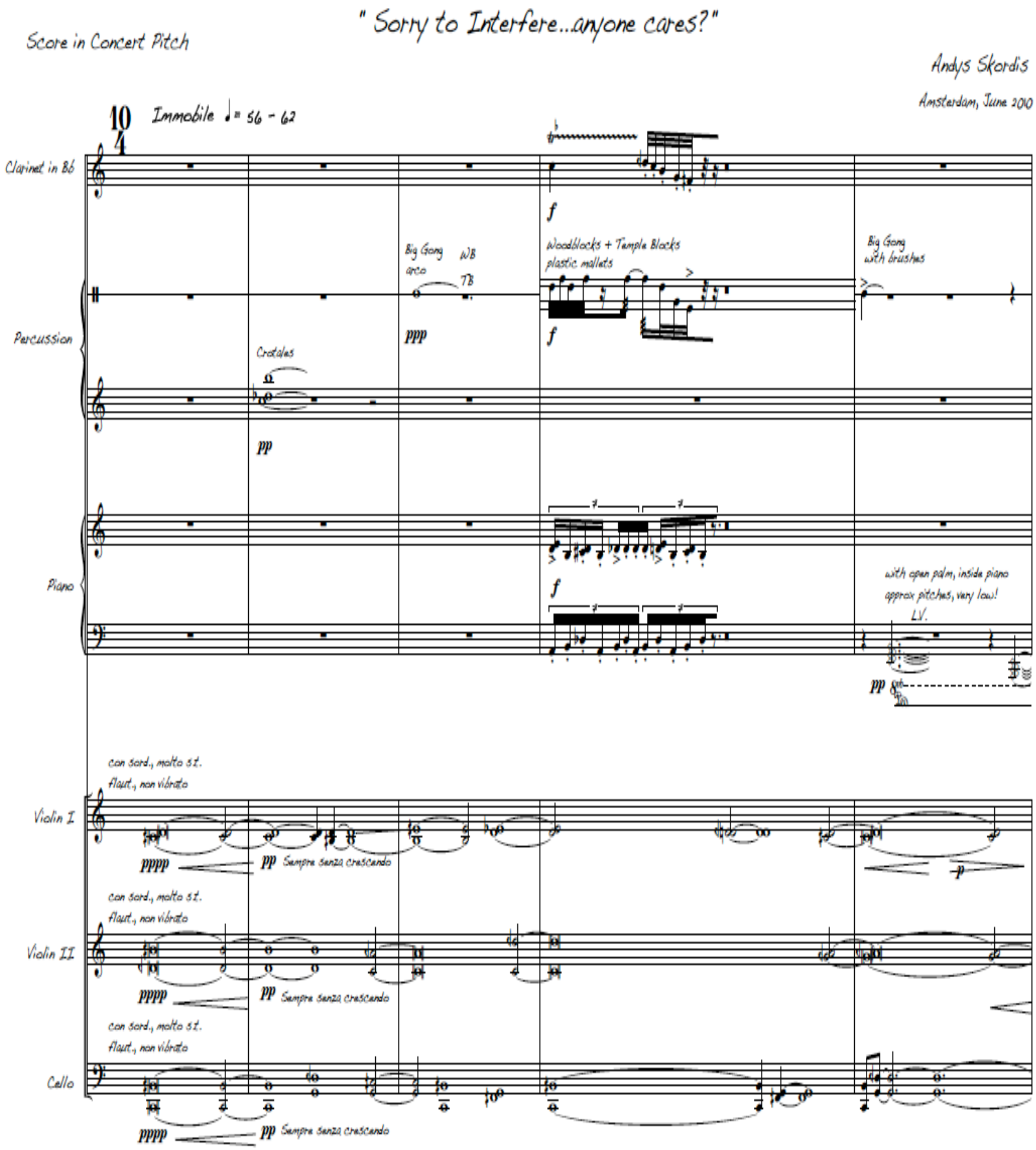
The composer has deliberately chosen to avoid a linear development and decided in favour of a vakra concept. Therefore, instead of increasing or decreasing systematically in every pala, his 'root' calculations are placed in the first block, distributing the decreased and increased version in the second and third blocks respectively.

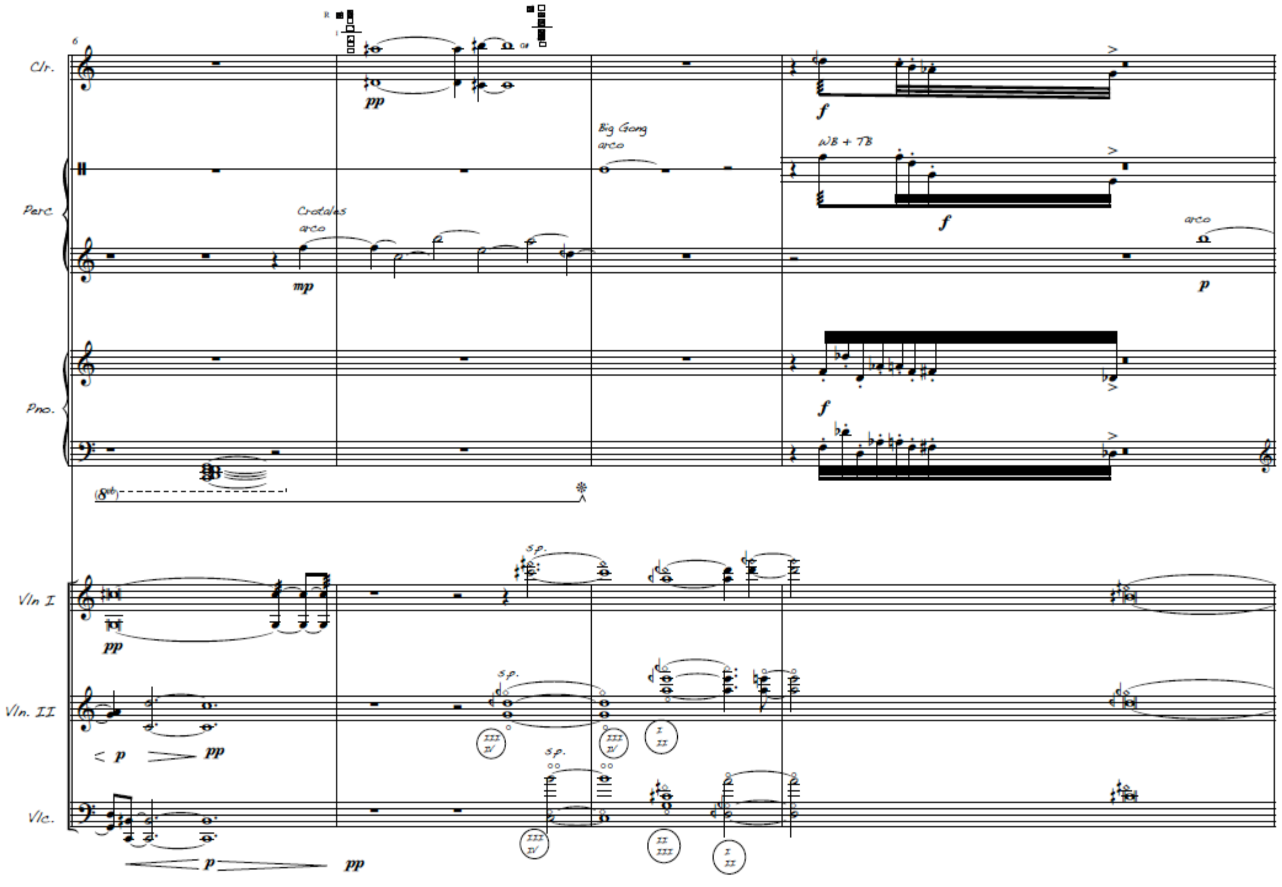
-Tirmana: 7x1, 7x2, 7x3

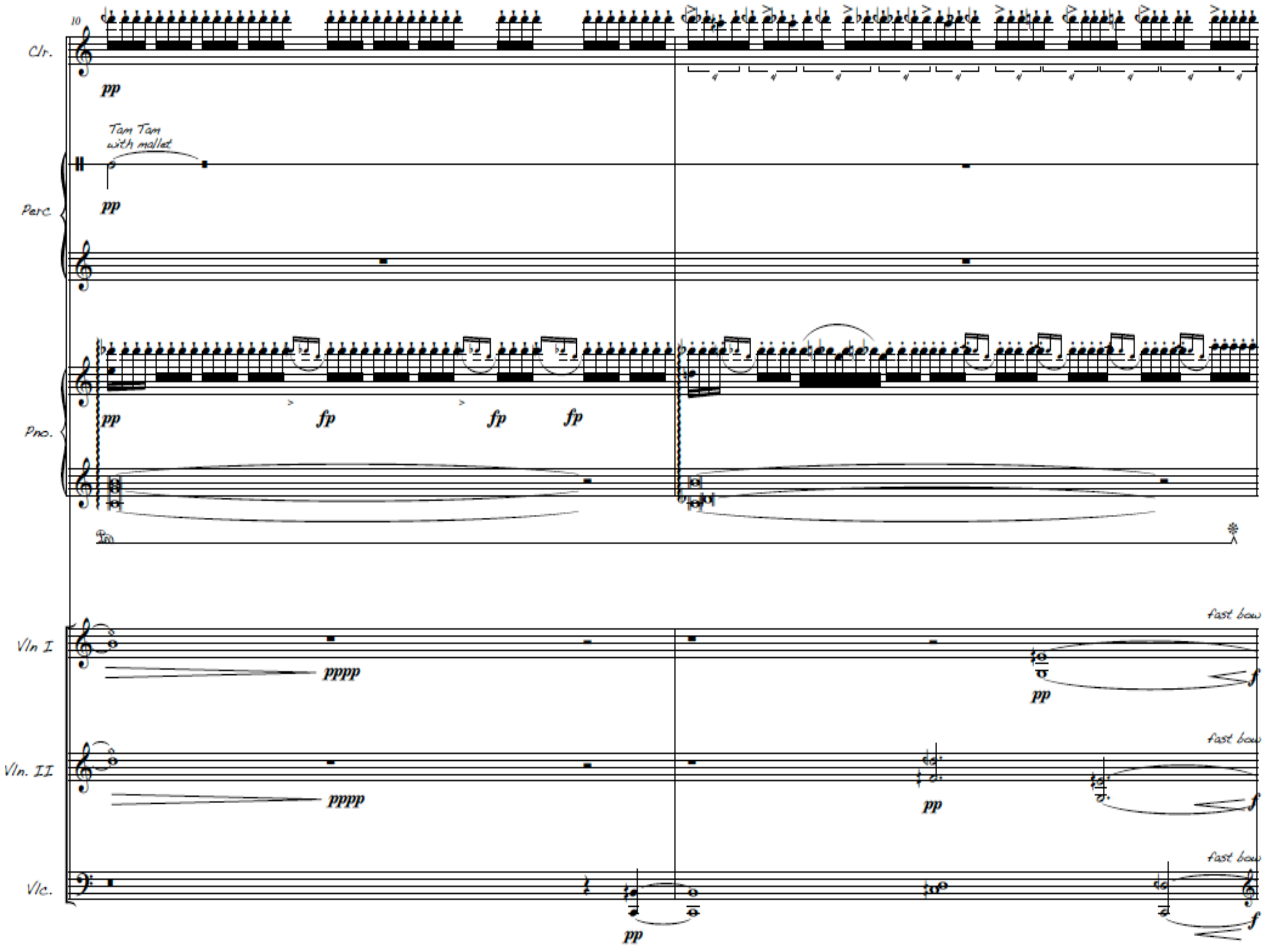


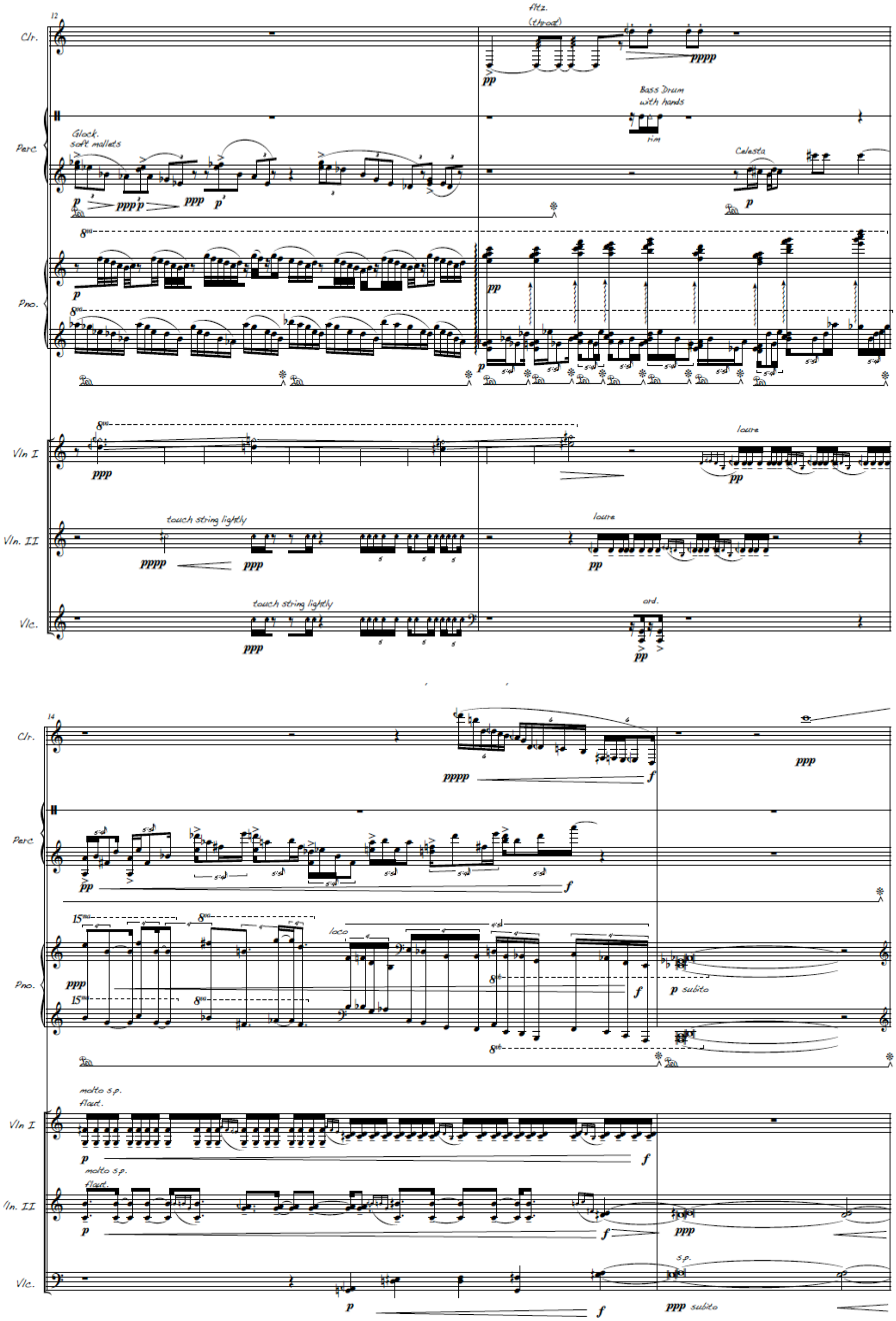
The final tirmana mukthay plays with the idea of keeping the same number of notes as in the previous pala but increasing the length of every step. Whereas in the second pala the idea of increasing one note whilst keeping the original duration was introduced, in this pala both ideas are employed.

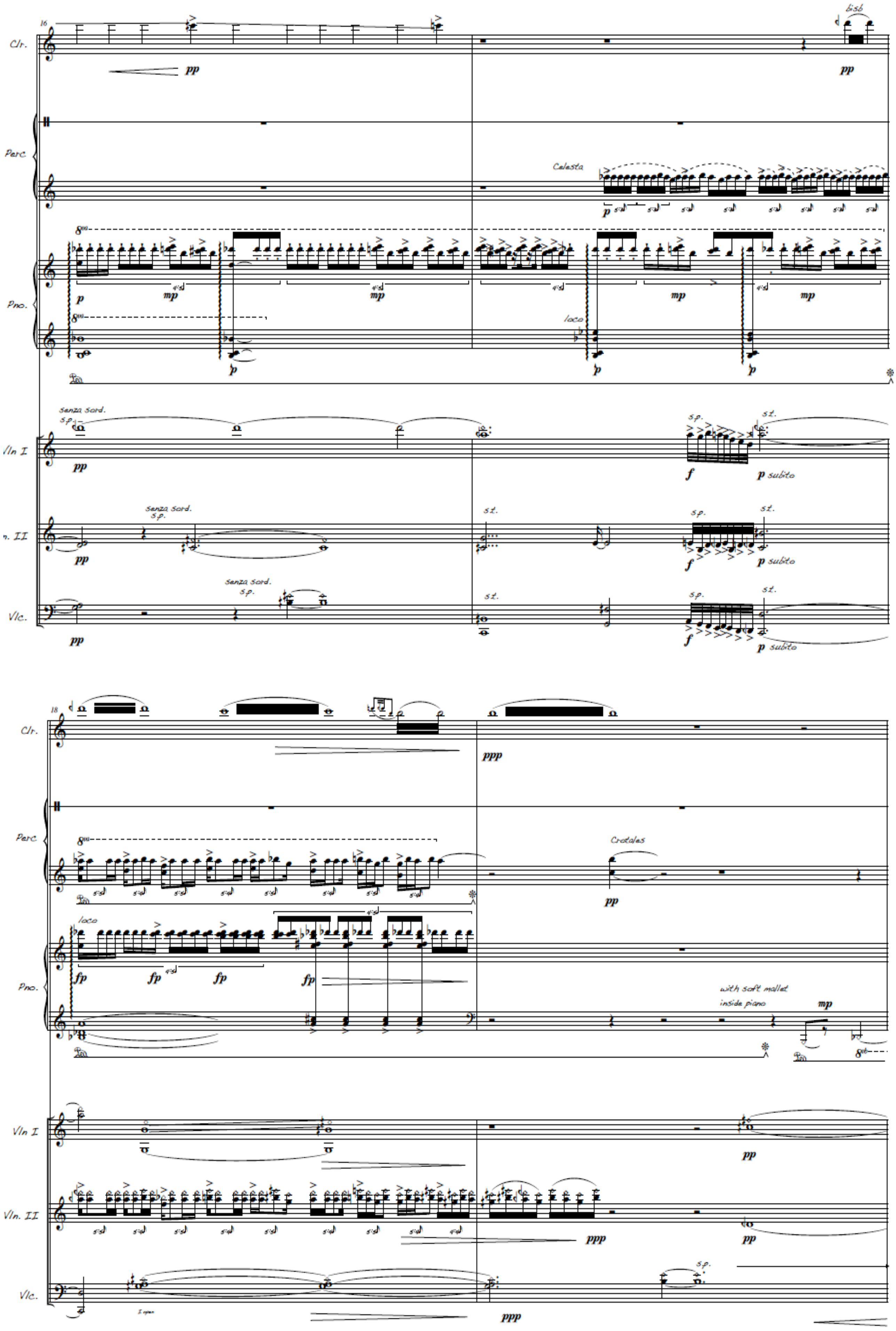
In general I find this piece a very good example of how techniques have been utilised, expanding the possibilities of karnatic music. This is achieved essentially by means of applying certain concepts systematically, such as using different registers for the gaps, the use of sequences of numbers to construct length of notes, or the utilisation of the concept of vakra in a more varied way, to mention just three characteristic elements of the composition. The fashion in which karnatic techniques are interwoven with a densely layered composition is, from my point of view, quite remarkable and I do not think any listener could separate the karnatic techniques from the rest, although the composer respects, in a very creative way, the fundamentals of every technique's construction. *(track 282)*

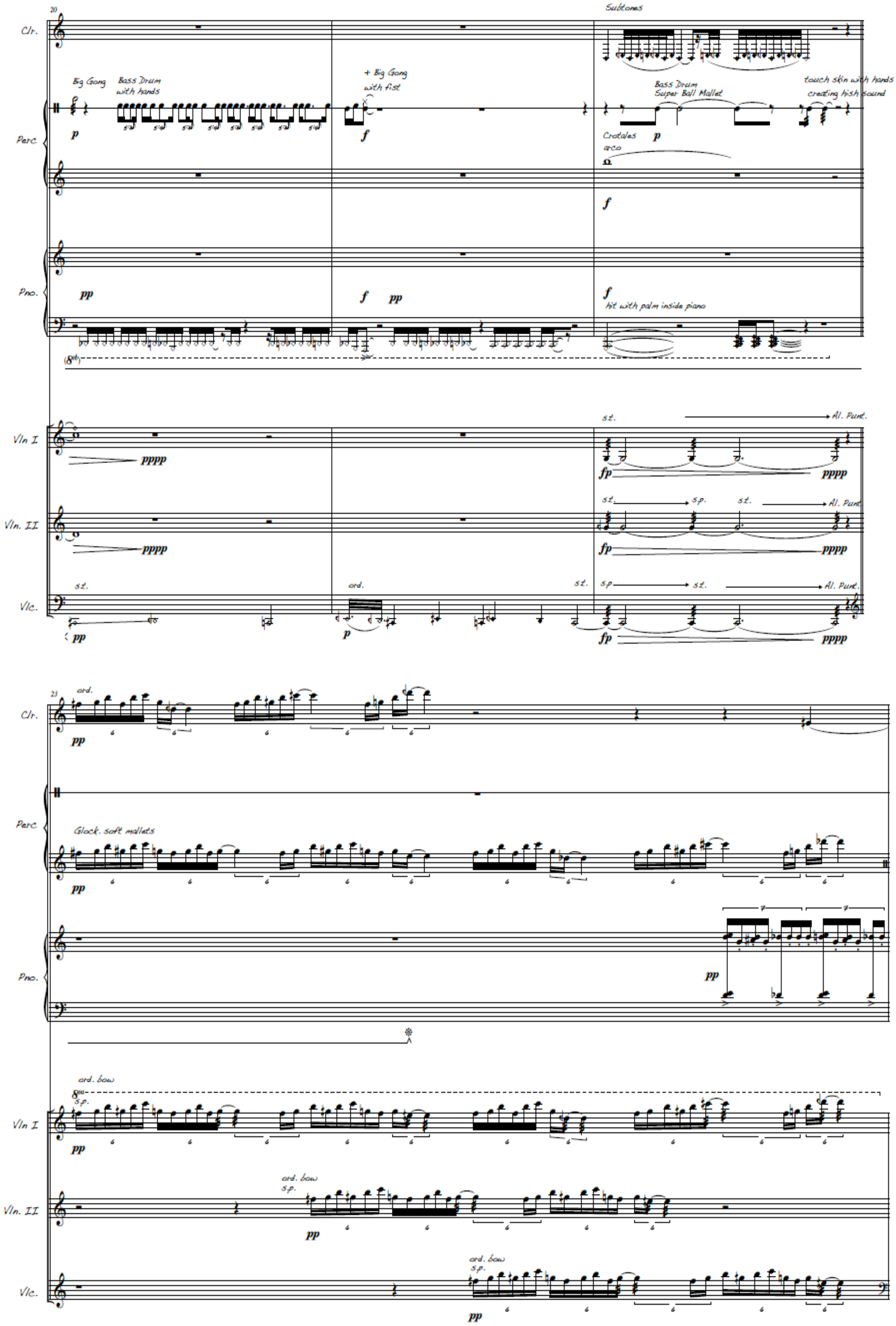

" Sorry to Interfere...anyone cares?"
Score in Concert Pitch
Andys Skordis
Amsterdam, June 2010
10/4
Immobile ♩= 56 - 62
Clarinet in B♭
Percussion
Piano
Violin I
Violin II
Cello
Big Gong arco
WB
TB
ppp
Crotales
pp
Woodblocks + Temple Blocks plastic mallets
f
Big Gong with brushes
with open palm, inside piano approx pitches, very low!
L.V.
pp
con sord., molto s.t. flaut., non vibrato
pppp
pp Sempre senza crescendo
p

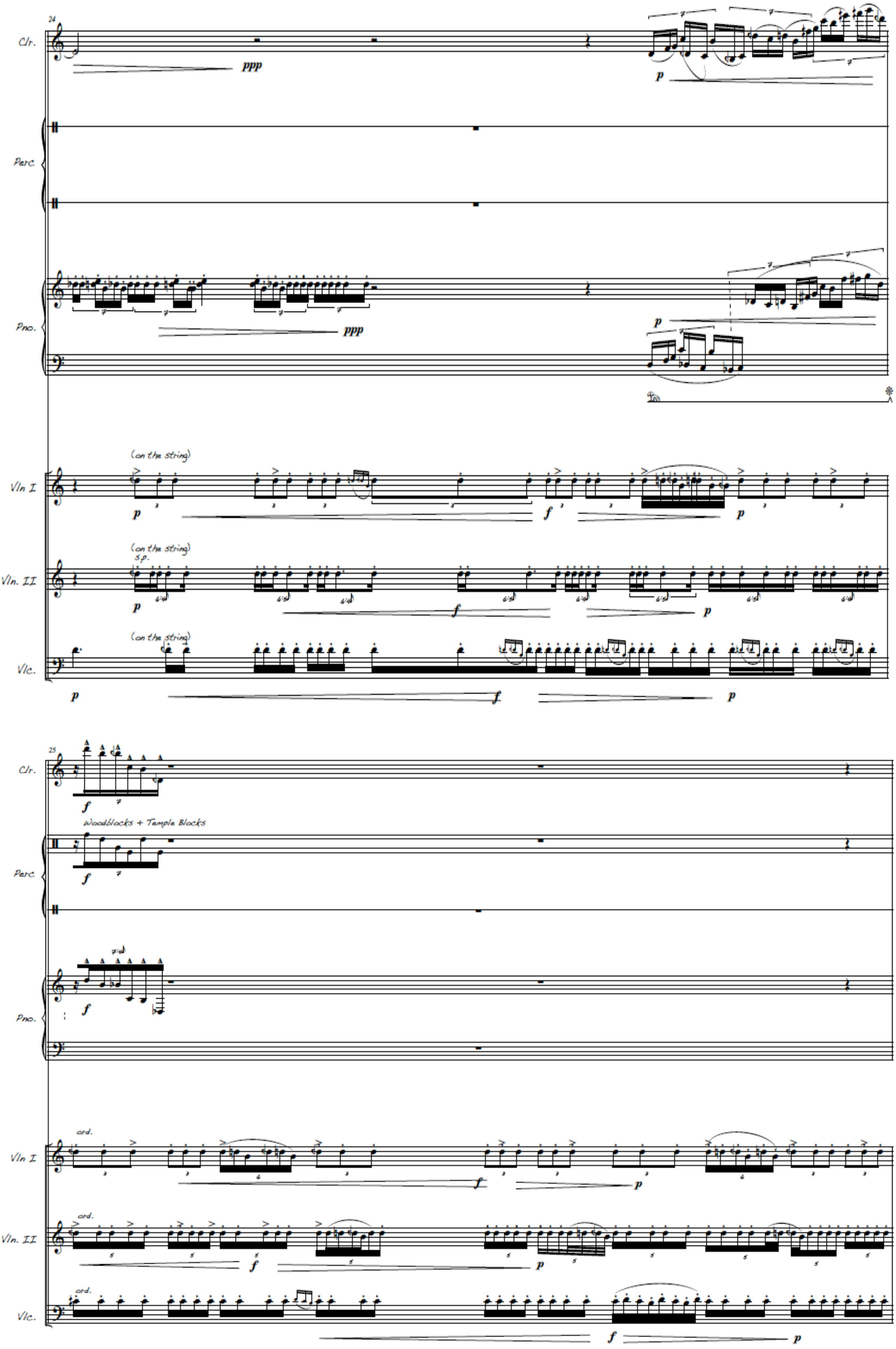

6
Clr.
pp
Big Gong
arco
f
WB + TB
Perc.
Crotales
arco
mp
arco
p
Pno.
f
Vln I
pp
s.p.
Vln. II
< p
pp
III
IV
I
II
Vlc.
p
pp
II
III

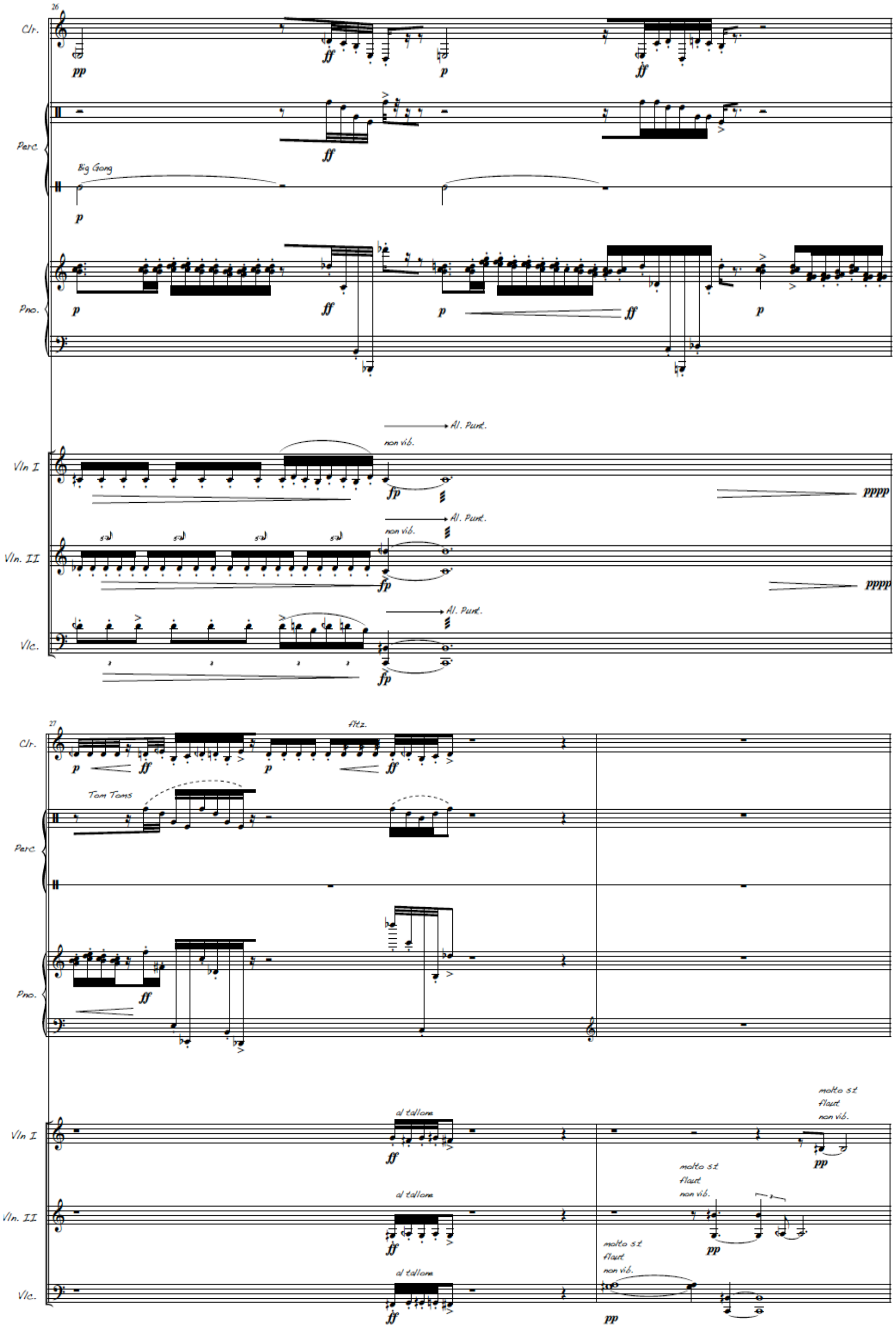

10
Clr.
pp
Tam Tam
with mallet
Perc.
pp
Pno.
pp
fp
fp
fp
Vln I
pppp
pp
fast bow
f
Vln. II
pppp
pp
fast bow
f
Vlc.
pp
fast bow
f

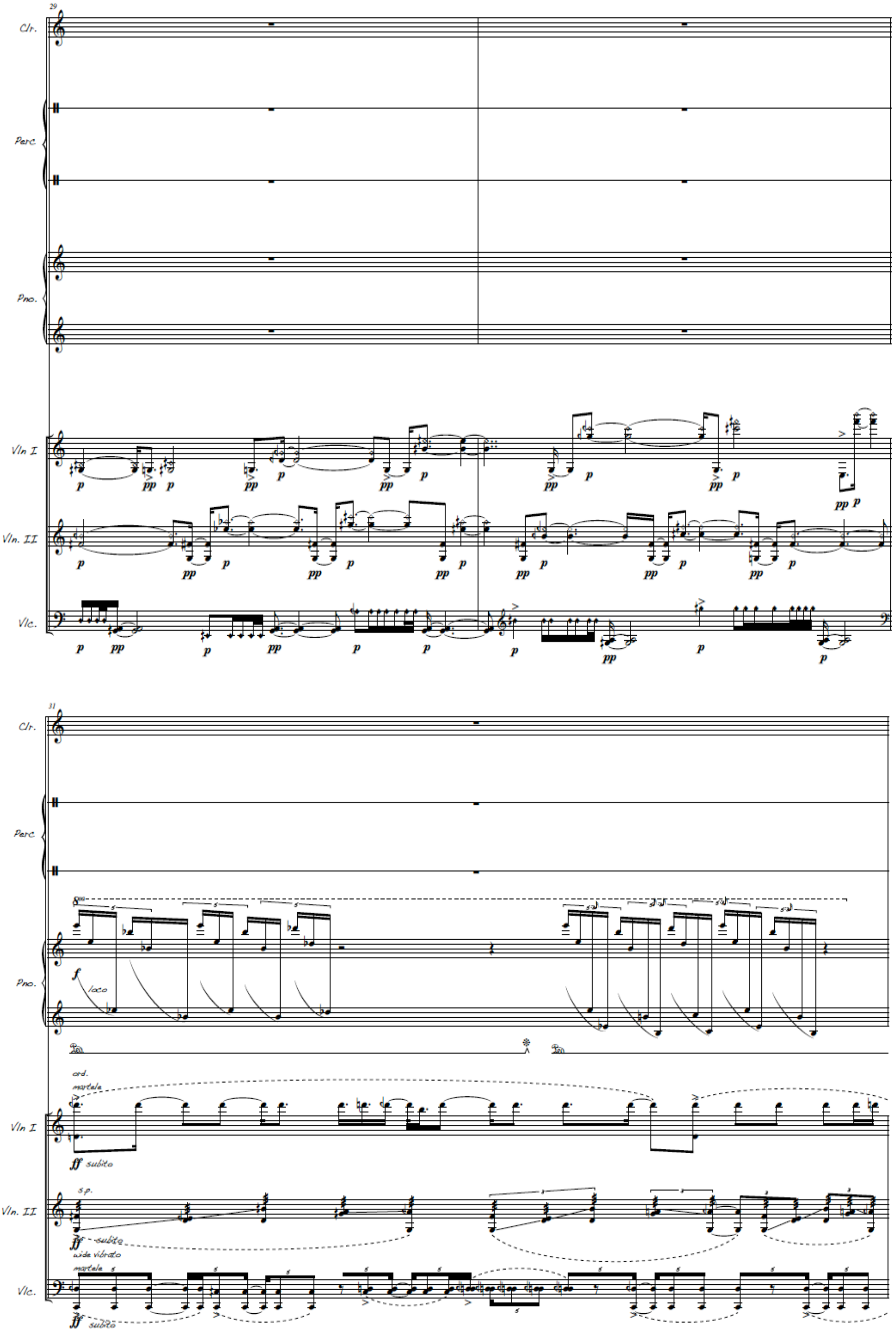

12
Clr.
Perc
Pno.
Vln I
Vln. II
Vlc.
Glock.
soft mallets
p
ppp
Flz.
(throat)
pp
pppp
Bass Drum
with hands
rim
Celesta
8va
touch string lightly
pppp
loure
ord.
14
f
15ma
loco
molto s.p.
flaut.
p subito
ppp
ppp subito
s.p.

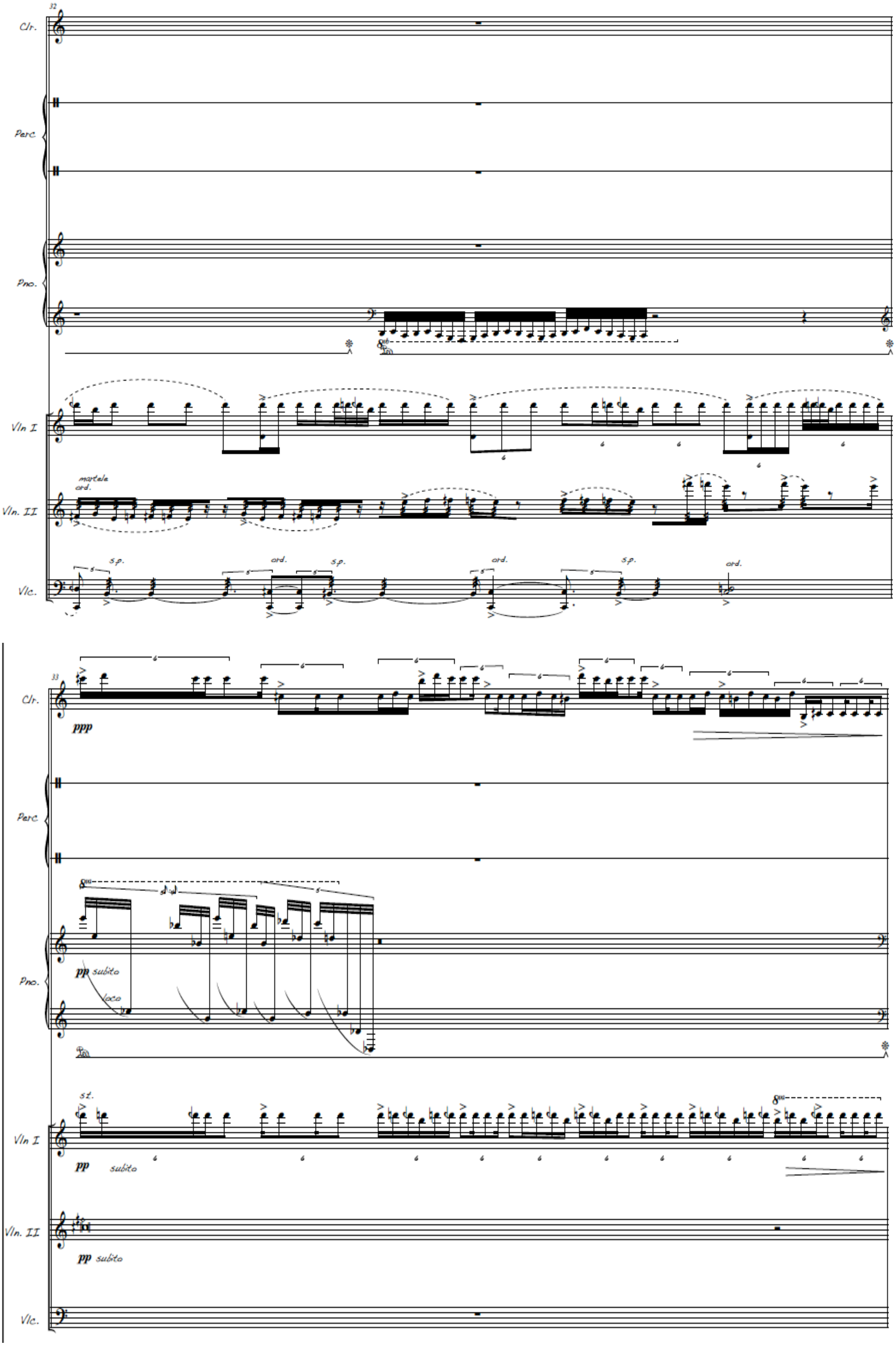

16
Cl.
Perc.
Pno.
Vln I
n. II
Vlc.
bisb
pp
Celesta
p
mp
loco
8va
Senza Sord.
s.p.
s.t.
f
p subito
18
Cl.
Perc.
Pno.
Vln I
Vln. II
Vlc.
ppp
Crotales
fp
with soft mallet
inside piano
mp
I open

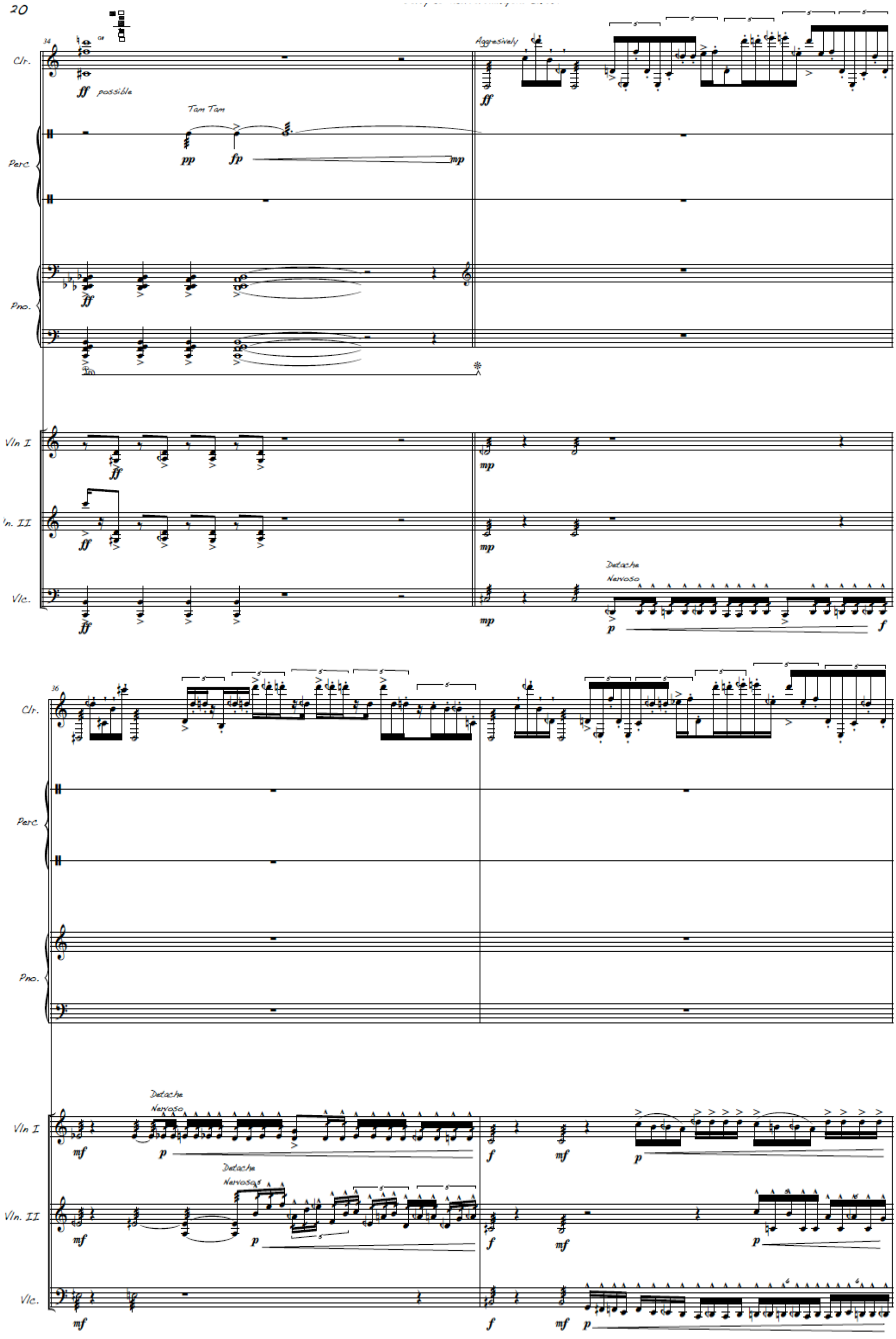

20
Cl.
Perc
Pno.
Vln I
Vln. II
Vlc.
Big Gong
Bass Drum with hands
p
+ Big Gong with fist
f
Subtones
Bass Drum Super Ball Mallet
p
touch skin with hands creating hish sound
Crotales arco
f
pp
f
pp
f
hit with palm inside piano
(8vb)
pppp
st.
Al. Punt.
fp
pppp
st.
s.p.
st.
Al. Punt.
fp
pppp
st.
ord.
st.
s.p.
st.
Al. Punt.
pp
p
fp
pppp
23
ord.
pp
Glock. soft mallets
pp
pp
ord. bow
8va
s.p.
pp
ord. bow
s.p.
pp
ord. bow
s.p.
pp

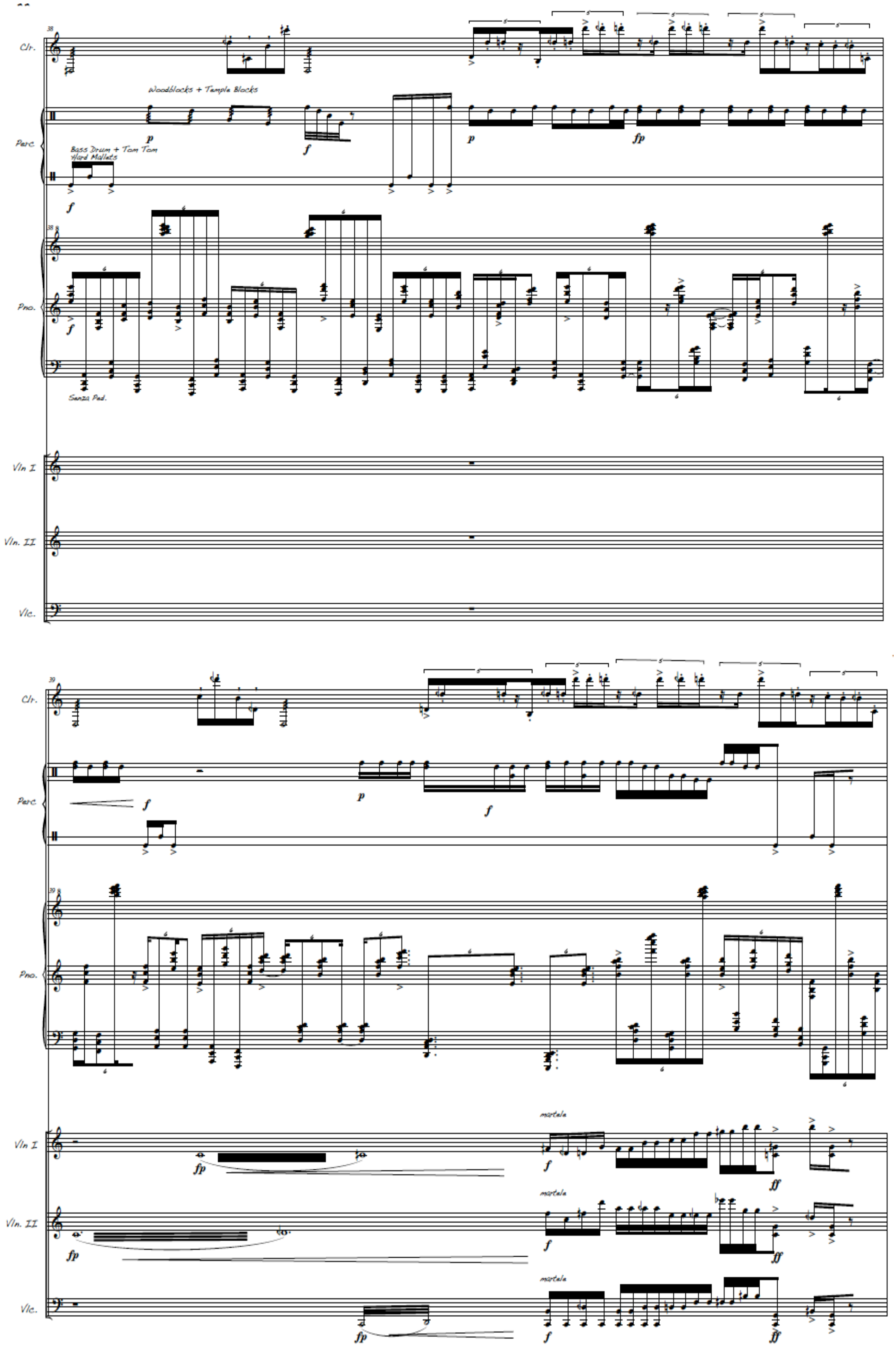

24
Cl'r.
Perc.
Pno.
Vln I
Vln. II
Vlc.
ppp
p
f
(on the string)
s.p.
25
Woodblocks + Temple Blocks
ord.

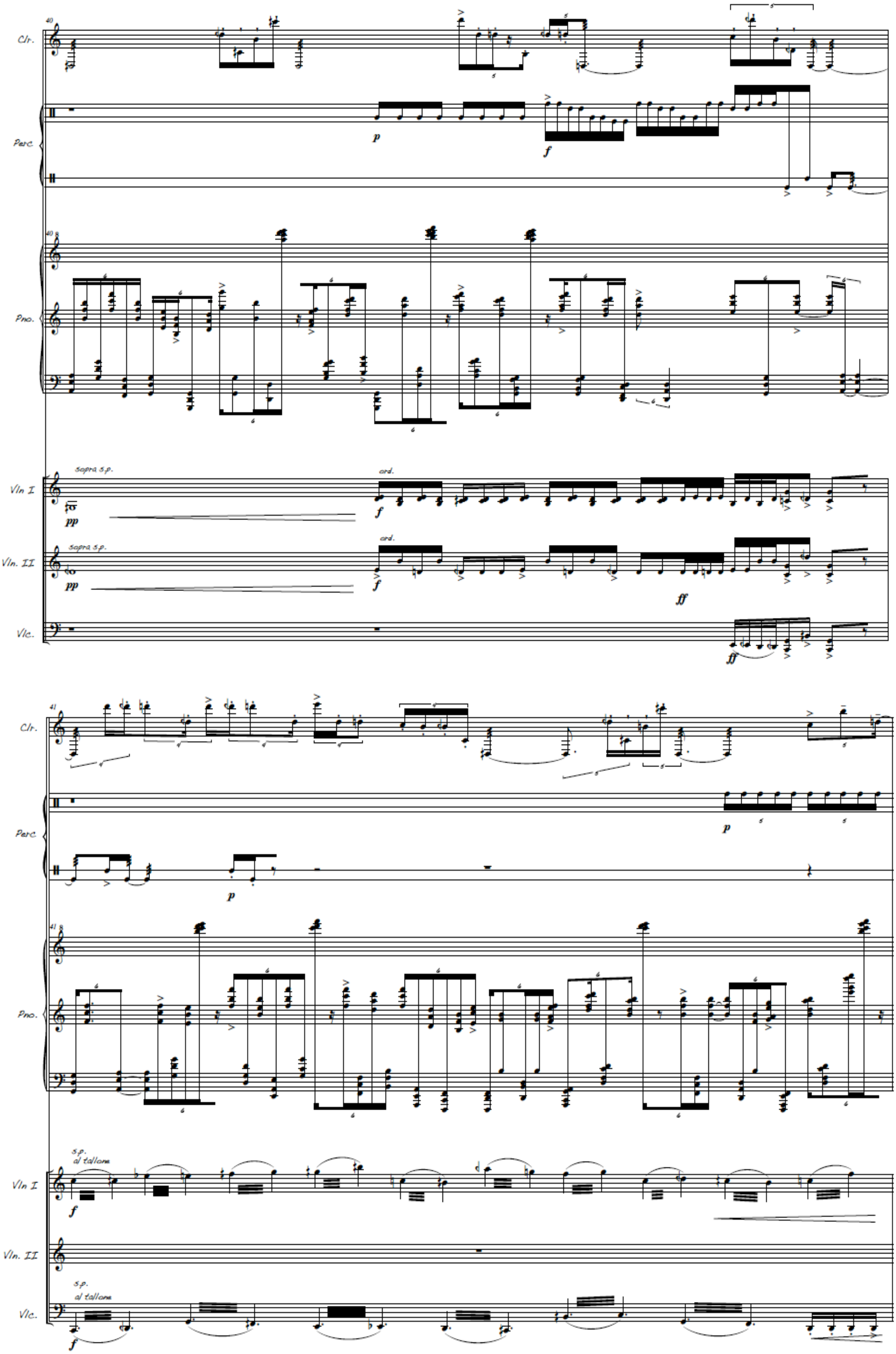

26
Clr.
Perc
Pno.
Vln I
Vln. II
Vlc.
Big Gong
Al. Punt.
non vib.
pp
ff
p
fp
pppp
27
Tom Toms
Fltz.
al tallone
molto st
flaut
non vib.

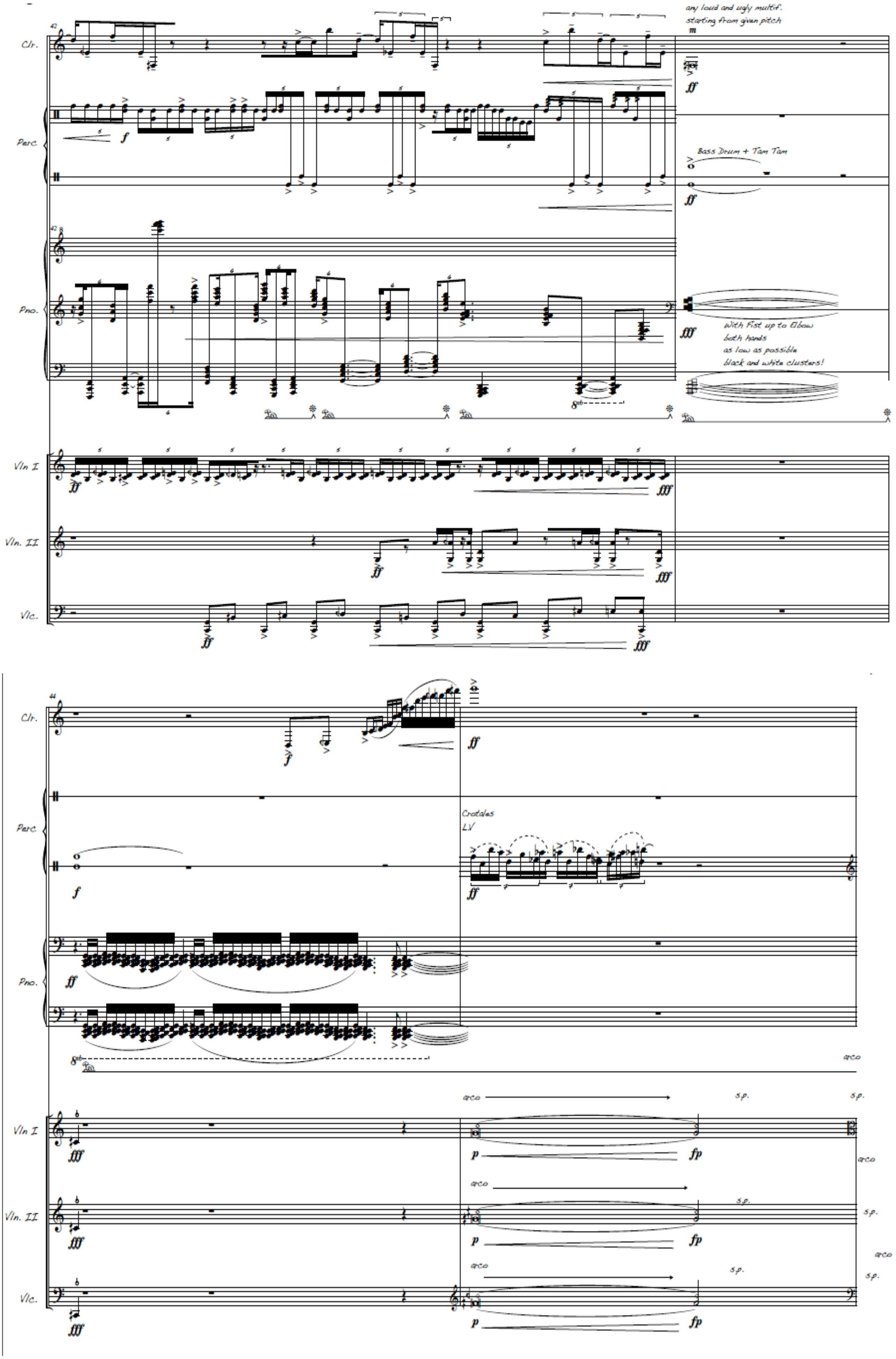

29
Clr.
Perc
Pno.
Vln I
Vln. II
Vlc.
p
pp
31
8va
f
loco
ord.
martele
ff subito
s.p.
ff subito
wide vibrato
martele
5
3

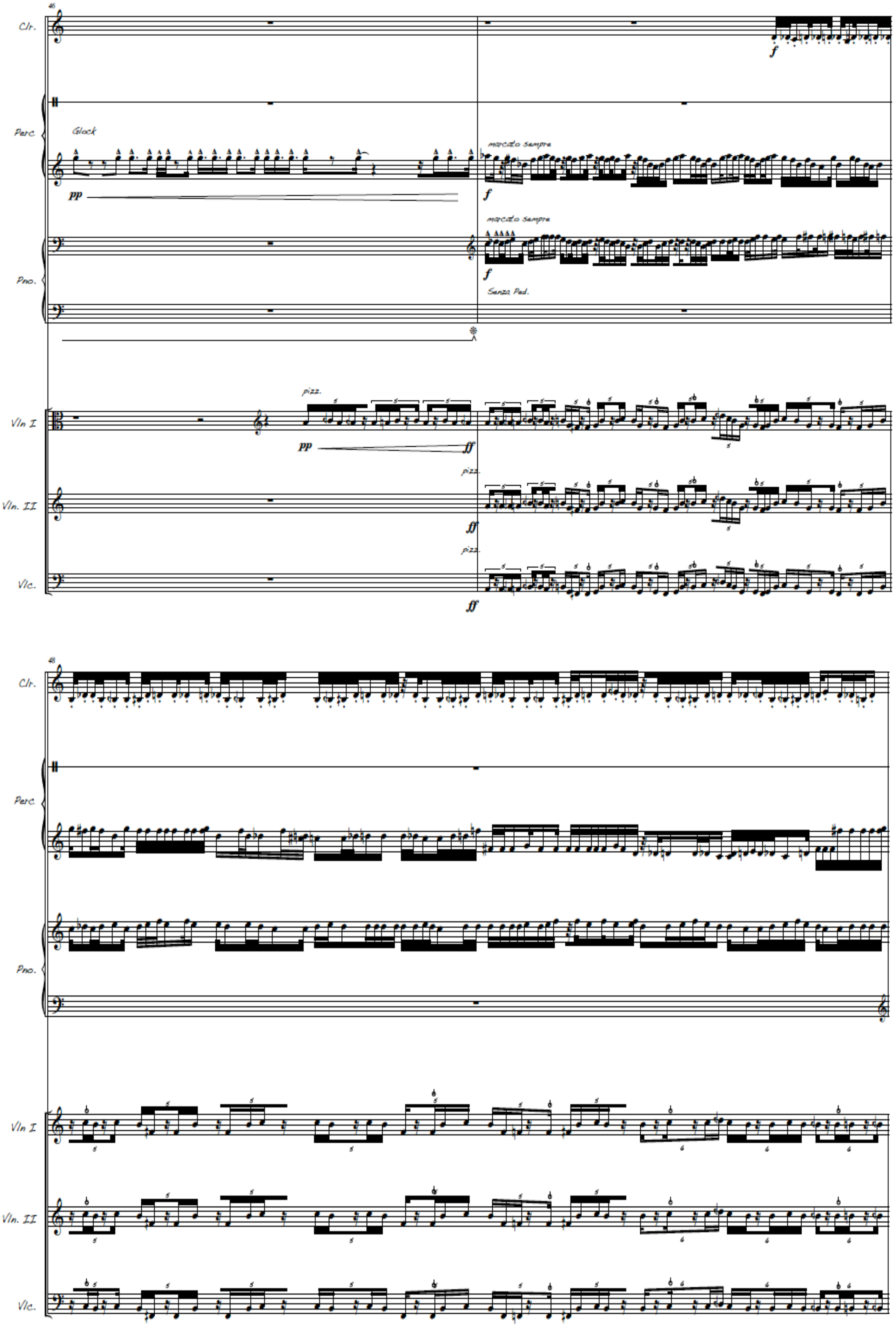

32
Cl.
Perc.
Pno.
Vln I
martele
ord.
Vln. II
s.p.
ord.
Vlc.
33
ppp
pp subito
loco
8va
st.
pp subito
pp subito

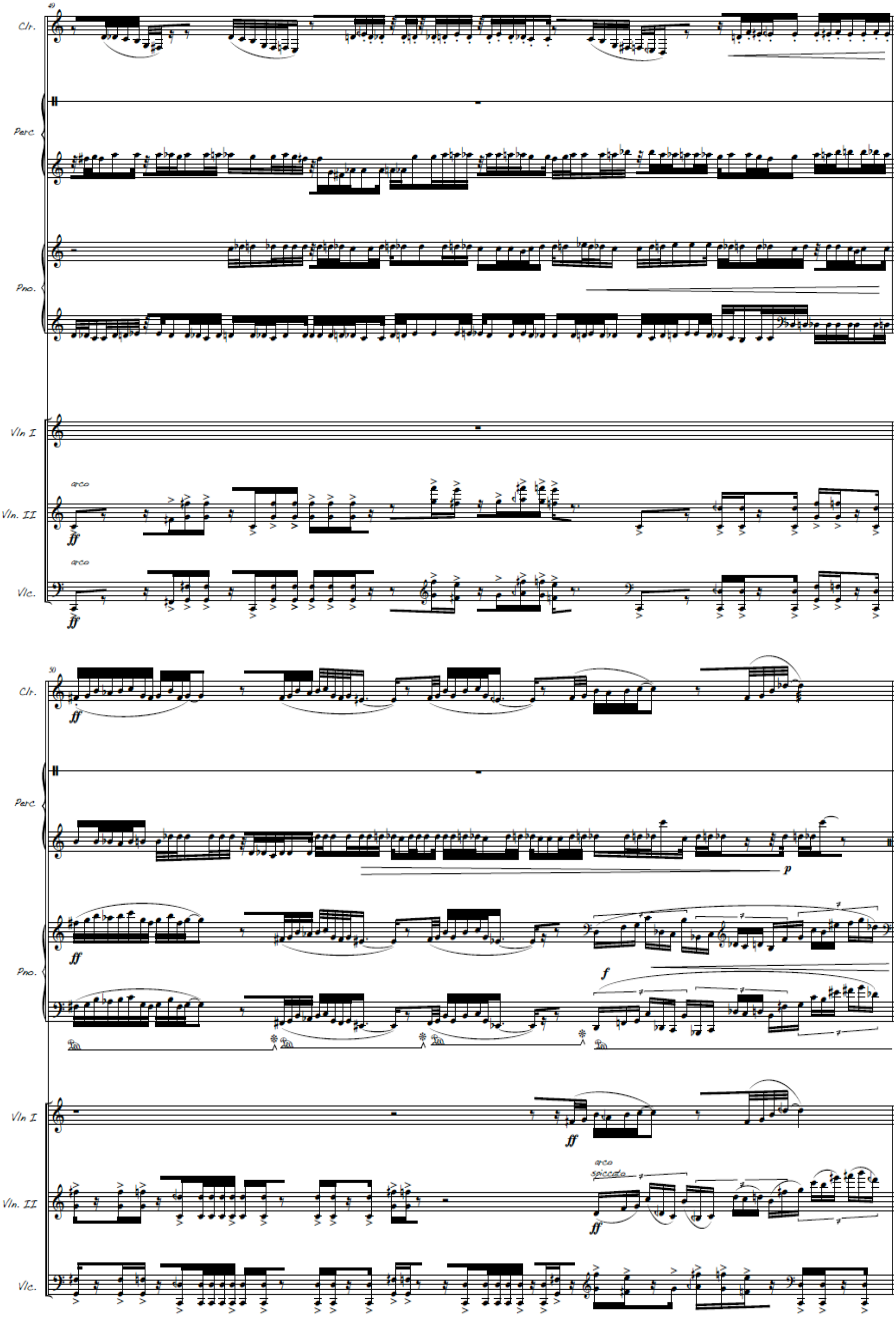

34
Cl.
ff possible
Tam Tam
pp
fp
mp
Perc.
Pno.
ff
Vln I
Vln. II
Vlc.
Aggresively
ff
mp
Detache
Nervoso
p
f
5
6
36
mf
p
f
mf

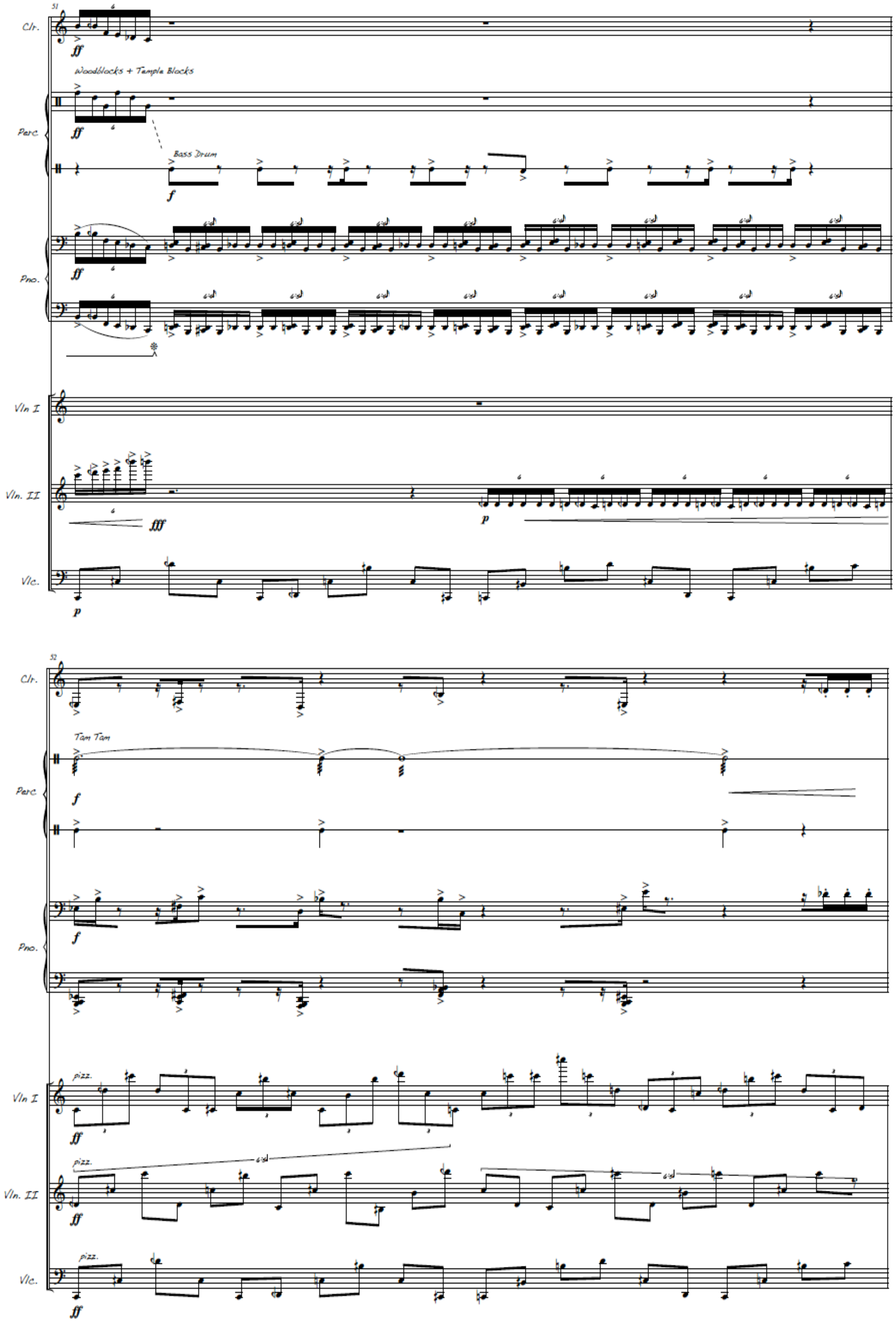

38
Cl.
Woodblocks + Temple Blocks
Perc.
Bass Drum + Tom Tom
Hard Mallets
Pno.
Senza Ped.
Vln I
Vln. II
Vlc.
39
martelé
martelé
martelé
p
f
fp
ff

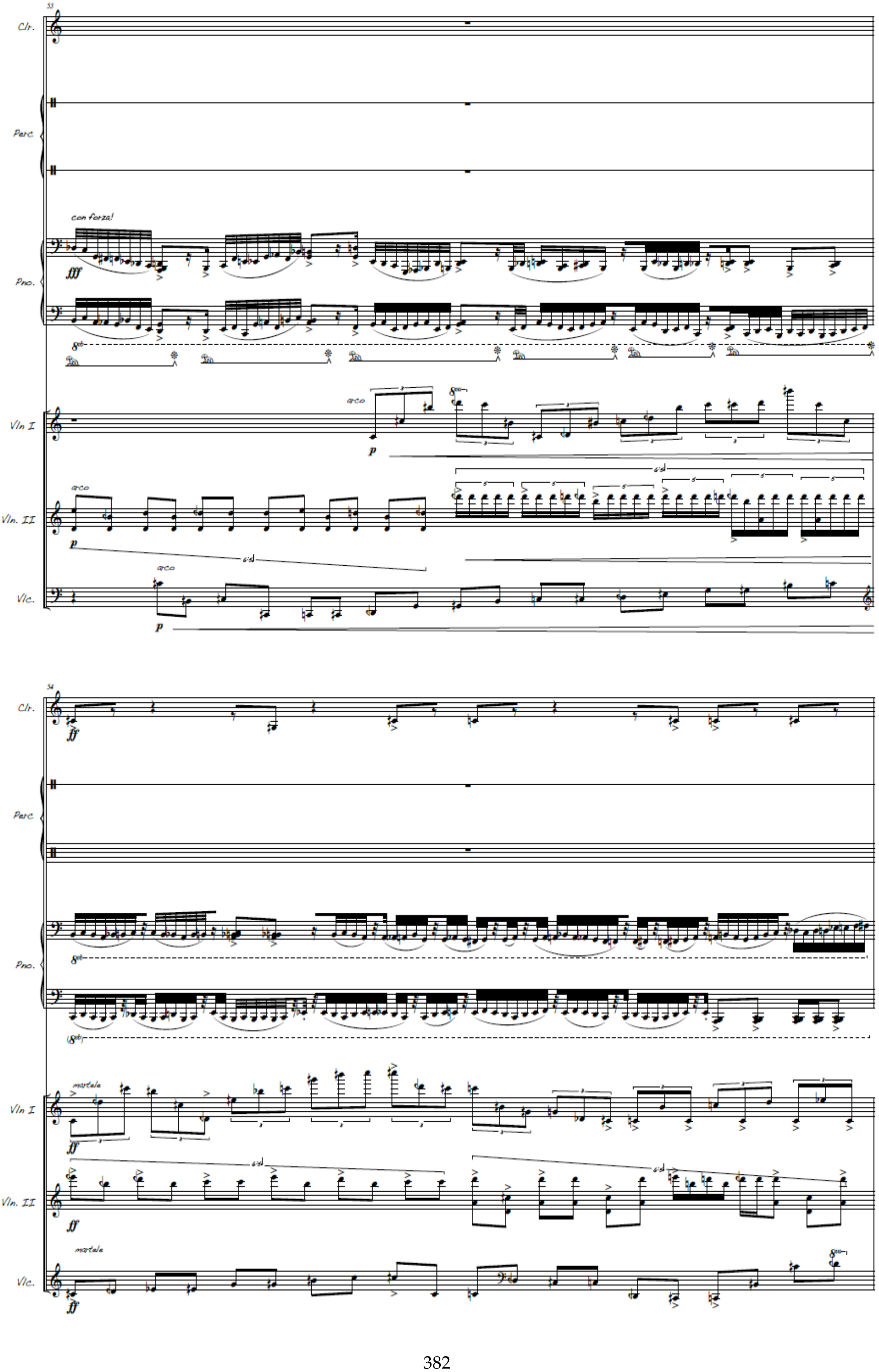

40
Clr.
Perc
Pno.
Vln I
Vln. II
Vlc.
p
f
sopra s.p.
pp
ord.
f
ff
41
s.p.
al tallone
f
p

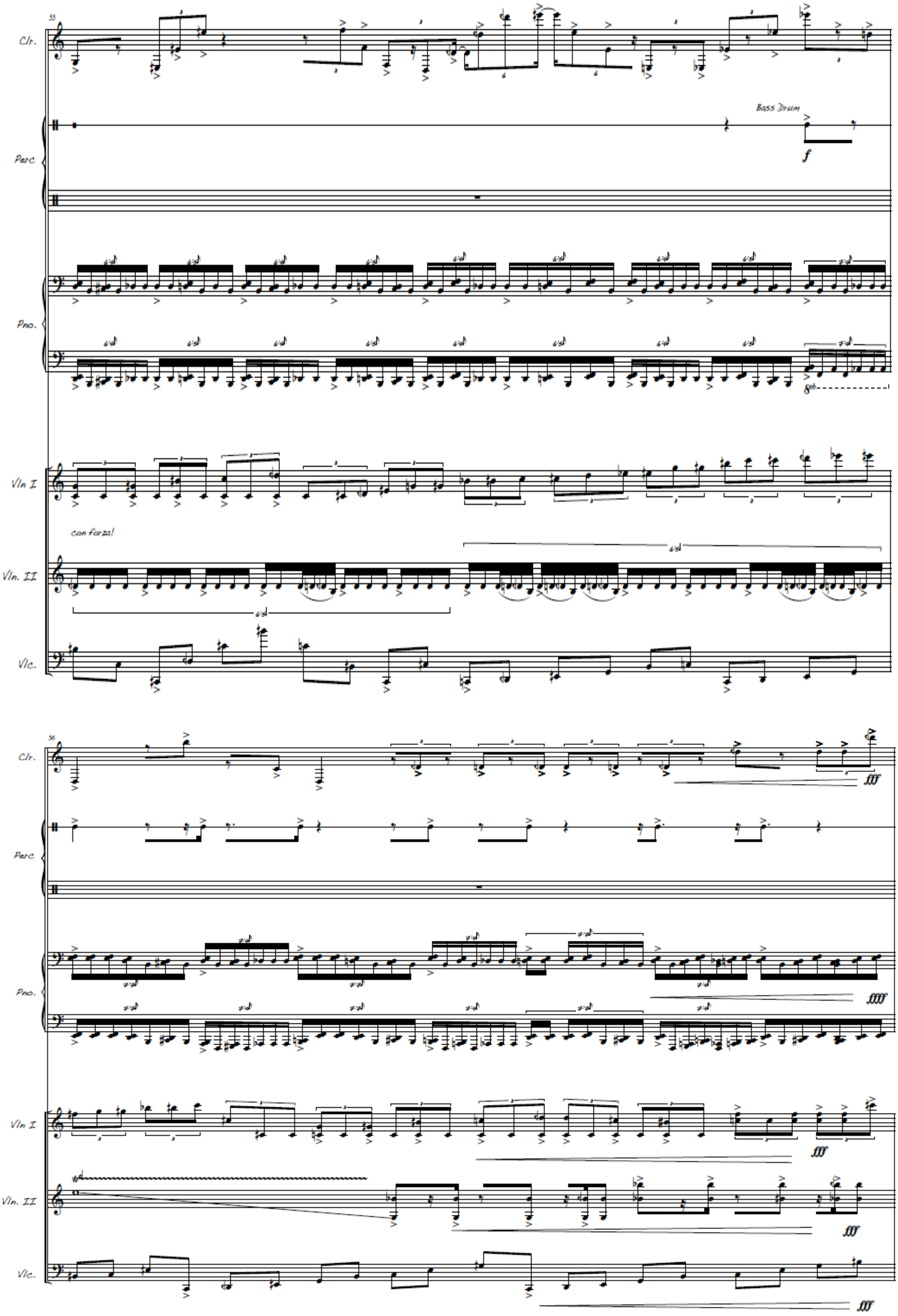

42
Clr.
Perc.
Pno.
Vln I
Vln. II
Vlc.
any loud and ugly multif.
starting from given pitch
Bass Drum + Tam Tam
With Fist up to Elbow
both hands
as low as possible
black and white clusters!
ff
f
fff
44
Crotales
LV
arco
s.p.
p
fp

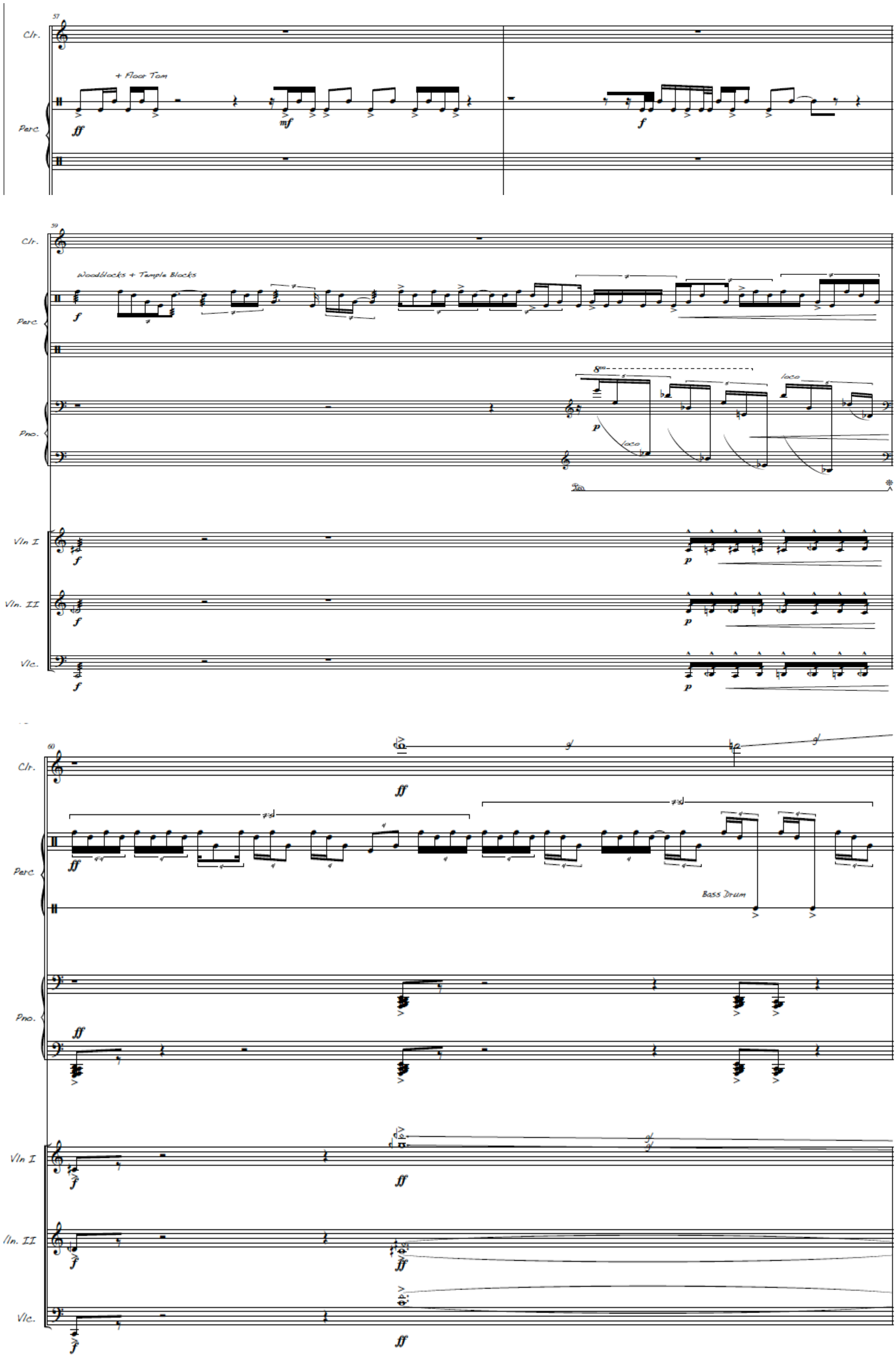

46
Clr.
Perc
Glock
pp
marcato sempre
f
Pno.
marcato sempre
f
Senza Ped.
pizz.
Vln I
pp
ff
pizz.
Vln. II
ff
pizz.
Vlc.
ff
48
Clr.
Perc
Pno.
Vln I
Vln. II
Vlc.

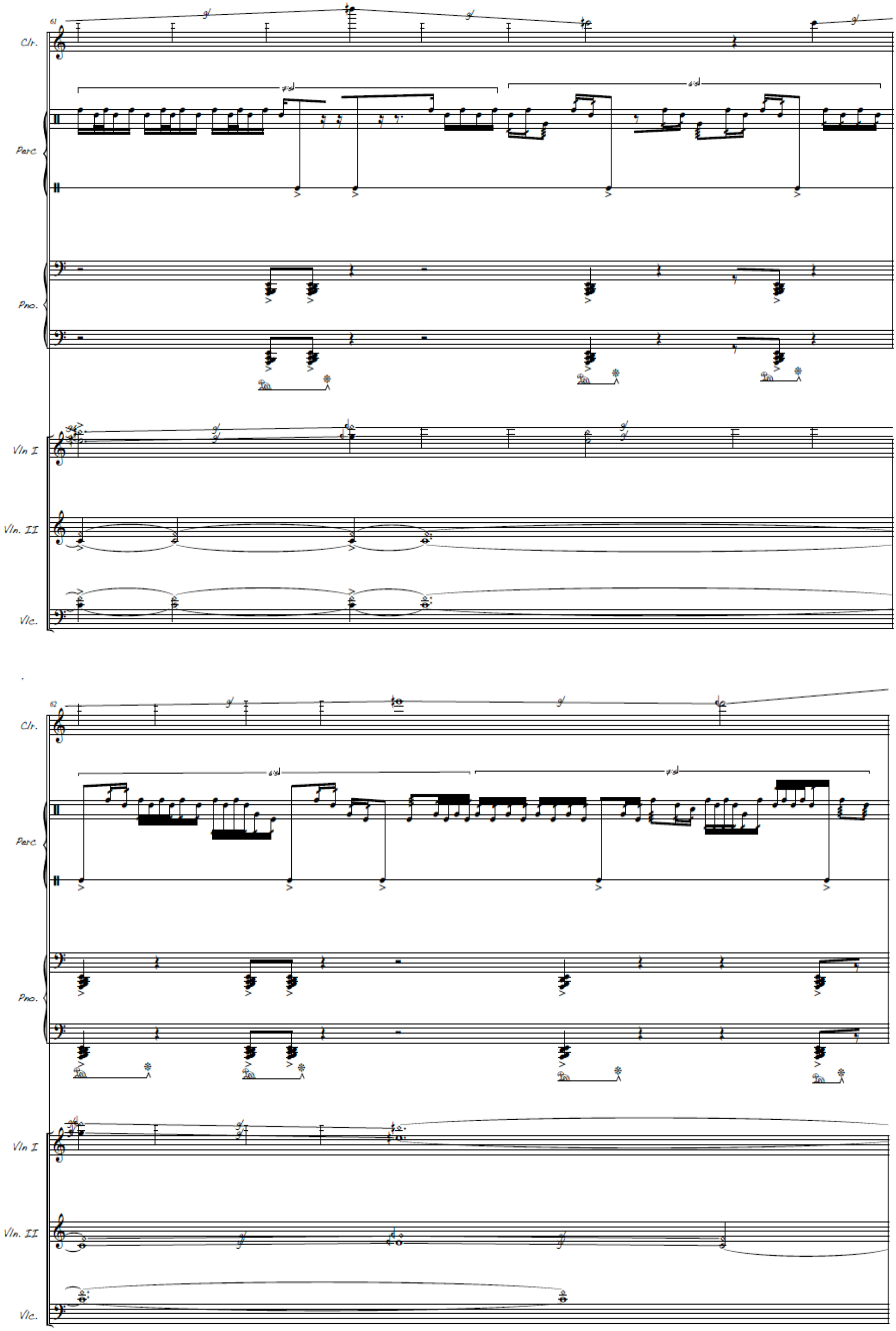

49
Clr.
Perc.
Pno.
Vln I
Vln. II
Vlc.
arco
ff
arco
ff
50
Clr.
ff
Perc.
p
Pno.
ff
f
Vln I
ff
Vln. II
arco
spiccato
ff
Vlc.

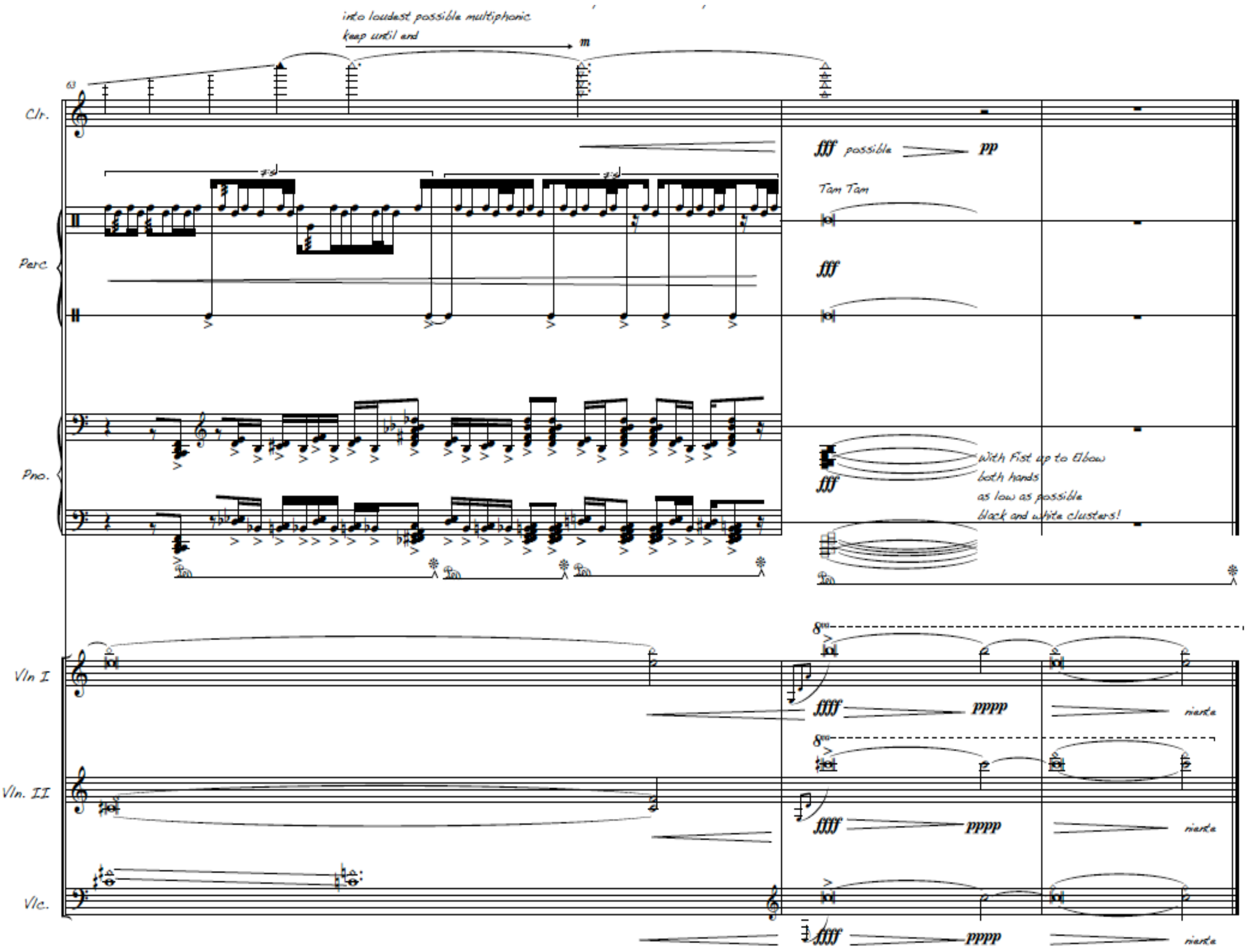

51
Clr.
ff
Woodblocks + Temple Blocks
Perc.
ff
Bass Drum
f
Pno.
ff
Vln I
Vln. II
fff
p
Vlc.
p
52
Clr.
Tam Tam
Perc.
f
Pno.
f
Vln I
pizz.
ff
Vln. II
pizz.
ff
Vlc.
pizz.
ff


53
Clr.
Perc.
con forza!
fff
Pno.
Vln I
arco
p
Vln. II
arco
p
Vlc.
arco
p
54
Clr.
ff
Perc.
Pno.
(8vb)
Vln I
martele
ff
Vln. II
ff
Vlc.
martele
ff


55
Clr.
Perc.
Bass Drum
f
Pno.
8vb
Vln I
con forza!
Vln. II
Vlc.
56
Clr.
fff
Perc.
Pno.
ffff
Vln I
fff
Vln. II
fff
Vlc.
fff


57
Clr.
+ Floor Tom
Perc
ff
mf
f
59
Woodblocks + Temple Blocks
Pno.
8va
loco
p
Vln I
Vln. II
Vlc.
60
Bass Drum
ff


61
Clr.
Perc.
Pno.
Vln I
Vln. II
Vlc.
62
Clr.
Perc.
Pno.
Vln I
Vln. II
Vlc.


into loudest possible multiphonic
keep until end
m
63
Clr.
Perc
Pno.
Vln I
Vln. II
Vlc.
fff possible
pp
Tam Tam
fff
With Fist up to Elbow
both hands
as low as possible
black and white clusters!
8va
ffff
pppp
niente

2) Shape Shifting (Hans Leeuw)

for Flute, Alto sax, Trumpet, Tenor Recorder (with effects), Electric Piano, Electric Bass & Drums

> *"The programme 'Contemporary music through non-western techniques' has been of significant influence for my musical development. I had always been searching for a way into jazz composition that would be both structured and free, a way of composing that would enable me to use grooves and rhythms of the more complex kind but that would still sound organic.*
>
> *The content of the programme is a constant source for generating material. I am not completely strict with it, but I do create rules on a piece-to-piece basis that are derived from the way of thinking I learnt during the studies. Devices that I often use in my work are mukhtays, yati phrases, jathi bhedam, tirmana, mukhtay combinations and mohara. I would like to use more elements like nadai bhedam or anuloma-pratiloma (as I did in 'Shape Shifting'), but according to my experience, such devices require players who either studied the programme or have been researching the same concepts of their own accord. In my own ensemble, I have been able to educate musicians through pieces, but only to a certain extent.*
>
> *As the base for my compositions, I mostly use some sort of algorithmic phrase (usually much shorter than a theme on one tala) and I build from there. I do not use the tala as such, but rather the concept of a fixed length, similar somehow to the concept of cycle. One piece I wrote for my band uses a fixed length of 363*

> *matras (3 x 11 x 11) for each of its seven parts. In this piece I, for example, use a mohara structure but since I have 33 x 11 (instead of 32 x 11) I need to utilise an extra bar for the finishing mukhtay. Using the material in this way I can use the logic of karnatic music as a starting point whilst adapting it to my own whims.*
>
> *I also discovered that teaching the basics of karnatic music to musicians of different degrees of proficiency can be very rewarding. Most students (ranging from amateur to (semi) professional) are very enthusiastic because they become much stronger rhythmically.*
>
> *Lastly, I am also programming karnatic rhythms in a computer program called MAXMSP. The algorithmic possibilities of karnatic music are endless and can deliver as well more interesting groovy and 'accessible' music than much of the looped based electronic music that has become main stream".*

'Shape Shifting' is a piece in which karnatic principals and jazz aesthetics are intertwined. It is based on three shadanga talas of the composer's own creation (as well as three ragas) using a form called *Ragatalamalika,* which usually calls for metrical modulations.

All talas are used in a cyclic fashion, and in most of them the composer constructs several outer amalgamation sequences. Since this is a crucial part of the creative process, I think it important to specify the manner in which the cycles have been developed.

-Structure

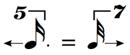
-First section (cycle of 52 beats) ♩ = 184

-Cycles 1-5: 9/8, 4/8, 9/8, 4/8, 9/8, 4/8, 9/8, 4/8
-Cycle 6: 7/8, 5/8, 3/8, 3/8, 7/8, 5/8, 3/8, 3/8, 7/8, 5/8, 4/8
-Cycle 7: Only ½ tala (26 beats) 4/4, 1/8, 4/4, 1/8, 4/4
-Cycle 8-16: 7/8, 5/8, 3/8, 3/8, 7/8, 5/8, 3/8, 3/8, 7/8, 5/8, 4/8
-Cycle 17: Only ½ tala (26 beats) 9/8, 4/4, 1/8, 4/4
-Cycle 18-19: 7/8, 5/8, 3/8, 3/8, 7/8, 5/8, 3/8, 3/8, 7/8, 5/8, 4/8
-Cycle 20: Only ½ tala (26 beats) 4/4, 1/8, 4/4, 1/8, 4/4
-Cycle 21: ¾ of a tala (39 beats): 6/8, 4/8, 6/8, 4/8, 6/8, 4/4, 5/8

Metrical modulation: the ♩ of a 4:5♪ becomes the new ♪

-Second section (cycle of 17 matras) (♪=74)

-Cycle 22: 4/8, 4/8, 3/8, 4/8, 2/8
-Cycle 23-29: 4/16, 3/16, 2/16, 3/16, 4/16, 3/16, 2/16, 3/16, 4/16, 3/16, 3/16
-Cycle 30-31: 3/8, 4/8, 3/8, 4/8, 3/8
-Cycle 32: 7/8, 7/7, 3/8

Metrical modulation: 

-Third section (cycle of 27 matras) (♪=105)

-Cycle 33-44: 7/8, 6/8, 7/8, 7/8

Metrical modulation: 105x10:7=150 (10𝅘𝅥𝅯:7♪). So the tempo of each 𝅘𝅥𝅯 of this irregular grouping is 150. The tempo of the 𝅘𝅥𝅯 is the same as the ♩ of the 6:7♪ in the new tala. To finally establish the new tempo the following calculation is required 150:6x7 = 175.

-Last section (52 matras) ♩ = 175

-Cycle 45-47: 7/8, 5/8, 3/8, 3/8, 7/8, 5/8, 3/8, 3/8, 7/8, 5/8, 4/8

-Cycle 48-53: 13/8 (x 4)

I find it important to explain the entire structure, since from the very beginning of my studies in India and my teaching in Amsterdam, the question of what a cycle is has been a recurrent question and generated much discussion.

For a karnatic musician, any structure conforming to a number of beats (tala) is synonymous of cycle, be it 3 or 128 beats. When working with karnatic musicians in my own music, I sometimes used similar manners of constructing cycles as in this piece. I found that for them it was very difficult to even conceive that different amalgamated metres that share the same number of beats could be the equivalent of a cycle.

The way of thinking of Hans Leeuw regarding cycle is, from my point of view, a very creative manner of developing this eastern concept but adapted to the needs of western creation. Whilst I find the concept of cycle one of the most important findings of eastern music in general, I always found that a complete respect for their way of constructing could be very constrictive for westerners.

However, having said this, I do not agree with the decision not to be completely faithful to a chosen number of beats, as is the case in the first section of 52 beats: whereas I can fully understand that in specific moments only ½ cycle could be utilised, I think this should always be done (not necessarily consecutively) twice or four times etc, so that the total number of beats are ultimately achieved. In this sense, I share the view of karnatic musicians that **the music has to adapt to the tala** (or cycles, or fixed lengths) and not the other way around. Therefore, I feel that cycle 21, in which ¾ of the tala is used, destroys the otherwise well-thought changing metres structure. This would be my sole objection to the construction of the whole piece.

As explained in chapter 1 (Suladi talas), the concept of cycle is something that really belongs to the realm of feeling and I find and have found very difficult to rationalise this concept; consequently, and probably because I somehow feel I live in between two worlds, my assessment or criticism of Hans' constructing manner is very personal; whereas for a karnatic musician this piece would have nothing to do with the tala system, for many westerners the use of a ¾ of a cycle is something they would never have a problem with. As said in the first chapter, one has to 'experience' the concept of cycle and this experience can be completely different depending on the cultural and musical background. The more one is exposed to the sources, the more is bound to understand and 'feel' the concept of cycle as conceived in karnatic music.

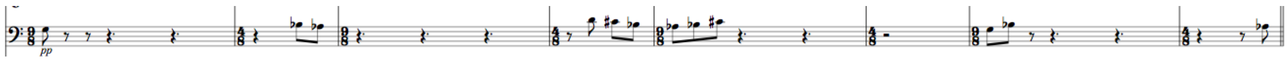
-Techniques

The entire composition is based on all sorts of yati phrases and yati mukthays (some of them of the composer's own creation) in almost every single instrument and musical parameter. Every layer constantly uses these notions to construct phrases, note values, or grooves. The other element abundantly employed is combinations anuloma-pratiloma.

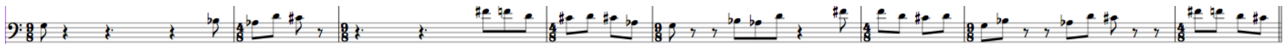
Since every single cycle utilises the aforementioned yati concept in one way or another, to proceed to explain every cycle would possibly be superfluous. Therefore, I have chosen the most representative ones.

Yati phrases and mukthays

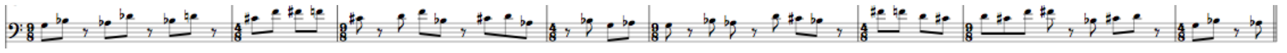
1) Measures 1-16 – Piano 1 (10) 2 (10) 3 3 (10) 2 (10) 1. Mridangamyati with viloma structure.



2) Measures 17-24 – Piano 1 (7) 4 (7) 7, 1 (2) 3 (2) 5, 2 (2) 3 (2) 4. Three successive srotovahayatis

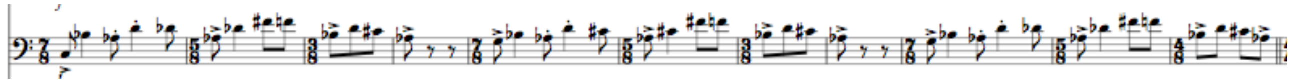


3) Measures 33-40 – Piano 2 (1) 2 (1) 2 (1) 2, 3 (1) 3 (1) 3 (1) 3. Two sama yatis followed by another mridagamyati with viloma structure 1 (1) 2 (1) 3 (1) 4 4 (1) 3 (1) 2 (1) 1

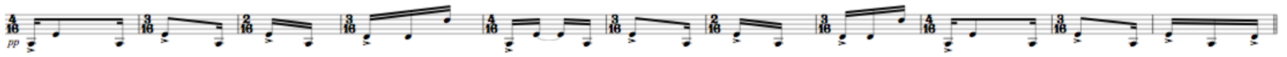


The second and third examples epitomise how most of the material is drawn: the use of all sort of yati phrases succeeding one another. Most instruments throughout the composition respond to this notion.

4) Measures 41-56 – Piano 7 5 3 1 (2) 7 5 3 1 (2) 7 5 3 1. A sama mukthay with an internal division following a gopuchayati concept.



5) Measures 218-272 – Drums and bass 4 3 2 1 (2) 4 3 2 1 (2) 4 3 2 1. Same as previous example



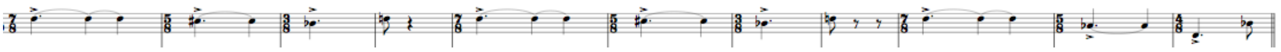
The fourth and fifth examples are the other main idea of the composition: whether as a groove or as a source for melodic development, mukthays with an inner division following a yati concept are present in much of the piece.

Anuloma-Pratiloma

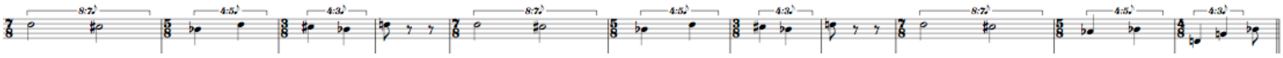
1) Measures 101-155 – Horns: 7 5 3 1, 7 5 3 1, 7 5 3 1. The starting point is the same mukthay as in measures 41-56, but the composer uses it to superimpose different gatis on the frame, employing the third developmental technique of combination anuloma-pratiloma. The composer also follows the phrasing idea

of using the same number of notes per cell of different lengths, together with the gopuchayati notion of systematically increasing the number of matras. In this manner, each cycle takes a different gati or speed.

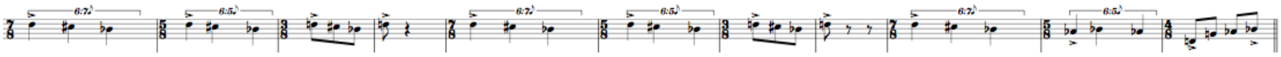
1:7♪, 1:5♪, 1:3♪, 1 (2) 1:7♪, 1:5♪, 1:3♪, 1 (2) 1:7♪, 1:5♪, 1:3♪, 1



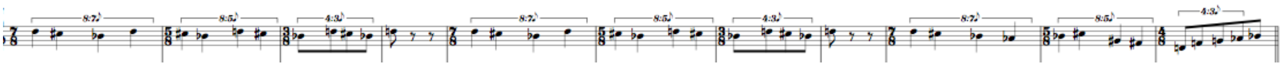
2:7♪, 2:5♪, 2:3♪, 1 (2) 2:7♪, 2:5♪, 2:3♪, 1 (2) 2:7♪, 2:5♪, 2:3♪, 1



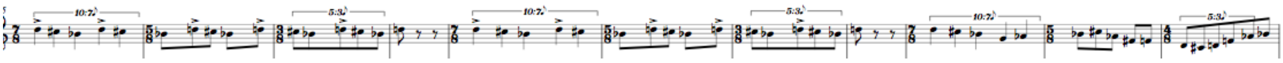
3:7♪, 3:5♪, 3:3♪, 1 (2) 3:7♪, 3:5♪, 3:3♪, 1 (2) 3:7♪, 3:5♪, 3:3♪, 1



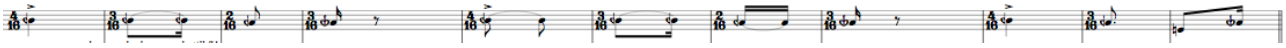
4:7♪, 4:5♪, 4:3♪, 1 (2) 4:7♪, 4:5♪, 4:3♪, 1 (2) 4:7♪, 4:5♪, 4:3♪, 1



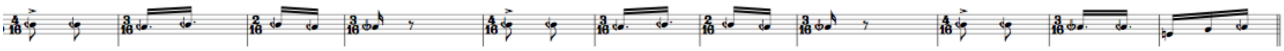
5:7♪, 5:5♪, 5:3♪, 1 (2) 5:7♪, 5:5♪, 5:3♪, 1 (2) 5:7♪, 5:5♪, 5:3♪, 1



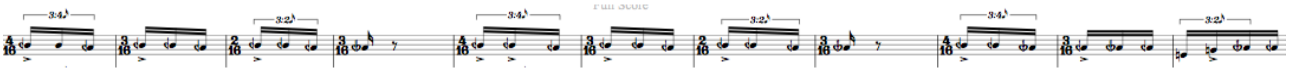
2) Measures 218-272 – Horns 1:2♪, 1:3♪, 1:2𝅘𝅥𝅯, 1 (2) 1:2♪, 1:3♪, 1:2𝅘𝅥𝅯, 1 (2) 1:2♪, 1:3♪, 1:2𝅘𝅥𝅯, 1. Exactly the same elements as the previous sequence, except that the numbers utilised do not follow a yati pattern.



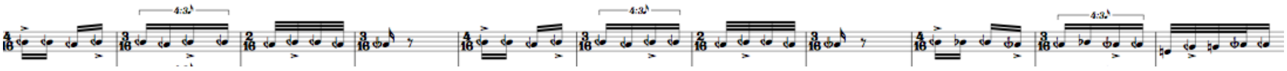
2:2♪, 2:3♪, 2:2𝅘𝅥𝅯, 1 (2) 2:2♪, 2:3♪, 2:2𝅘𝅥𝅯, 1 (2) 2:2♪, 2:3♪, 2:2𝅘𝅥𝅯, 1



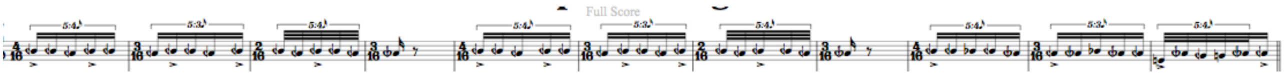
3:2♪, 3:3♪, 3:2𝅘𝅥𝅯, 1 (2) 3:2♪, 3:3♪, 3:2𝅘𝅥𝅯, 1 (2) 3:2♪, 3:3♪, 3:2𝅘𝅥𝅯, 1



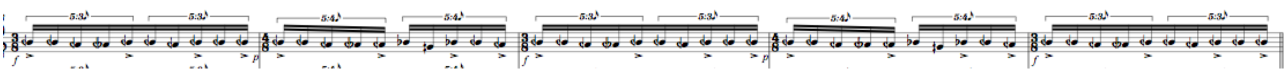
4:2♪, 4:3♪, 4:2𝅘𝅥𝅯, 1 (2) 4:2♪, 4:3♪, 4:2𝅘𝅥𝅯, 1 (2) 4:2♪, 4:3♪, 4:2𝅘𝅥𝅯, 1



5:2♪, 5:3♪, 5:2𝅘𝅥𝅯, 1 (2) 5:2♪, 5:3♪, 5:2𝅘𝅥𝅯, 1 (2) 5:2♪, 5:3♪, 5:2𝅘𝅥𝅯, 1

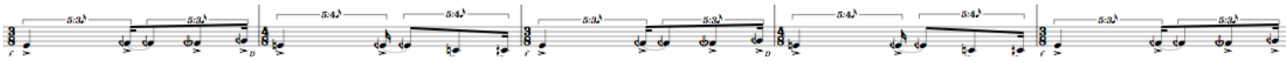


3) Measures 273-277 – Horns 10:6𝅘𝅥𝅯, 10:8𝅘𝅥𝅯, 10:6𝅘𝅥𝅯, 10:8𝅘𝅥𝅯, 10:6𝅘𝅥𝅯, (last 10:6𝅘𝅥𝅯 subdivided in 4 3 2 1). Another example of the third developmental technique of anuloma-pratiloma combinations, constructed this time around the changing metres sequence.



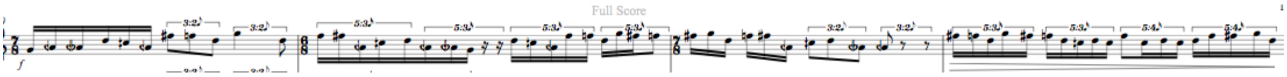
4) Measures 273-277 – Piano and bass 10 [4321]:6♪, 10 [4321]:8♪, 10 [4321]:6♪, 10 [4321]:8♪, 10 [4321]:6♪

The subdivision of 4 3 2 1 utilised by the horns for the last 10:6𝅘𝅥𝅯 is applied to every frame in this layer. By doing so, the composer also enters the territory of phrasing through gati changes (speeds in this case).



In all previous examples, although the main idea is the use of anuloma-pratiloma, this one is developed once again using a yati concept of increasing or decreasing systematically. This manner provides a coherence to the use of anuloma-pratiloma, especially because the yati concept is the motor of the piece.

5) Measures 310-313 – Horns 6:3♪, 3:2♪, 3:2♪, 10:3♪, 10:3♪, 6:3♪, 3:2♪, 3:2♪, 10:3♪,10:4♪



There are several elements converging in this section:

-The structure provided by the mukhy system for the tala of 27 beats is 3 2 2, 3 3, 3 2 2, 3 2 2: the composer uses tisra in the first and third parts and khanda in the second and fourth.

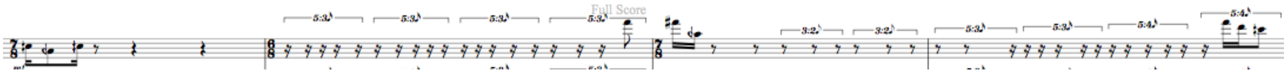
-An overall sama mukthay construction: 20 (2) 20 (2) 20.

-Phrasing through gati changes: since the total number of matras in one cycle (by using the previous gatis) is 64, the mukthay goes through gati and speed changes. It is ultimately a similar idea to moharas within shadanga talas, as seen in chapter 27 (Tala Prastara).

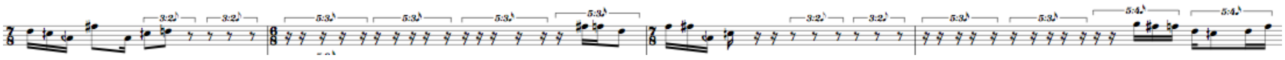
-There is a slow build up to the mukthay/melody of measures 310-313 by using four previous mukthays that increase their length in a gopuchayati fashion: every mukthay increases by four matras in every pala and decreases by six matras in the gap.

Measures 294-309 – Development towards final mukthay following a yati pattern.

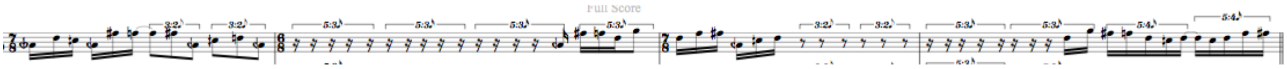
4 (26) 4 (26) 4



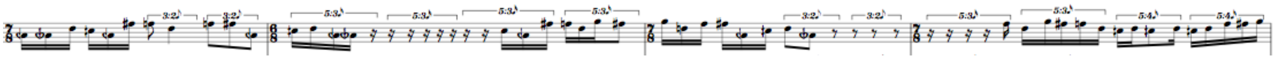
8 (20) 8 (20) 8



12 (14) 12 (14) 12



16 (8) 16 (8) 16



Although in this section the gatis change following the inner division provided by the mukhy system, all parameters are permeated once again with the notion of yati.

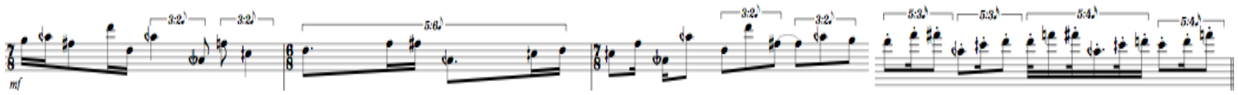
Mohara

Measures 314-329 – Horns

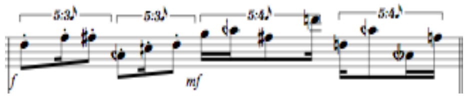
This device is developed in 4 cycles of the tala of 27 beats and utilises the same anuloma-pratiloma frames as in the previous example. Since the bigger gesture of 7 6 7 7 employed in this tala produces four frames, the four phrases of a mohara are structured around them.

6:3♪, 3:2♪, 3:2♪ 5:3♪, 5:3♪ 6:3♪, 3:2♪, 3:2♪ 10:3♪,10:4♪

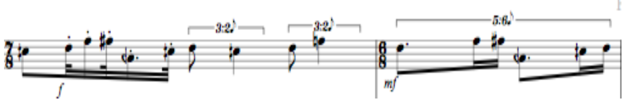
A B C D



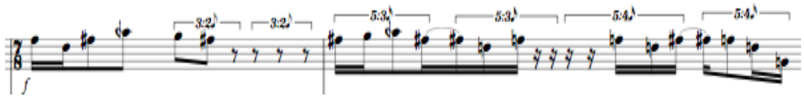
½ D –A



A (end), 2nd cell ½ D B



Final mukhtay 8 (4) 8 (4) 8



In this mohara the composer combines various elements presented in the relevant chapter, as well as their use within shadanga talas: on one hand he employs two different gatis, tisra for phrases A and C and khanda for phrases B and D, and on the other hand he makes use of the mukhy system of regrouping the inner cells of the shadanga tala so that four groups are created and used as frames for the four phrases of the mohara.

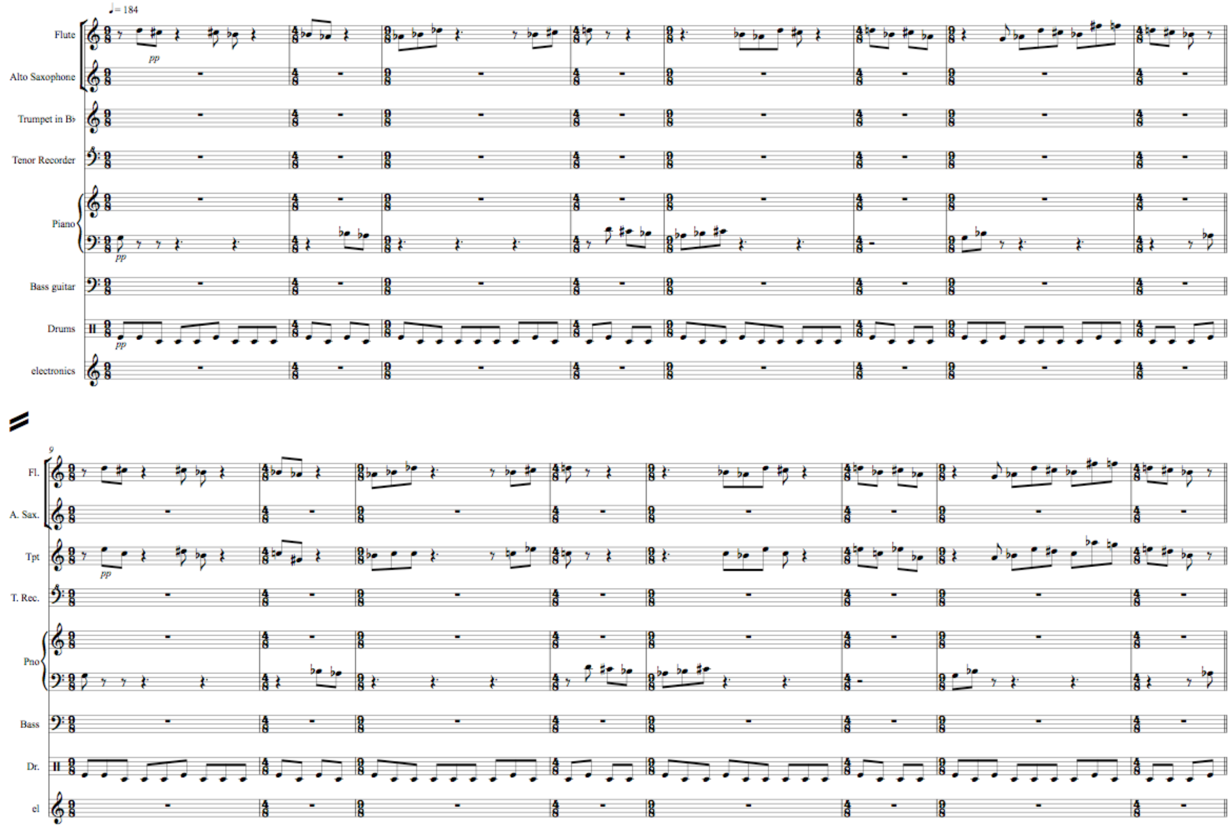
The anuloma-pratiloma frames remain unaltered throughout the mohara. This results in a rather complex displacement of the phrases whilst going through several gati or speed changes, once the characteristic pattern of ½ D, A, ½ D, C, Mukthay is reached (although the composer replaces C by B to avoid further difficulty to the already complex structure).

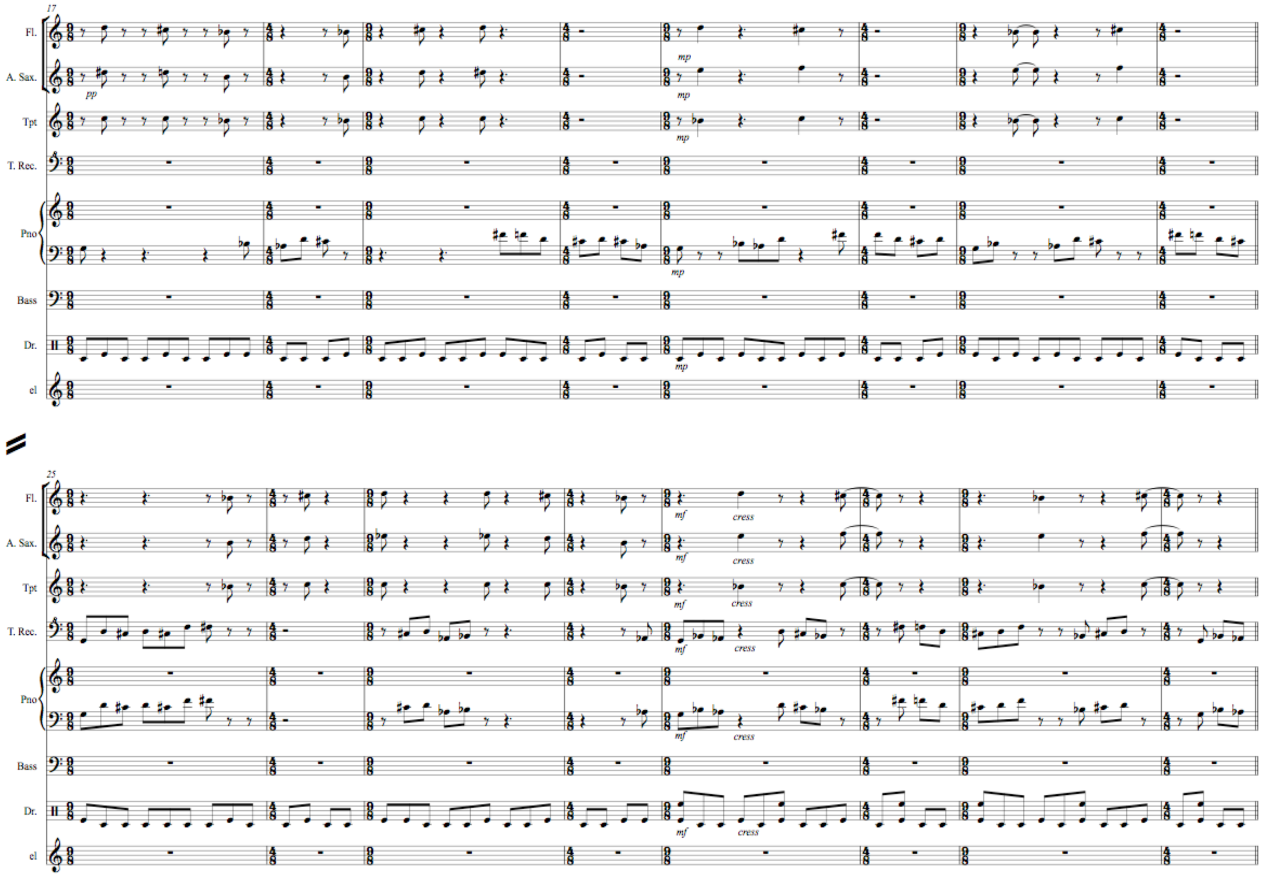
As a general comment to the piece I would very much like to point out how the composer has managed to write a high-energy and very ‘groovy’ piece revolving almost exclusively around the concept of yati in every conceivable manner, whilst using complex talas and metrical modulations. Practically every phrase or pattern contains some form of yati concept, including the development of anuloma-pratiloma sequences.

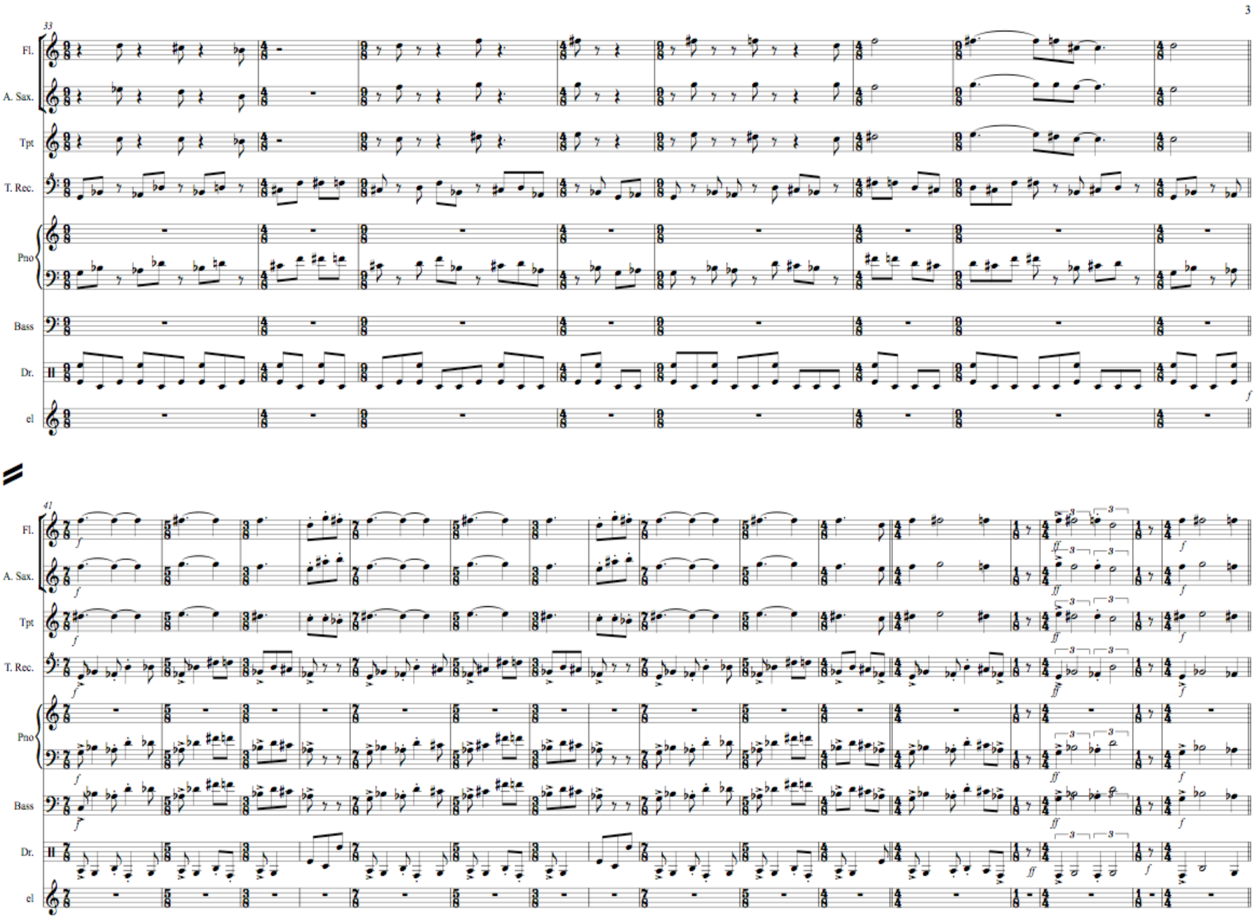
Through my compositional experience I can say that all forms of yatis require much time dedicated to calculations and they do not always fit into the flow of the music. Hans Leeuw has, to my view, achieved constructing a coherent piece that never sounds repetitive using the yati concept as, essentially, the sole source of producing material.

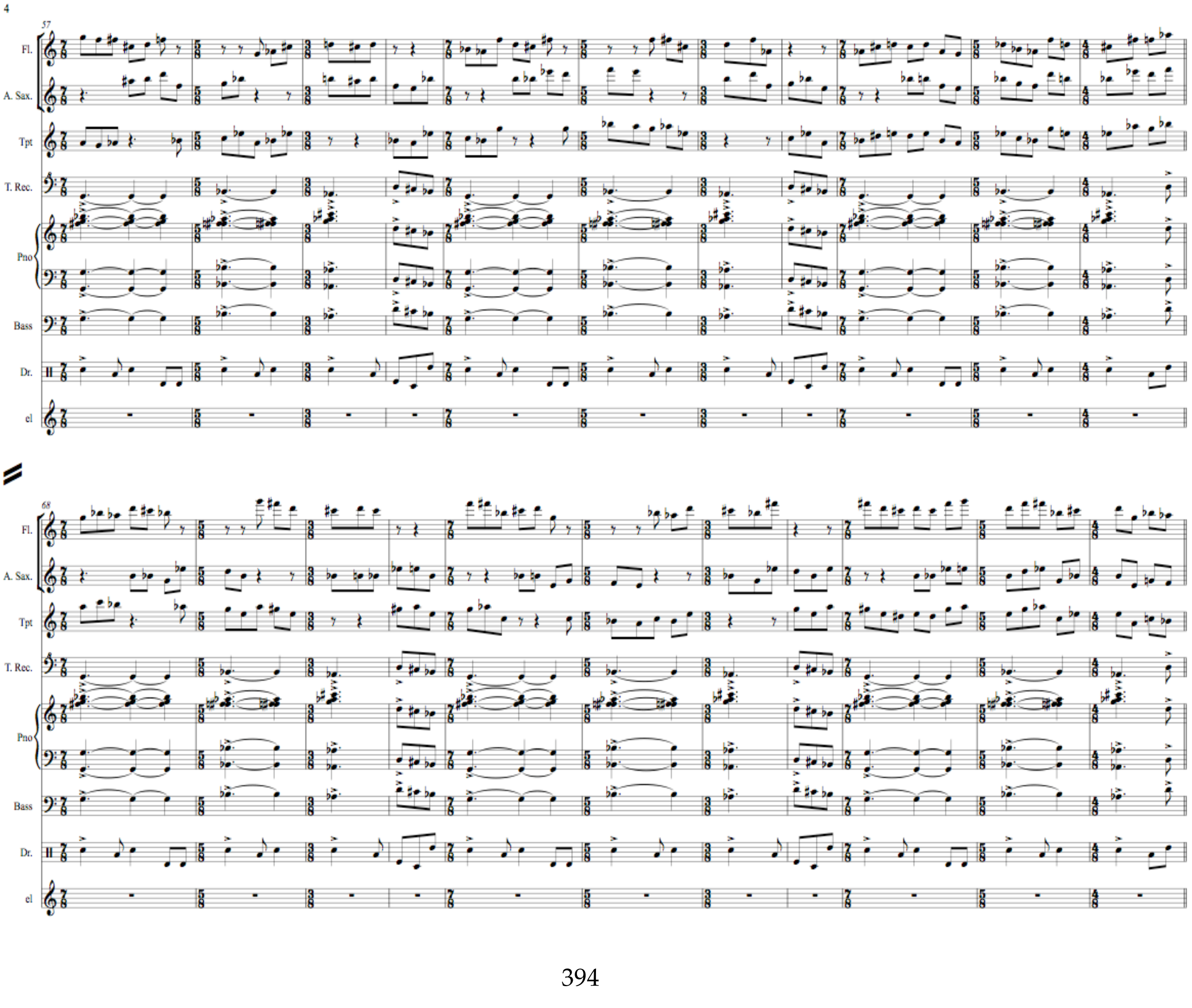
(track 283)

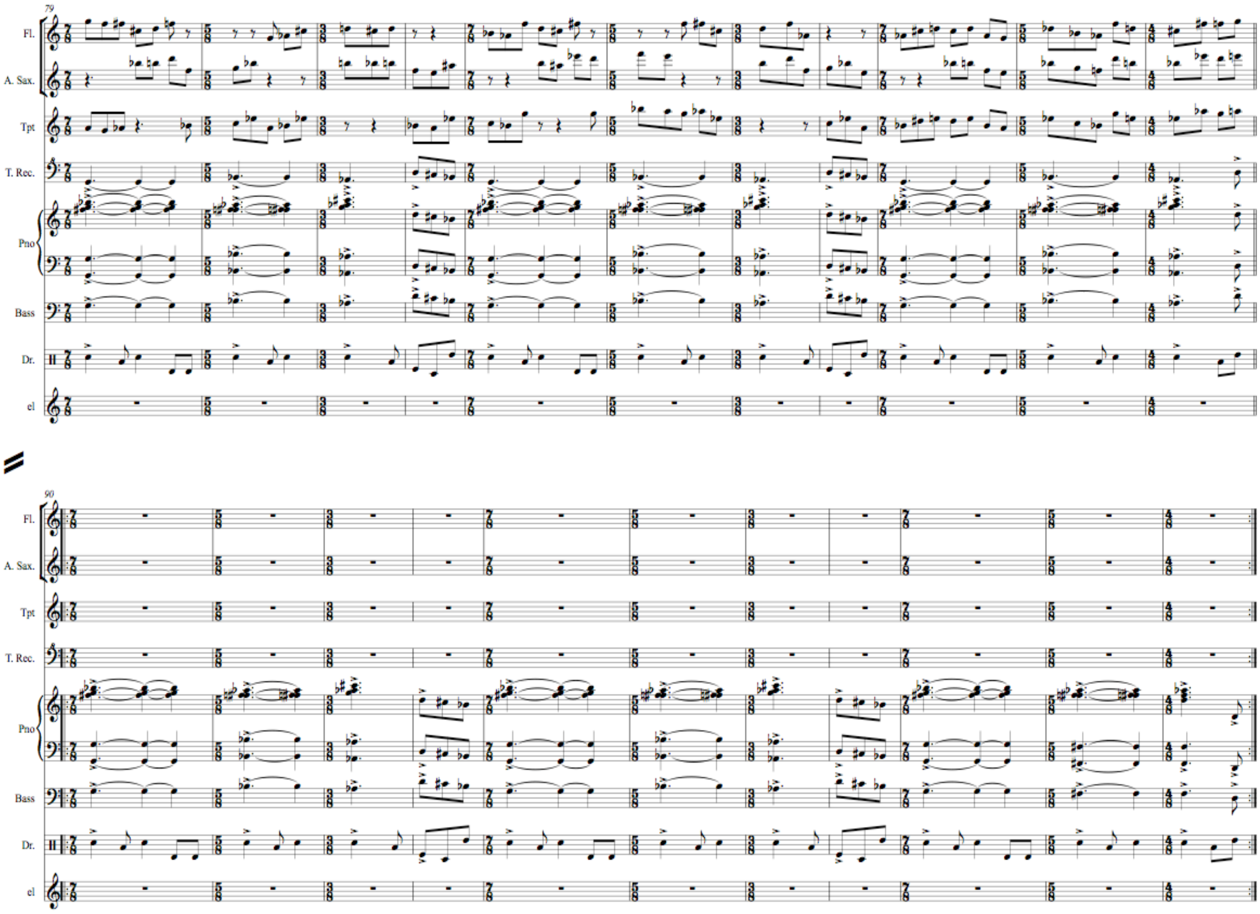
Shape Shifting

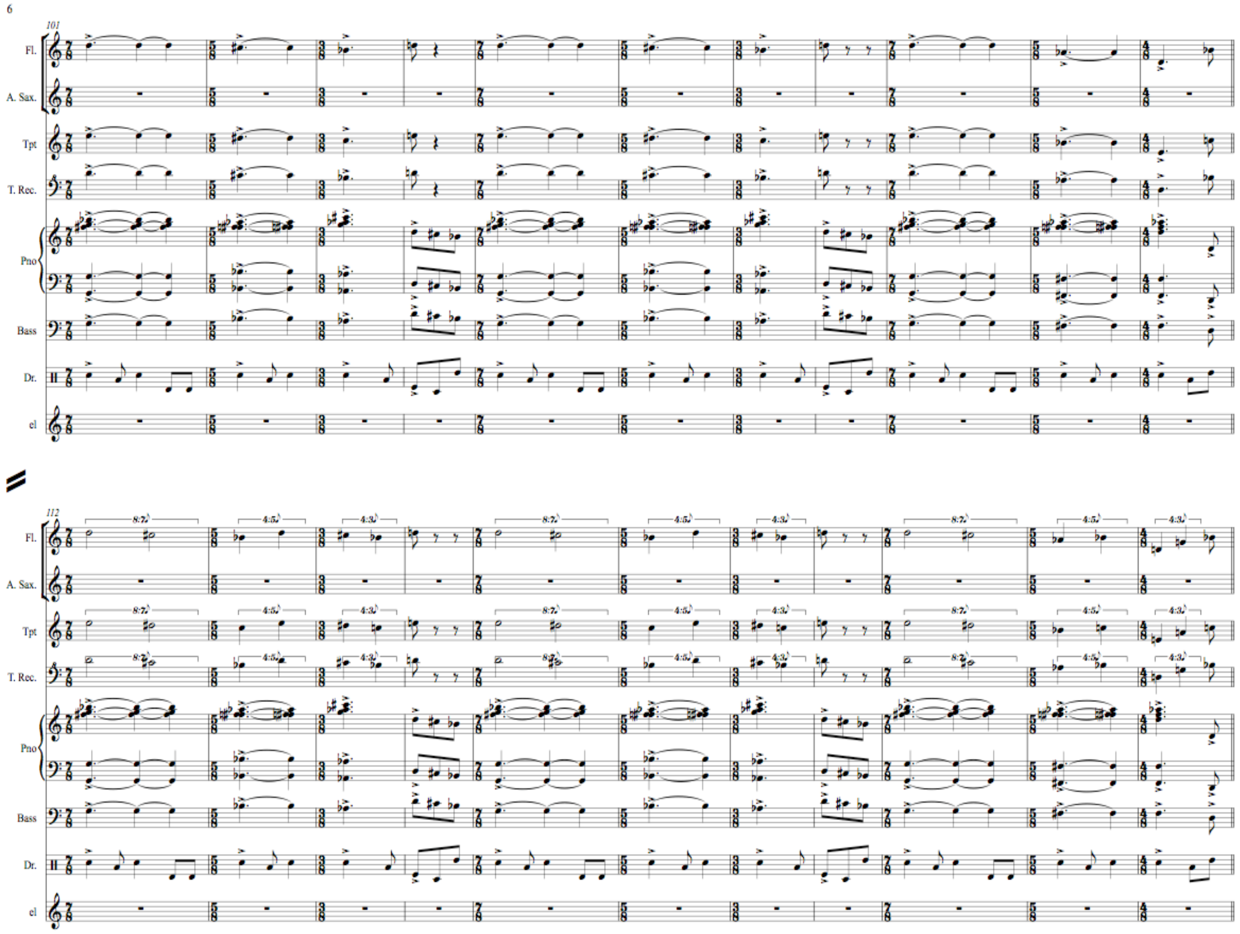

♩= 184
Flute
Alto Saxophone
Trumpet in B♭
Tenor Recorder
Piano
Bass guitar
Drums
electronics
pp
9
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
el

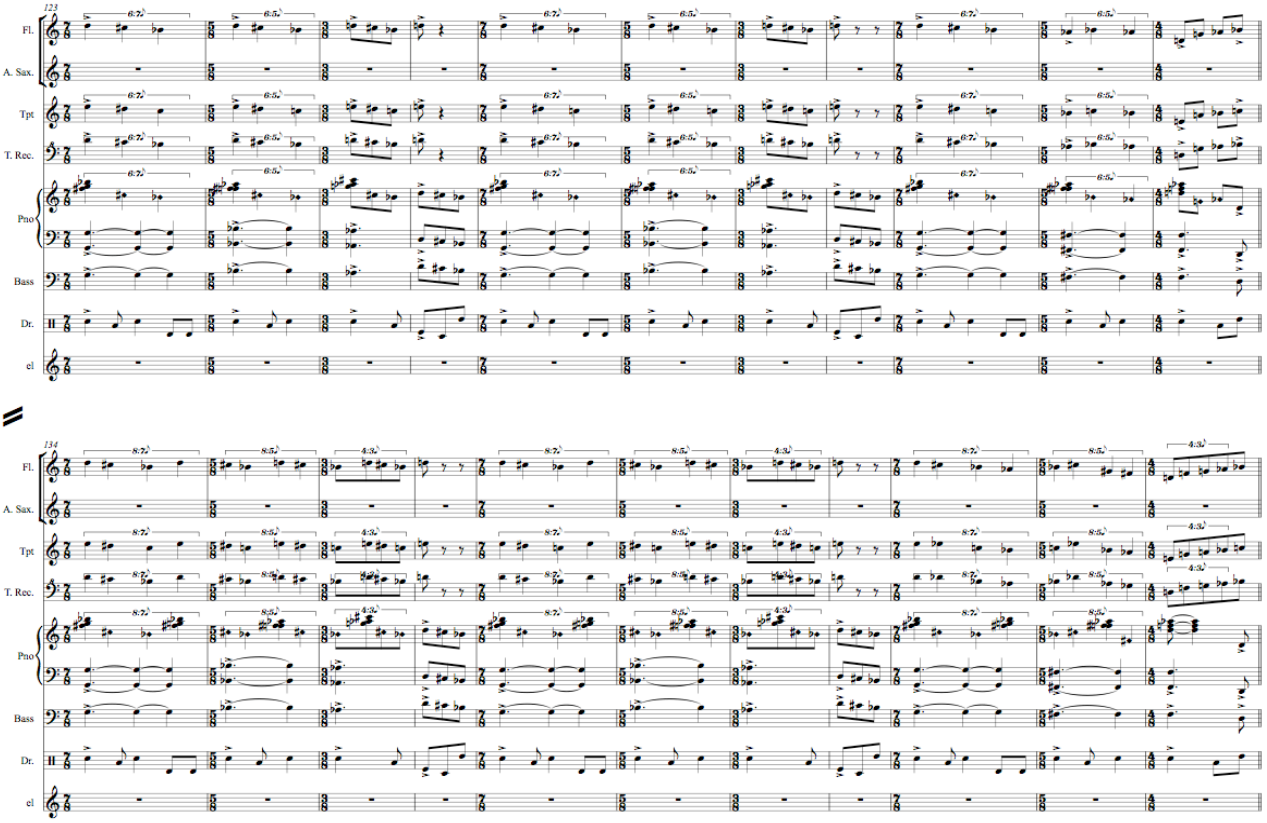

17
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
el
pp
mp
25
mf
cress

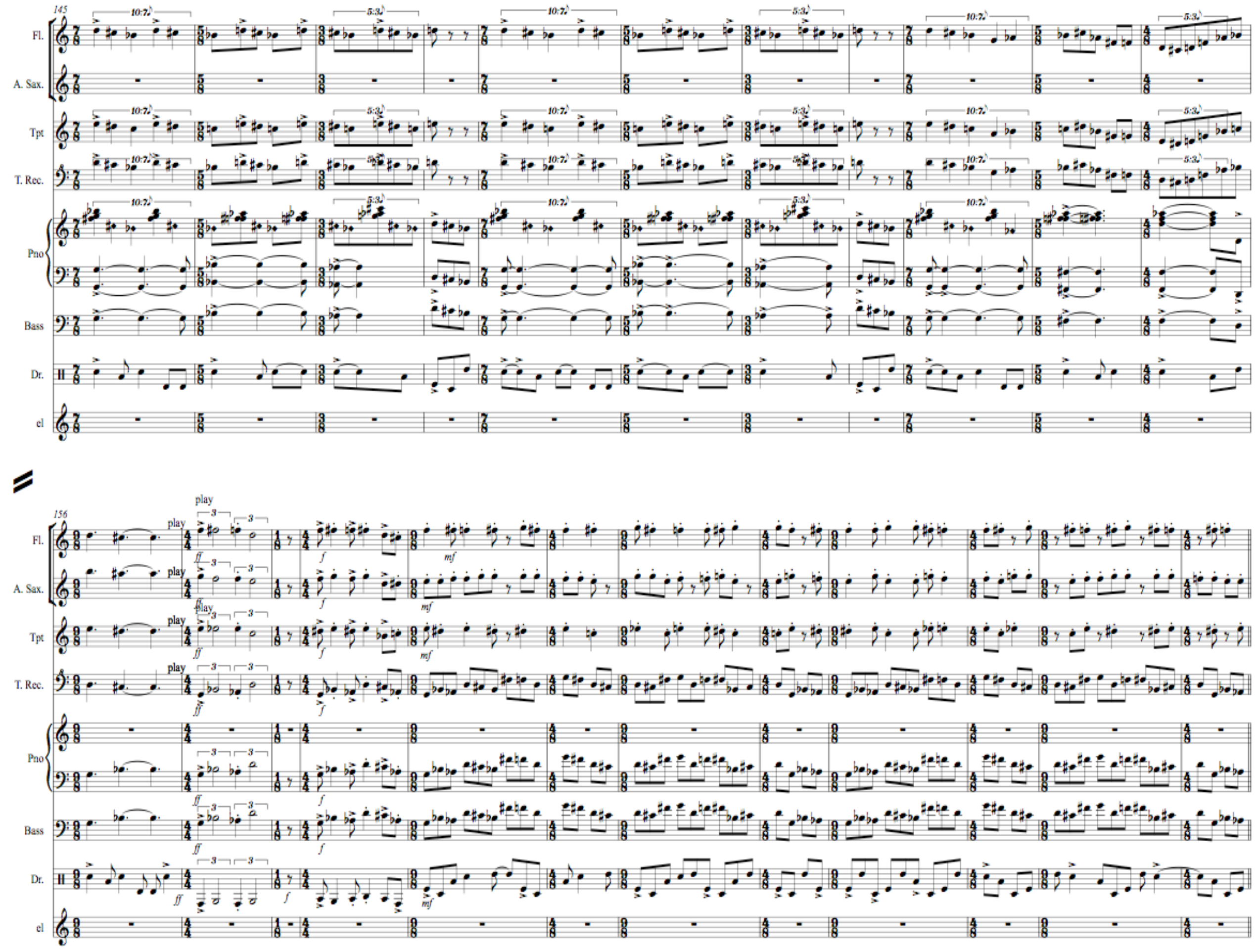

3
33
41
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
el
f
ff

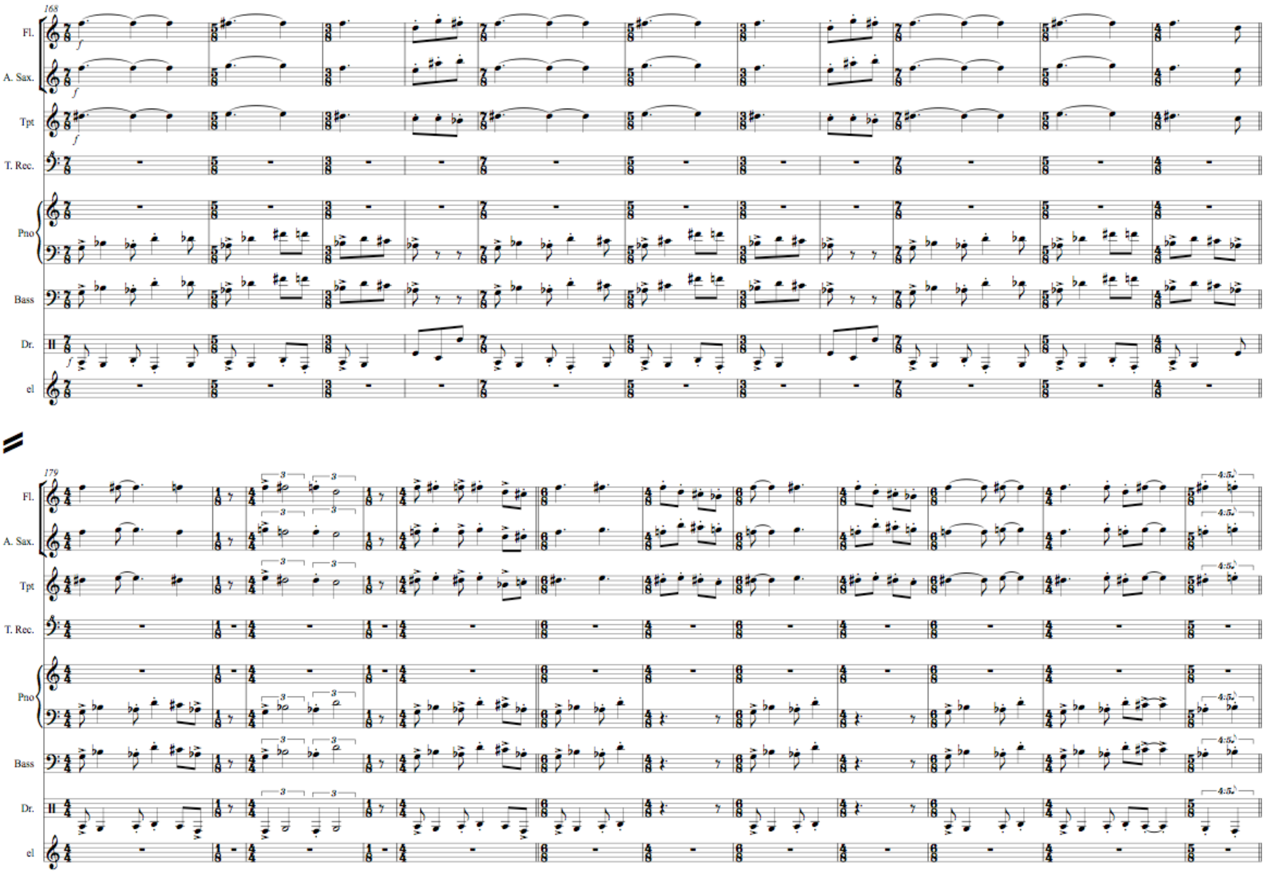

4
57
68
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
el

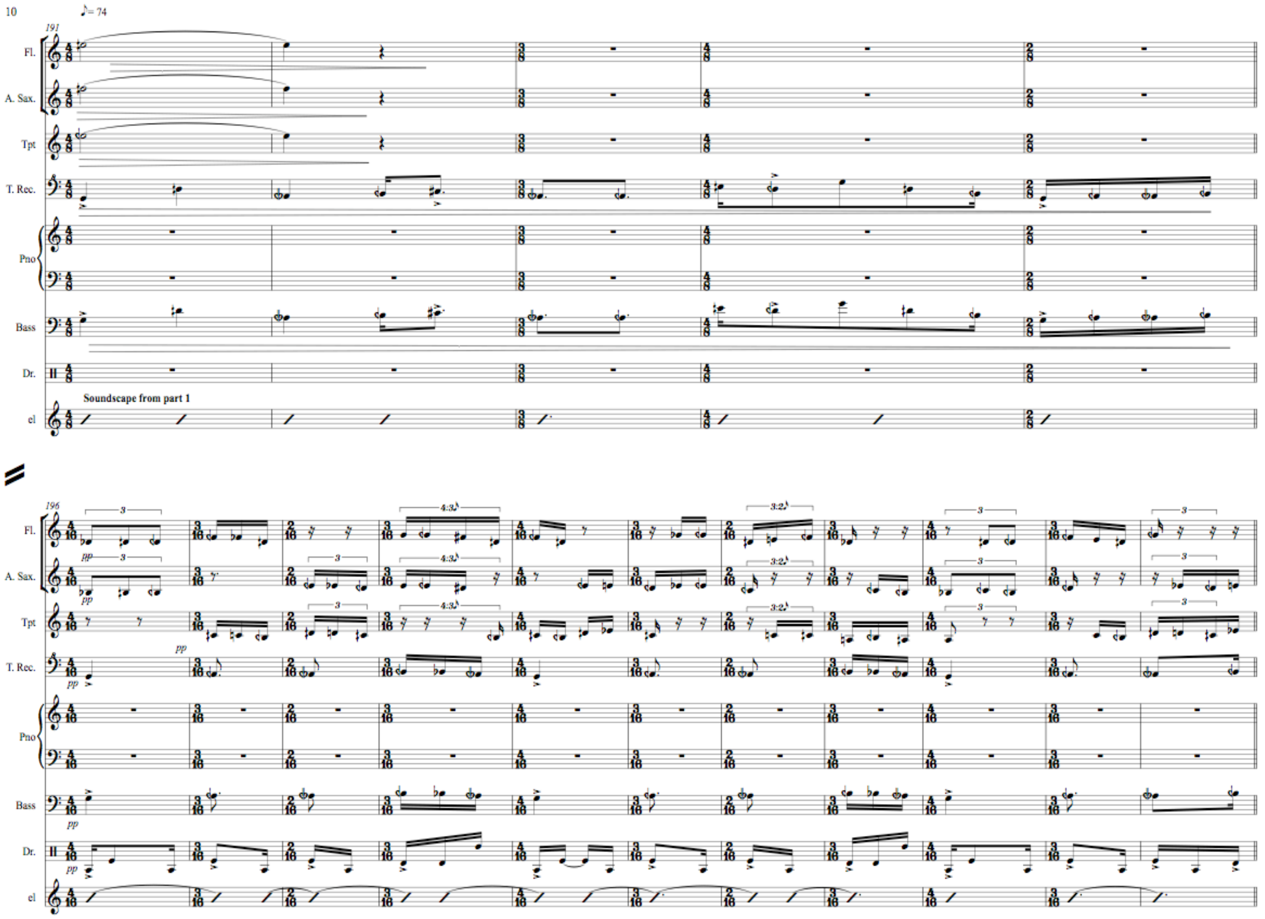

79
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
el
90
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
el

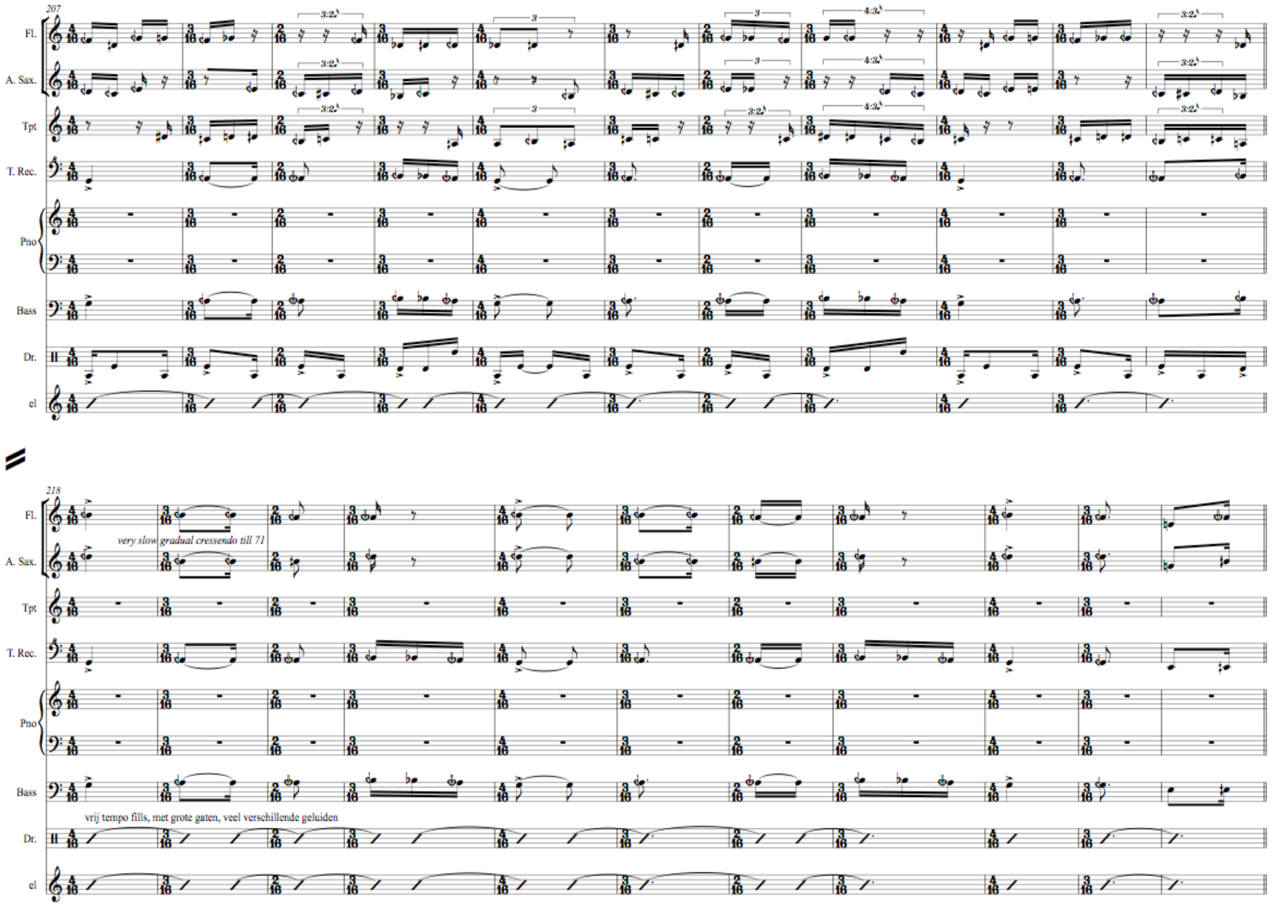

6
101
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
el
112
8:7
4:5
4:3
8:2
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
el

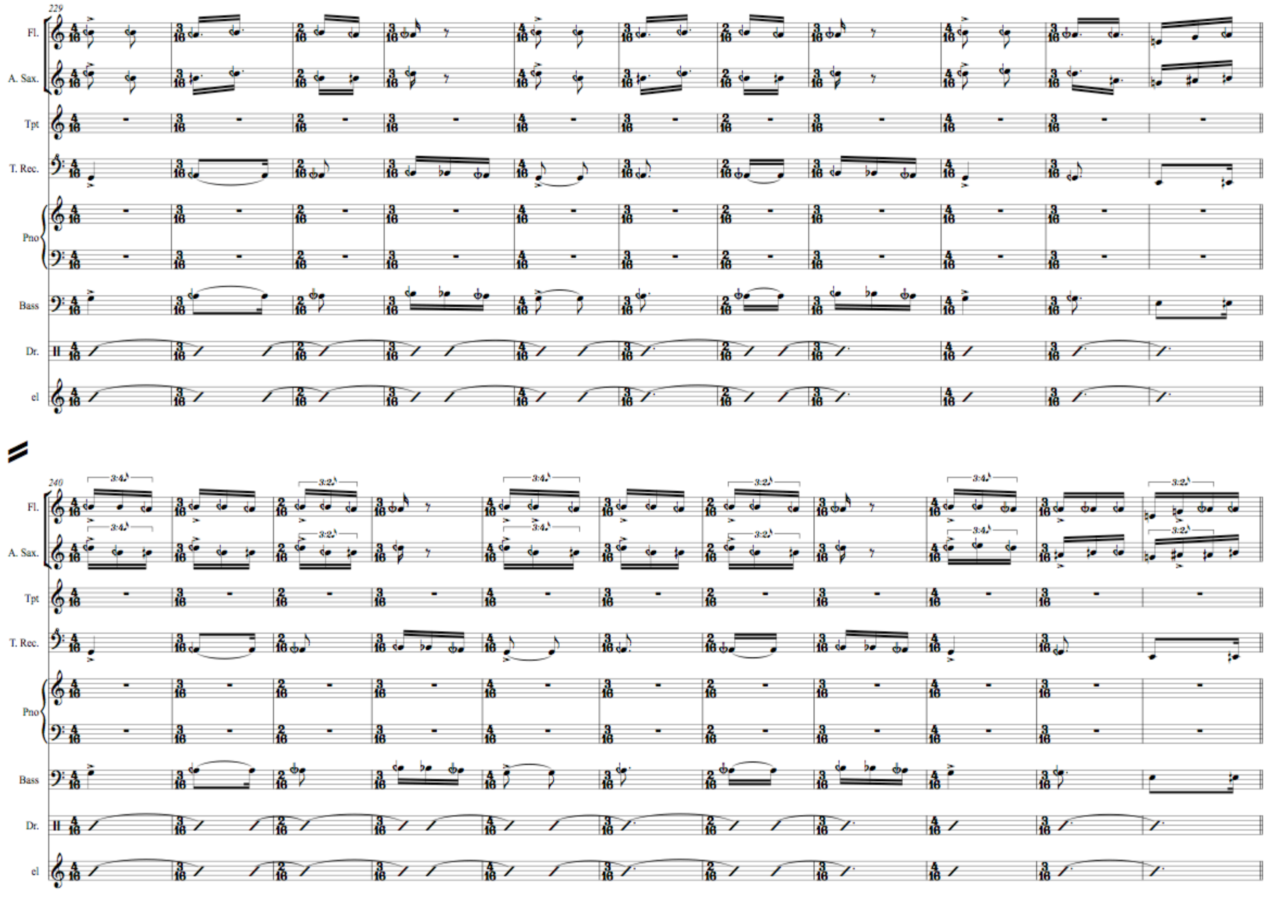

123
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
el
6:7♪
6:5♪
134
8:7♪
8:5♪
4:3♪

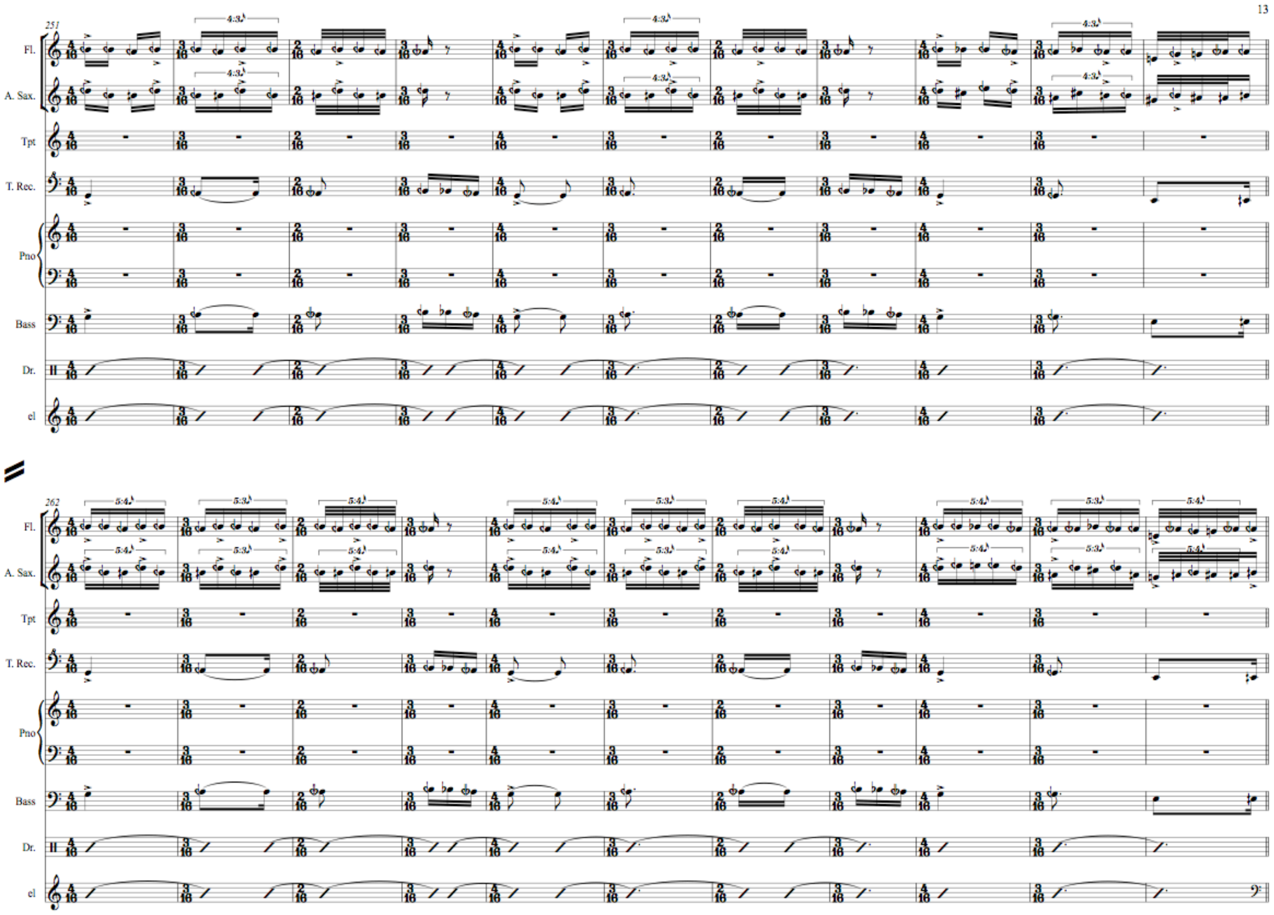

145
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
el
10:7♪
5:3♪
156
play
ff
f
mf

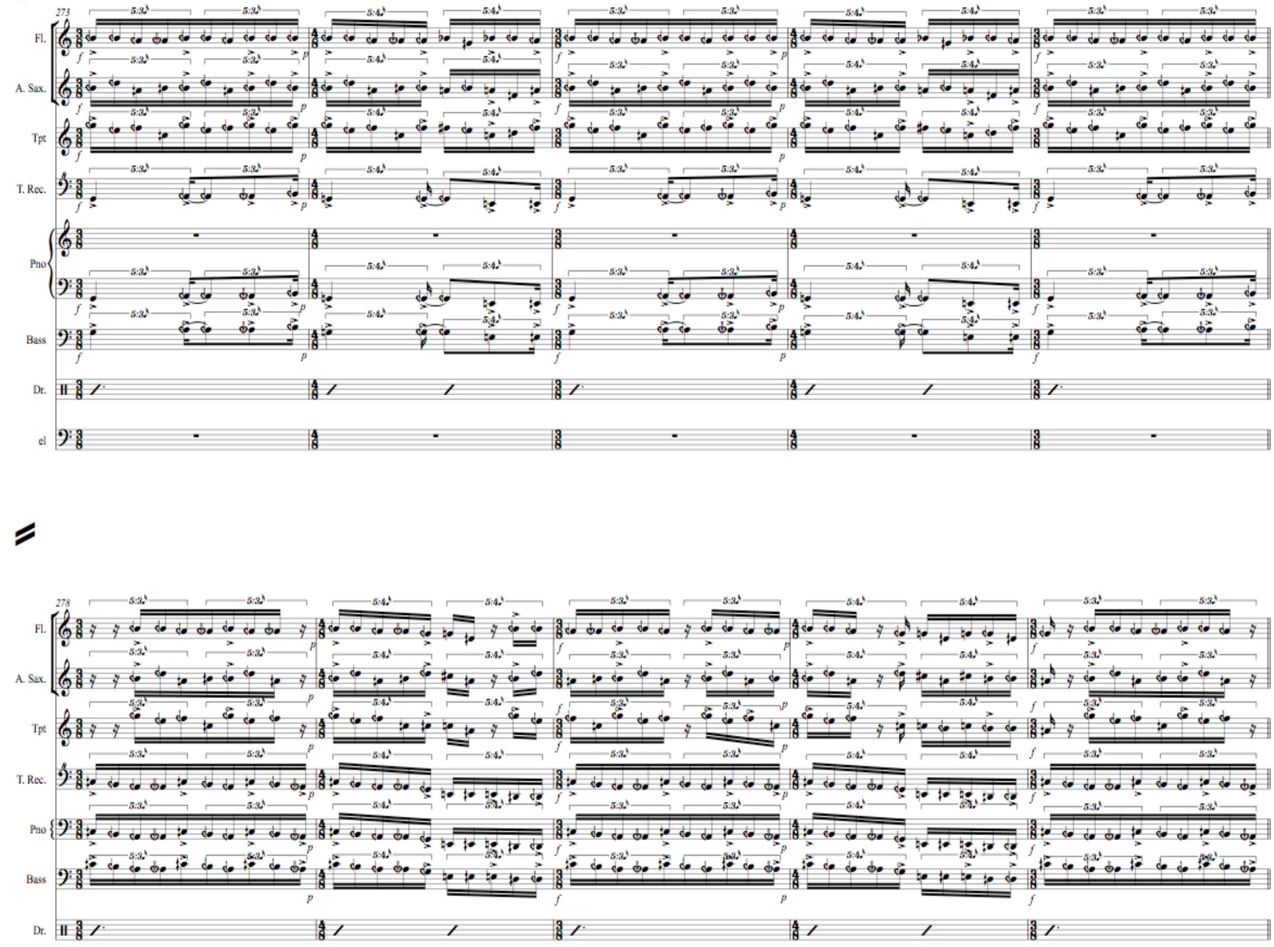

168
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
el
f
179
3
4:5♪

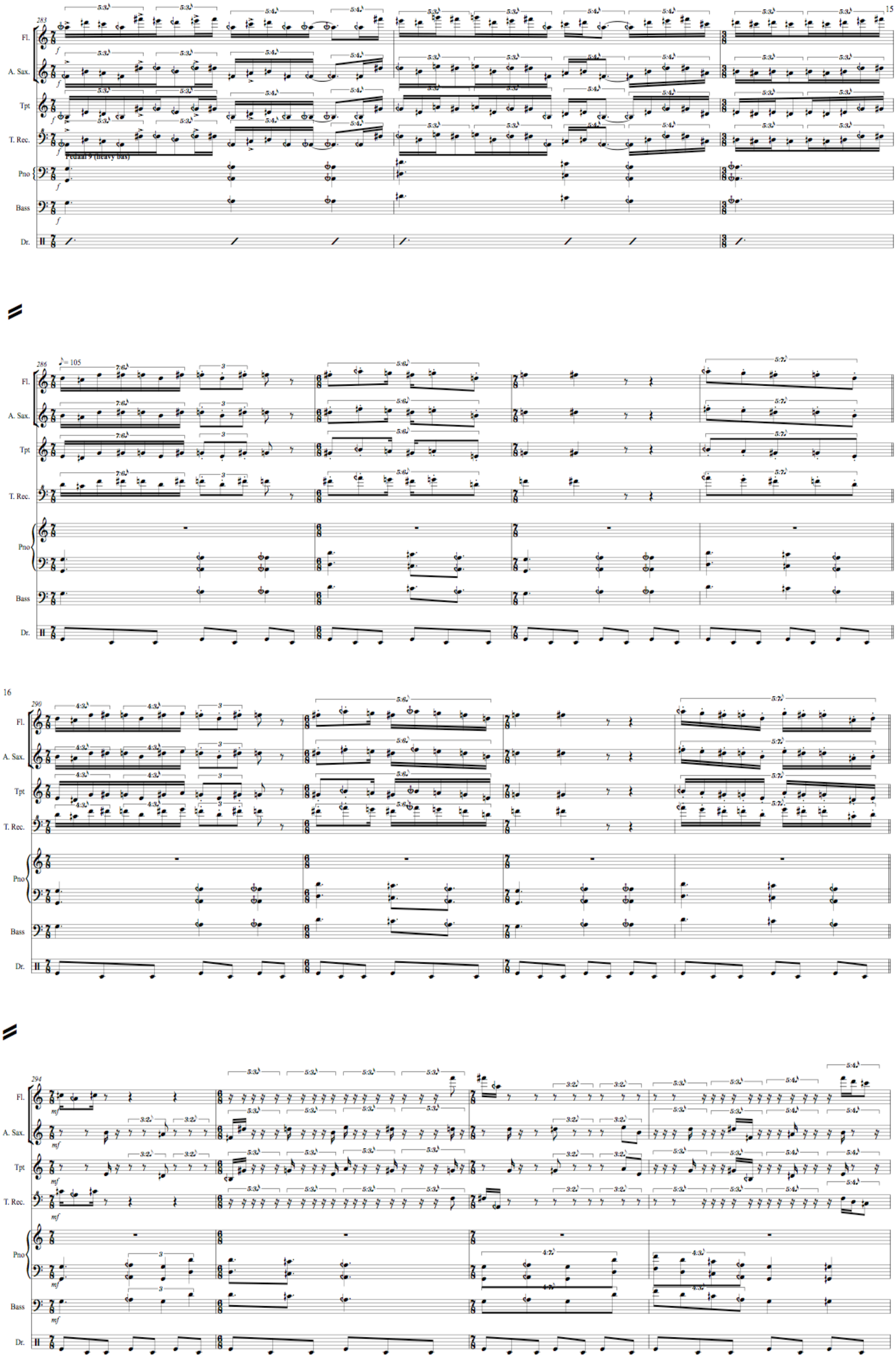

♪= 74
191
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
el
Soundscape from part 1
196
pp
3
4:3♪
3:2♪

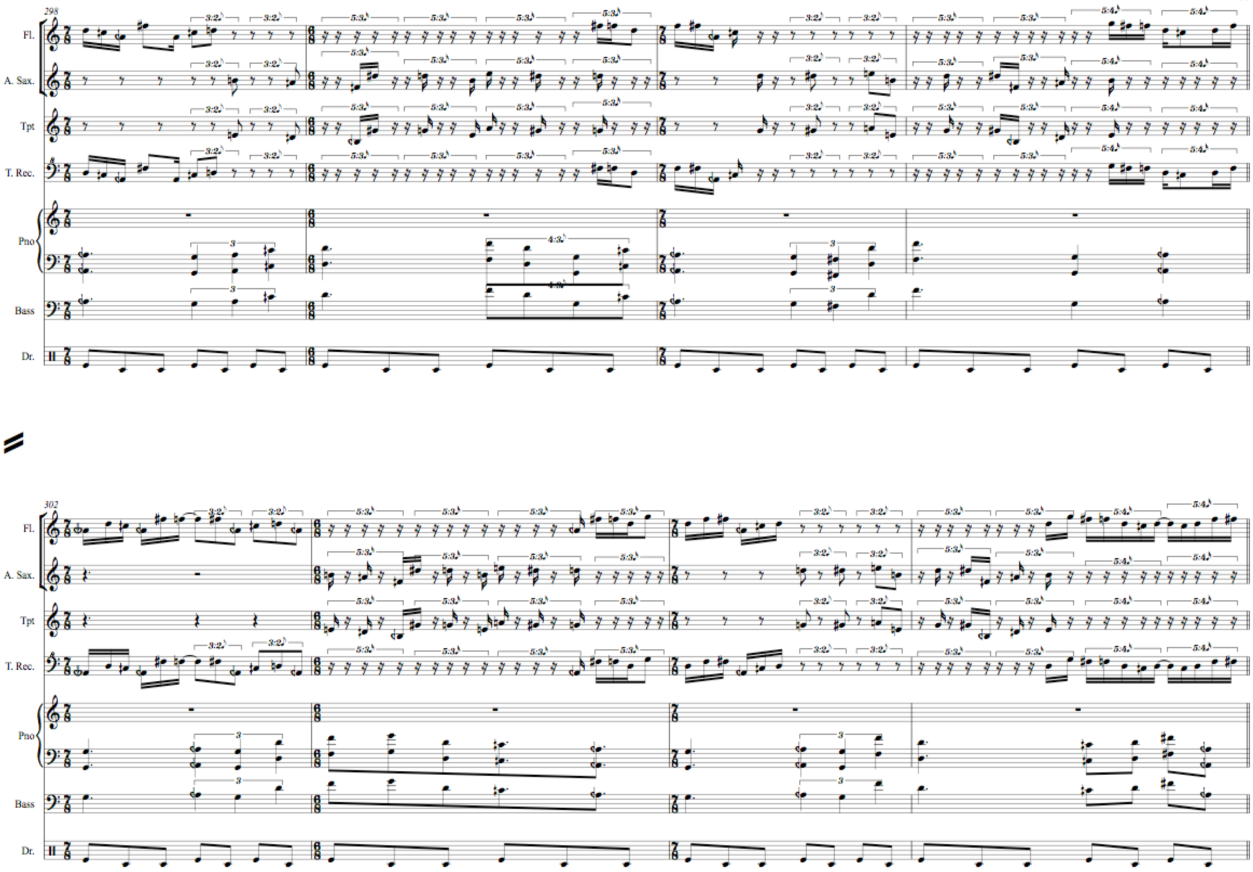

207
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
el
218
very slow gradual cressendo till 71
vrij tempo fills, met grote gaten, veel verschillende geluiden

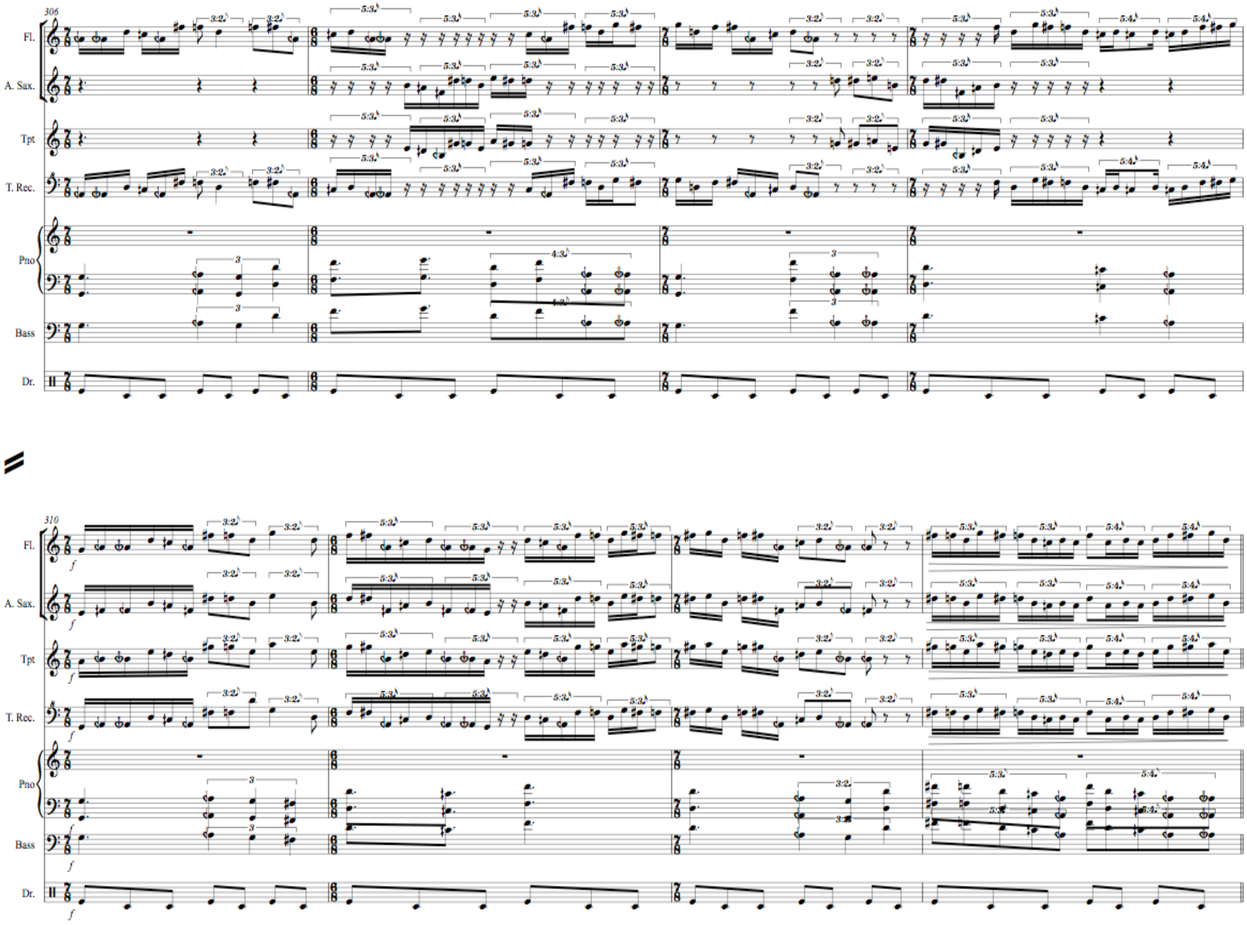

229
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
el
240

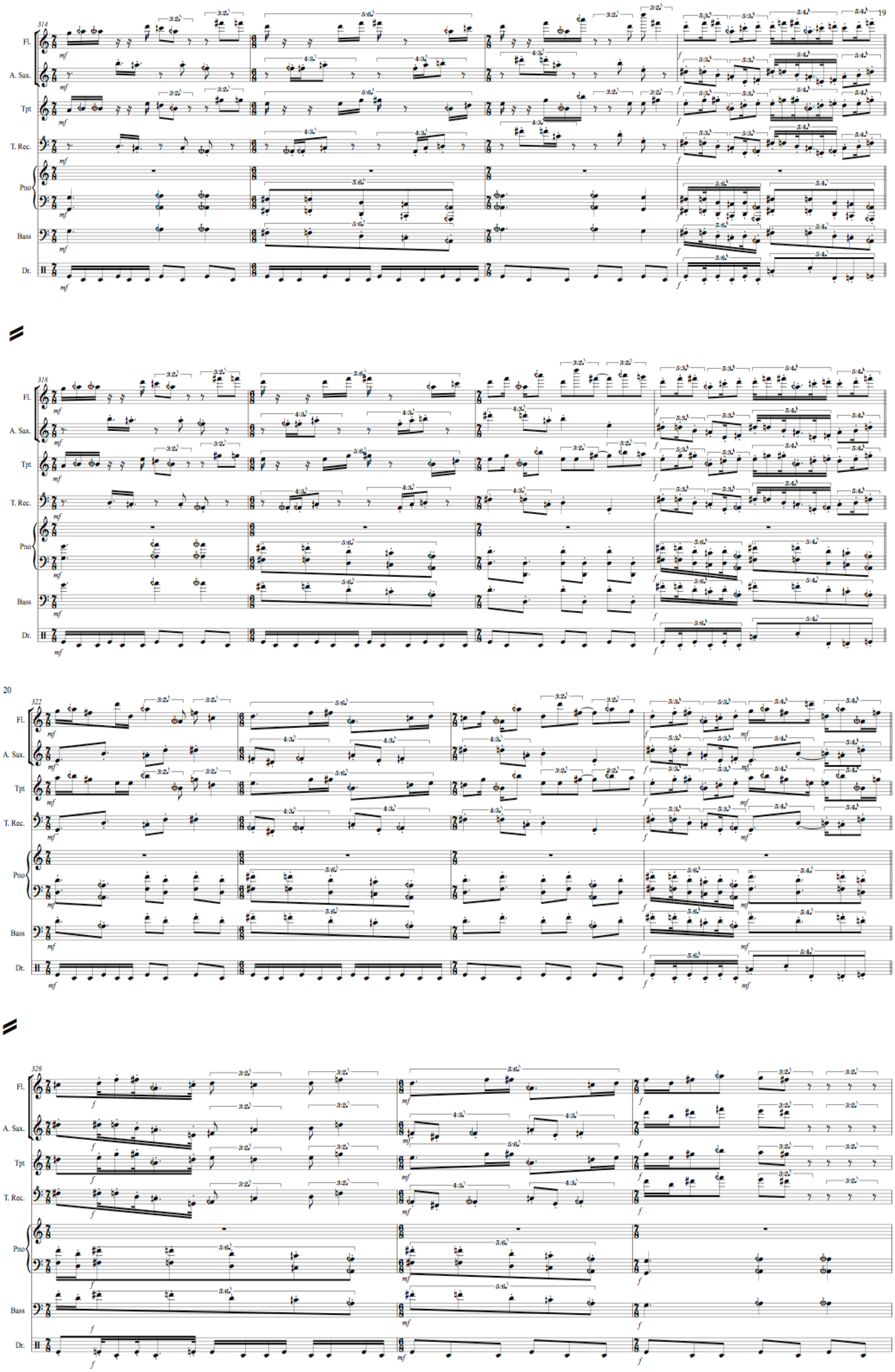

251
262
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
el
4:3
5:4
5:3

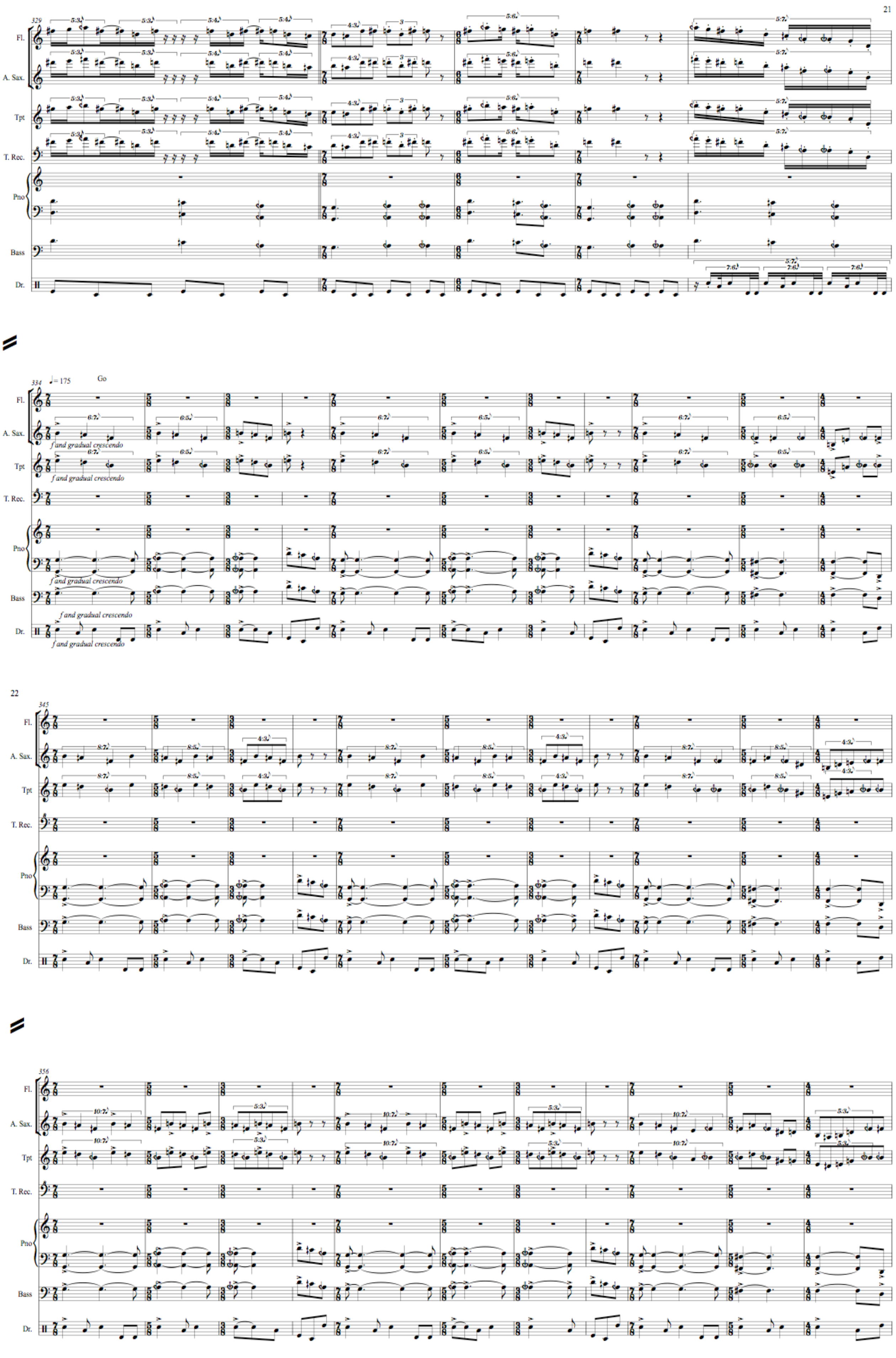

273
278
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
el
5:3
5:4
f
p

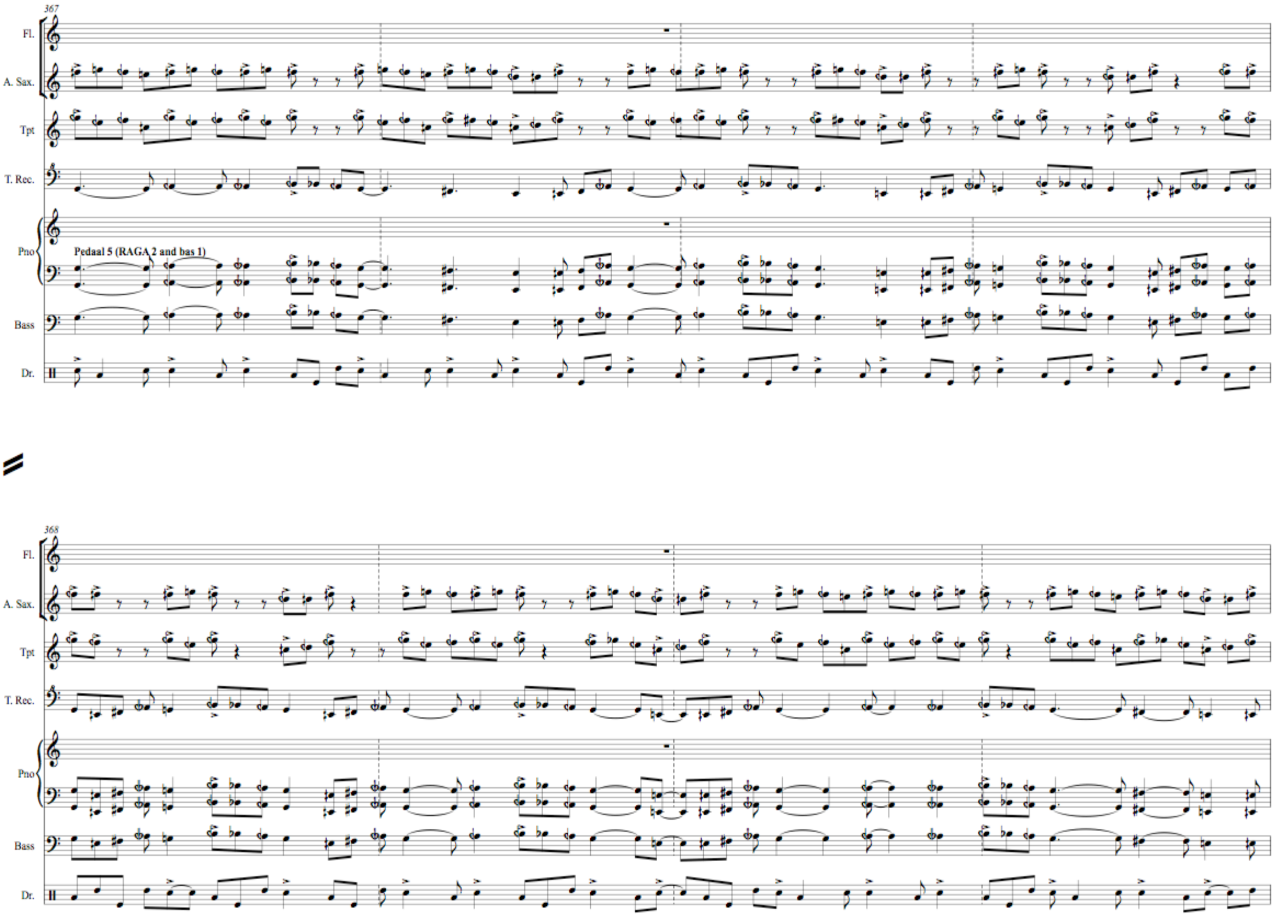
283
15
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
f
Pedaal 9 (heavy bas)
286
♪= 105
16
290
294
mf

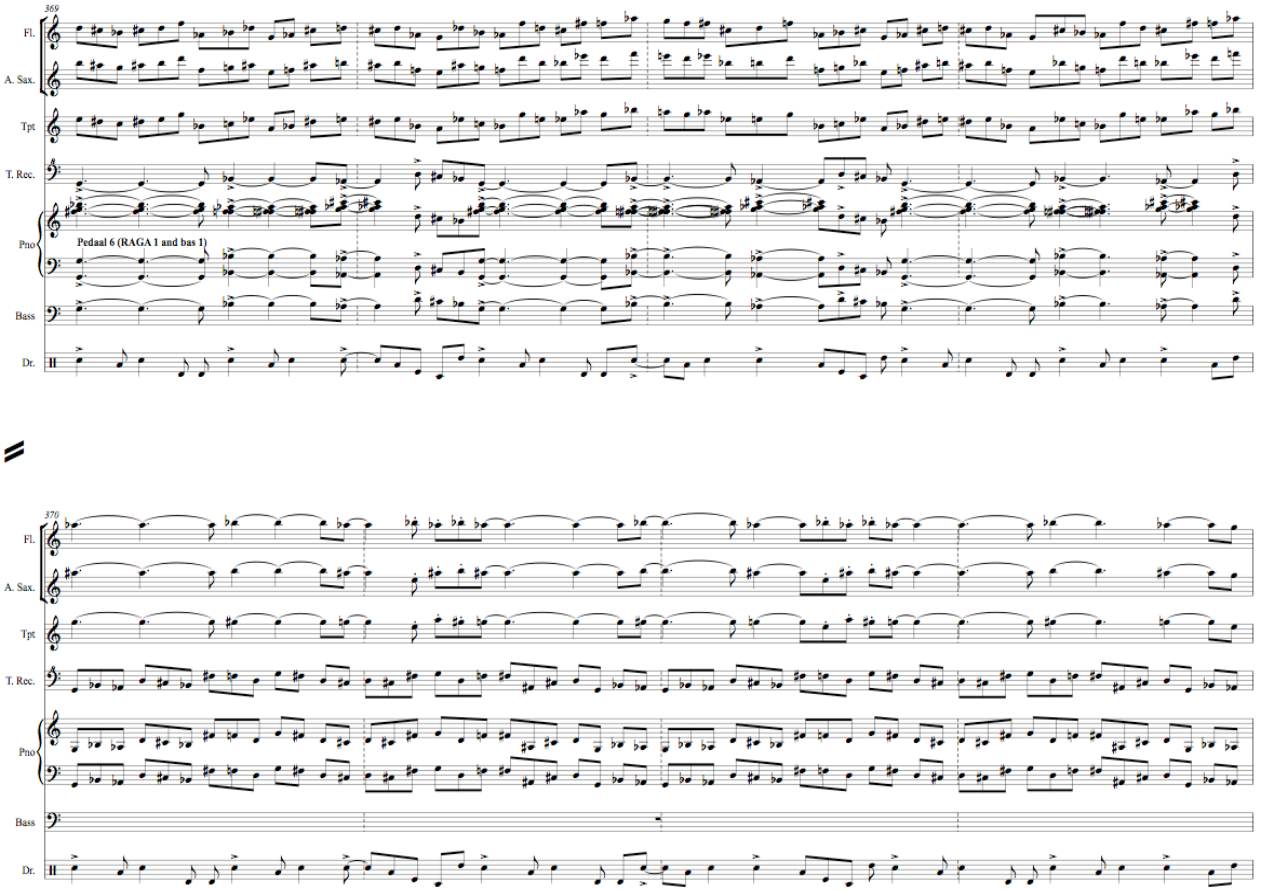

298
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
302
3:2
5:3
5:4
4:3
3

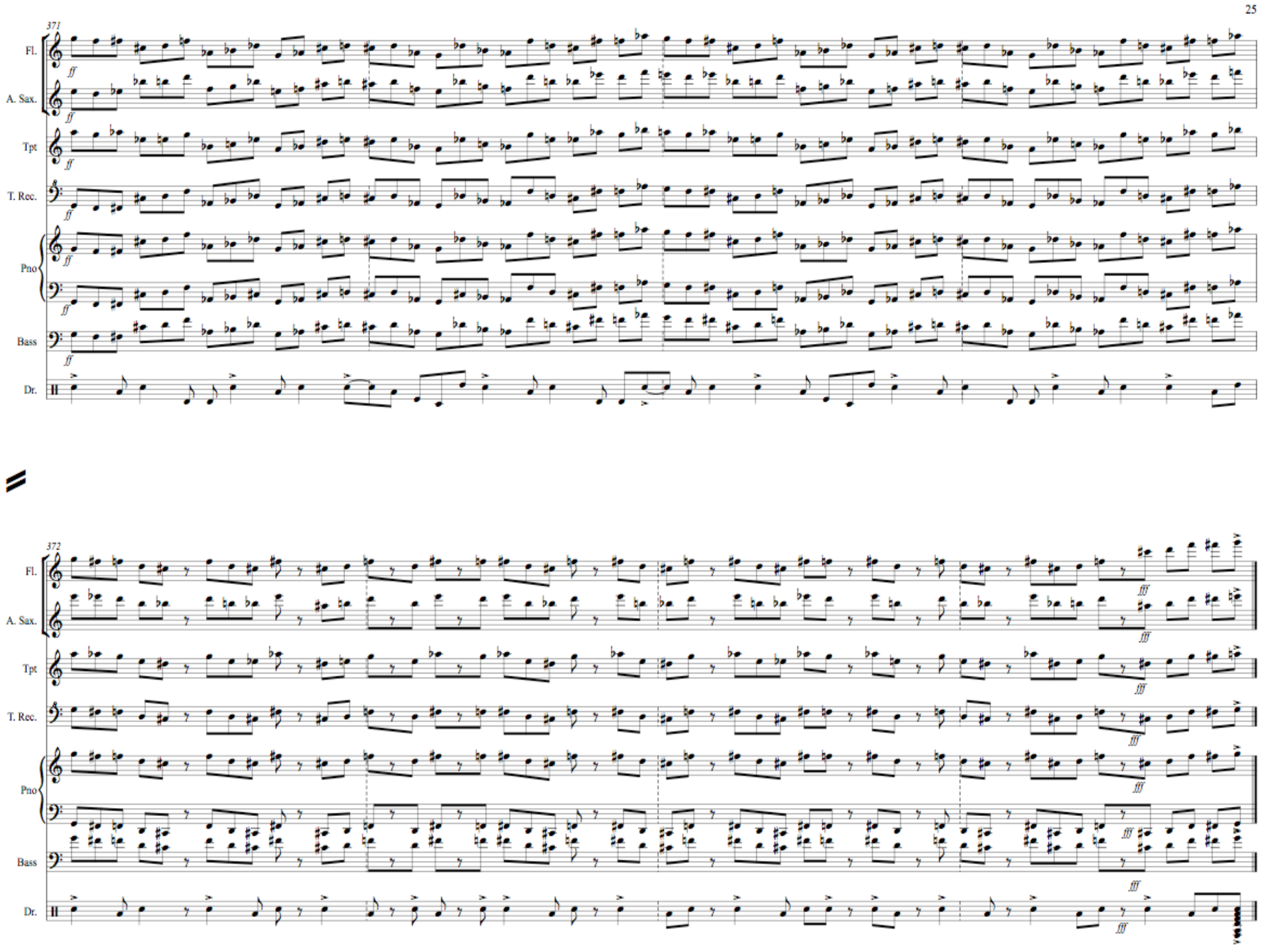

306
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
310
f
3:2
5:3
5:4
4:3
3


19
314
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
318
20
322
326
mf
f
3:2♪
4:3♪
5:6♪
5:3♪
5:4♪


329
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.
5:3
5:4
4:3
3
5:6
5:7
7:6
334
♩= 175
Go
f and gradual crescendo
6:7
6:5
22
345
8:7
8:5
4:3
356
10:7
5:3


367
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Pedaal 5 (RAGA 2 and bas 1)
Bass
Dr.
368
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.


369
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Pedaal 6 (RAGA 1 and bas 1)
Bass
Dr.
370
Fl.
A. Sax.
Tpt
T. Rec.
Pno
Bass
Dr.



3) It was always stark... ... this just makes it starker (Dolan Jones)

for Clarinet & Bass Clarinet, Drum set, Voice, Violin and Electric Bass

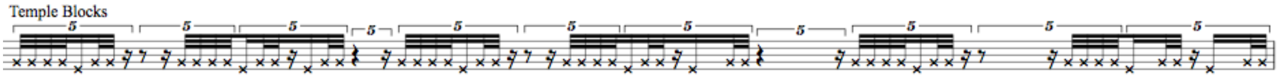
> *"When I first began studying karnatic music, something about it connected to a way of thinking I had always employed but had not been able to develop. None of my previous teachers had been able to help me with the rhythmical ideas there were going around in my head. When I came to Amsterdam and began taking classes in 'Contemporary Improvisation through non-western techniques' and also digging into Balkan compound metres it was not so much that a whole new world opened up, but that I was given the tools to understand and develop the thoughts I was previously unable to comprehend.*
>
> *Before writing "It was always stark… …this just makes it starker" my compositional output was limited to a few jazz tunes and a handful of arrangements for extended jazz combo based very much in the jazz tradition.*
>
> *I had also attempted to write a piece for an ad-hoc wind quintet. This was simply a musical catastrophe. The reason it was such a failure was that I had no idea how to construct a composition. The possibilities seemed endless, and as a result it was impossible to find a starting point or any coherence.*

> *This piece as such is my second composition ever: when I started sketching this piece I undertook to construct everything from a single cell and melody using only karnatic techniques. This meant that the abyss of endless possibilities became a manageable series of best choices. I had to be creative with the numbers, but the techniques gave parameters that reduced the process to workable tasks about proportionality, ordering of events and orchestration.*
>
> *The karnatic process also enabled me to envision multiple layers of complexity without loosing sight of the overarching musical narrative of the piece. So long as everything was derived from a common cell, and was constructed with strict adherence to karnatic rules, the piece would be coherent and my task was to order this into a convincing narrative".*

The piece is structured in a suladi tala of eleven beats, divided L3 D L3 L3 and based on the number series 3 3 2 2. Due to the slow tempo and high activity of the piece, developed mostly in khanda 2nd speed anuloma, the calculations are made based on 𝅘𝅥𝅰 and therefore every tala is 110 matras long instead of 55.

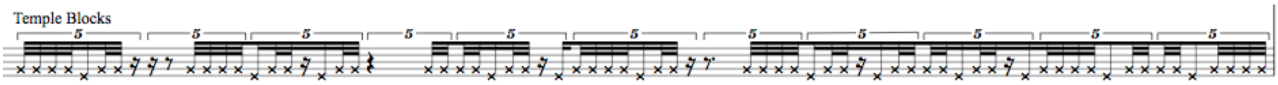
As opposed to the other compositions in this section, the composer scrupulously follows a suladi tala, and quite interestingly, almost the whole piece is conceived in khanda 2nd speed anuloma, with a lot of difficult 𝅘𝅥𝅰 displacements. Although this approach is quite common in South India (constructing a whole piece, including improvisations, in just one speed of a gati), I have observed that western creators who employ complex rhythm would barely even contemplate this possibility (and I could include myself in this group). Therefore, I thought it fascinating that this Irish composer would undertake the formidable challenge of adhering as much as possible to these ideas.

1) Measure 3 – Temple blocks: motif 1 forms the first pala of a sama mukthay 30 (10) 30 (10) 30



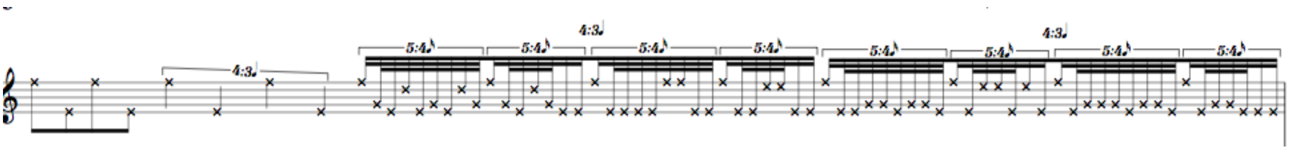
2) Measure 5 – Temple blocks: yati phrase; the last 2 matras of the yati phrase are also the first two matras of a short mukthay.

8 (8) 14 (8) 20 (8) 24+2+2 (4) 4 (4) 4



Whether intentional or not, the composer uses the concept of overlapping explained in a few karnatic chapters, but in a different manner. Usually the overlapping is carried out over one note, but he uses the number 2, one of the two numeric motors of the piece, as the last cell ending the yati phrase and commencing the short mukthay.

3) Measures 10-11 – Voice: nadai bedham; 4:3♩ with khanda nadai.

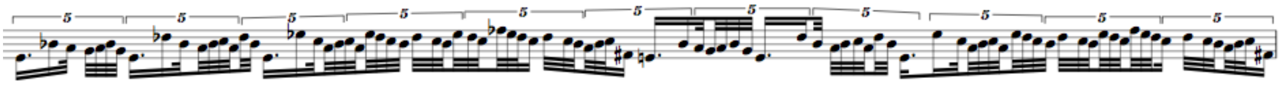


Although the nadai bhedam phrase looks quite difficult, the composer manages to prepare the frame quite cleverly in a rather short time-span: firstly, he writes four ♪ along the pulse, turns these four notes into a 4:3 (an easy development within chatusra), and finally utilises this frame for the khanda nadai phrase.

4) Measure 14-18 – Clarinet & violin: theme constructed on a jathi bhedam sequence.

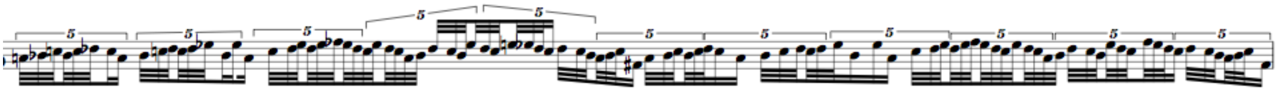
3 3 2 2, 3 3 2 2 2, 3 3 2 2 2 2, 3 3 3 2 3 3 2

These 55 matras are thought out in khanda 2nd speed and the sequence is repeated, with a 𝅘𝅥𝅯 displacement, thus giving the 110 matras.



The theme is developed in the subsequent cycles with different developmental possibilities characteristic of this technique. The short cells are regrouped in longer segments, such as:

6 8 14 6 8 10 and 6 8 14 6 12 14 18 16 (the latter is derived from the third technique in the second block of poruttam.)

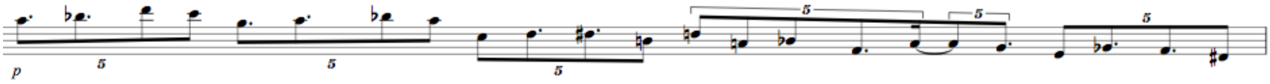


The composer uses a 'Balkan flavoured' melody that gives way to a more 'atonal' development whilst the rhythmical source is a jathi bhedam sequence that is constructed only with numbers 2 and 3, to then expound them into bigger groupings. Despite the Balkan feeling that continues throughout the 5-measure passage, the development clearly takes the music away from a repetitive melody or the establishment of a rhythmical pattern or 'vamp'.

In addition, the composer introduces the exchange of phrases between clarinet and violin, the two instruments that improvise in the *Soram Prastara*[2] section.

Poruttam A Block 1

The theme for the poruttam sequence is presented in measure 4 and fragmented in three segments.



This counter theme seems to be deliberately constructed with the poruttam sections in mind, because of its lower degree of activity, which acts as a contrasting element to the intricate techniques the composer uses in these sections.

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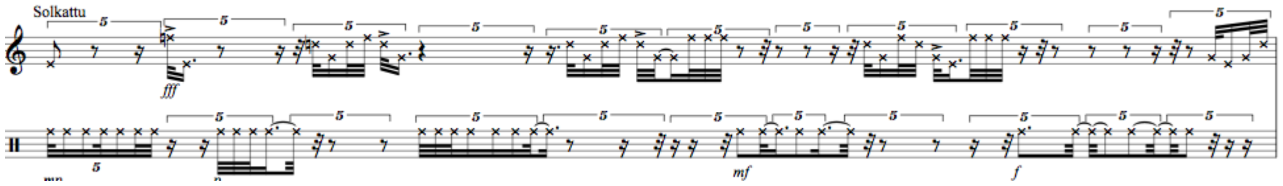
[2] *Please, see below for an explanation of this section.*

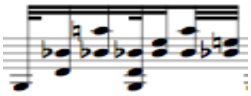
1) Measure 6 – Technique 1, voice and drums:

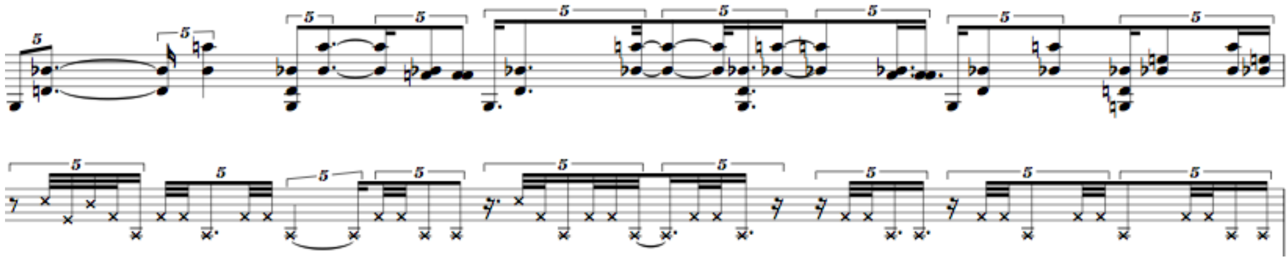
-Yati phrase 10 (0) 16 (0) 22 (0) 28 (0) 34



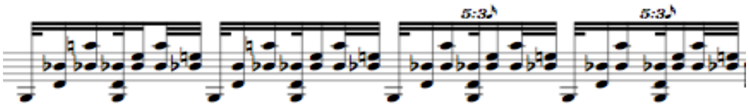
The yati phrase is developed in a sort of yati prastara fashion by fragmenting the phrase between voice and drums.

2) Measures 7-8 – Technique 2, violin, voice & drums:

-Tirmana-compound with a 7-note phrase, five matras of length. Taking the seed phrase  as the starting point, every note is multiplied following the calculations of **5x4, 5x3, 5x2, 5x1 and twice 5:3♪**



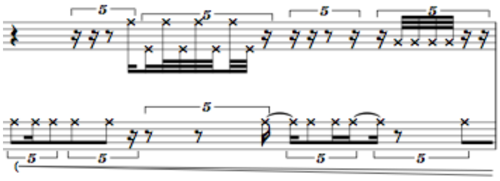
2b) Measure 8 (continuation)



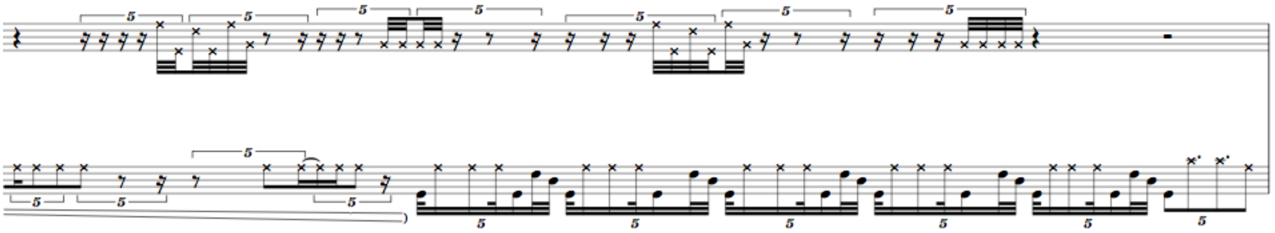
Once again, the composer fragments the technique between violin and voice. The violin plays the tirmana-compound idea as such, whilst the voice fills up the longer notes so the tirmana feeling slightly vanishes. The composer finds a very good solution to combining both concepts.

3) Measures 8-9 – Technique 3, voice & drums:

-‘Unorthodox’ yatis prastara with only 2 palas per yati phrase. A gopuchayati with the numbers 19 15 intermingled with a samayati 11 11. This is followed by a groove in the drums and the voice performing cells used previously in the yatis prastara, as a way of assuring certain continuity until the end of the cycle.



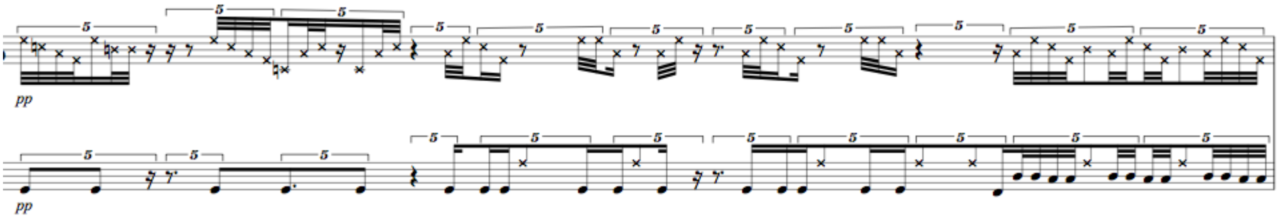
3b) Measure 9 (continuation)



Poruttam A Block 2

4) Measure 38 – Technique 1, voice & drums:

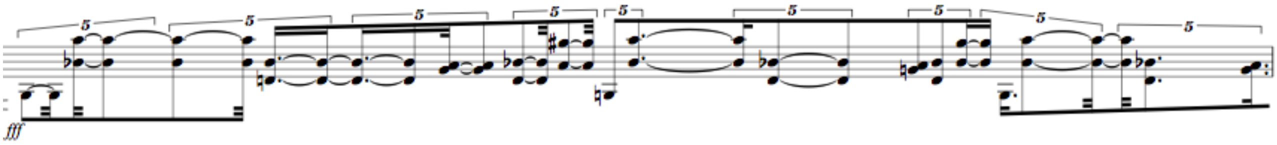
-Development of the yati phrase and short mukthay from measure 5.



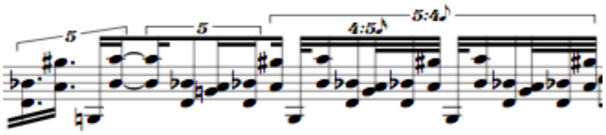
Although conforming to the same structural calculations, the palas are once again fragmented between the drum set and voice. There is a clear continuity with the same technique presented in block 1.

5) Measures 39-40 – Technique 2, violin & drums:

-Tirmana built on a new 4-matra seed phrase that takes six notes in this block, and each note is multiplied by 5, 4, 3 and 2 matras, followed by the seed phrase in 4:5♪ within a 5:4♪ (this pala starts one matra off the beginning of the bracket) and ends with the seed phrase.



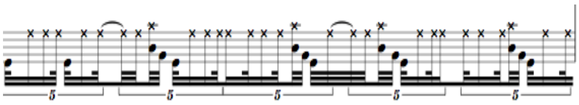
5b) Measure 40 (continuation)



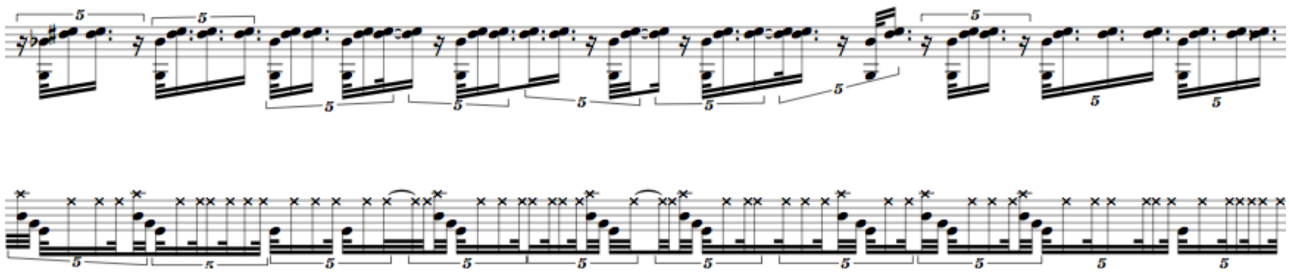
The violin performs another tirmana-compound, which is a modification of the one in the first block. The number of notes and matras has been reduced by one.

6) Measure 40-41 – Technique 3, violin & drums:

-Jathi bedham sequence 6 8 14 6 12 6 8 10 repeated twice.



6b) Measure 41 (continuation)



This last technique serves as a backdrop for the repetition of the main theme. I think it is quite a good way of disguising the poruttam technique by moving it to the background, as opposed to making it function as the foreground, as is usually the case in karnatic music. In my view, it is in this manner that karnatic devices can become much more intermingled with multi-layered western music.

Soram Prastara

-Measures 19-34: soram prastara is an improvised section following rules of proportionalities and where two melodic instruments exchange solos. The first melodic instrument takes the initiative, dictating the length of the solos and the material. The musician is also expected to coherently develop his own ideas within the greater structure of his own improvisations. The second melodic instrument is expected to be coherent with the first one and to develop ideas set out by its counterpart as well as to match the length of the solos. Sections are in complete talas and change is indicated by means of a cue drawn from the thematic material.

The material developed in this soram prastara draws on the clarinet and violin thematic exchange of measures 14 -18, as well as on yati phrases/prastara and nadai bhedam rhythmical concepts.

Kuorupu

-Measures 44-53: kuorapu is somehow the opposite of a soram prastara: a kuorapu section systematically gets shorter and the cue is only one note. The voice takes the initiative using solkattu in a very percussive manner and exchanges ideas with the drum set. The two players exchange improvisations using 2 talas each, then 1 tala, ½ a tala each (therefore, eleven ♪) and, finally a ¼ of a tala each (therefore, eleven 𝅘𝅥𝅯). The voice uses previous rhythmical material but subjects it to rhythmical sangatis and mixed jathi nadai bhedam.

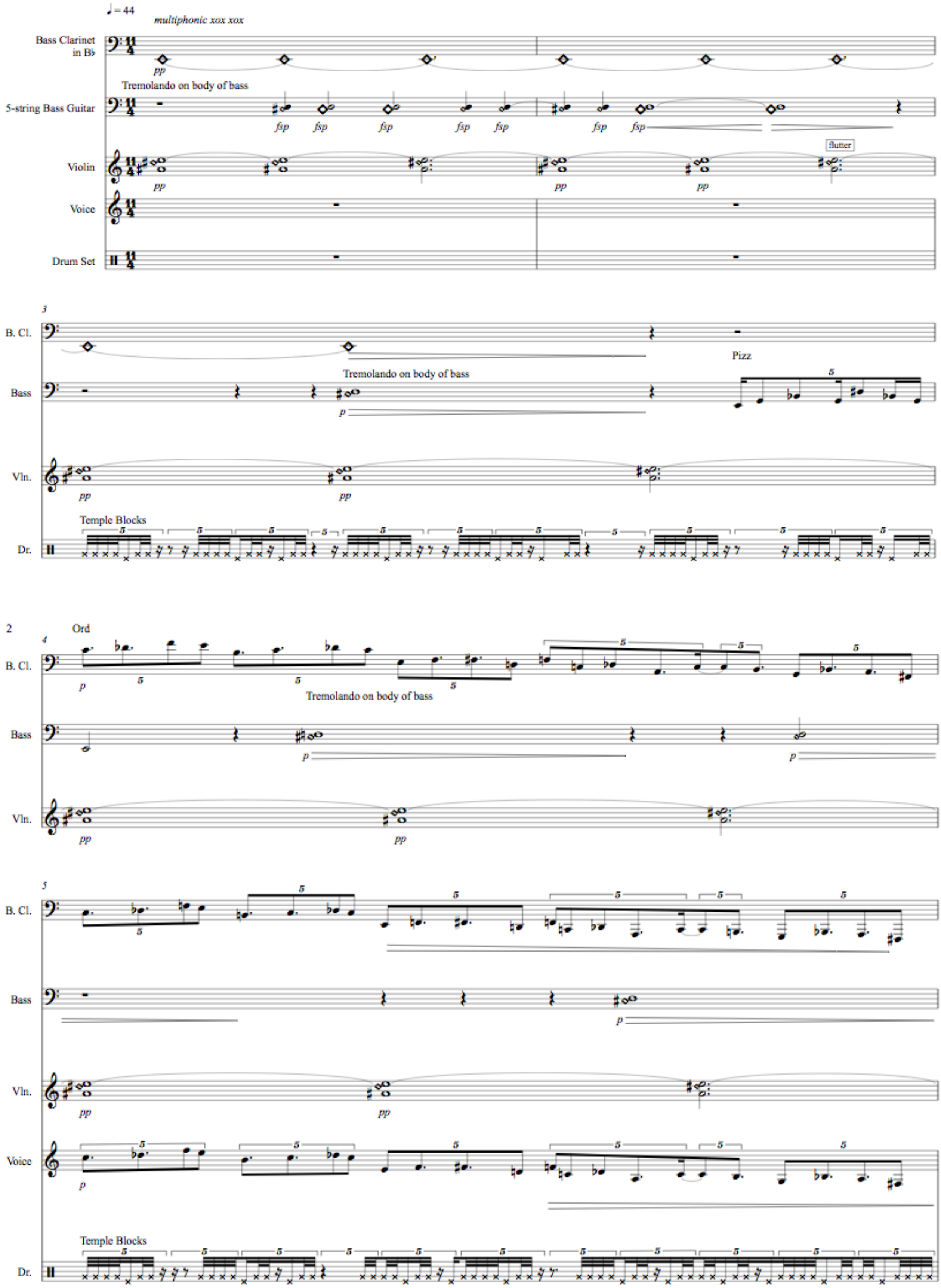
The reader/listener will not find in this piece some of the interesting instrumental colours or intricate structural developments of other compositions presented in this section. I chose the piece because I wanted to show how a jazz musician, with barely any knowledge of composition, and using almost exclusively karnatic techniques, is able to construct a quality piece. The boldness of the composer to elaborate, within a jazz style, a piece of such a complexity whilst keeping a high level of energy is rather commendable. Also quite remarkable is how the drum parts are extremely complex, but sound very groovy, to the point that unless one looks at the score one cannot imagine what the drums (and also the bass) are actually performing.

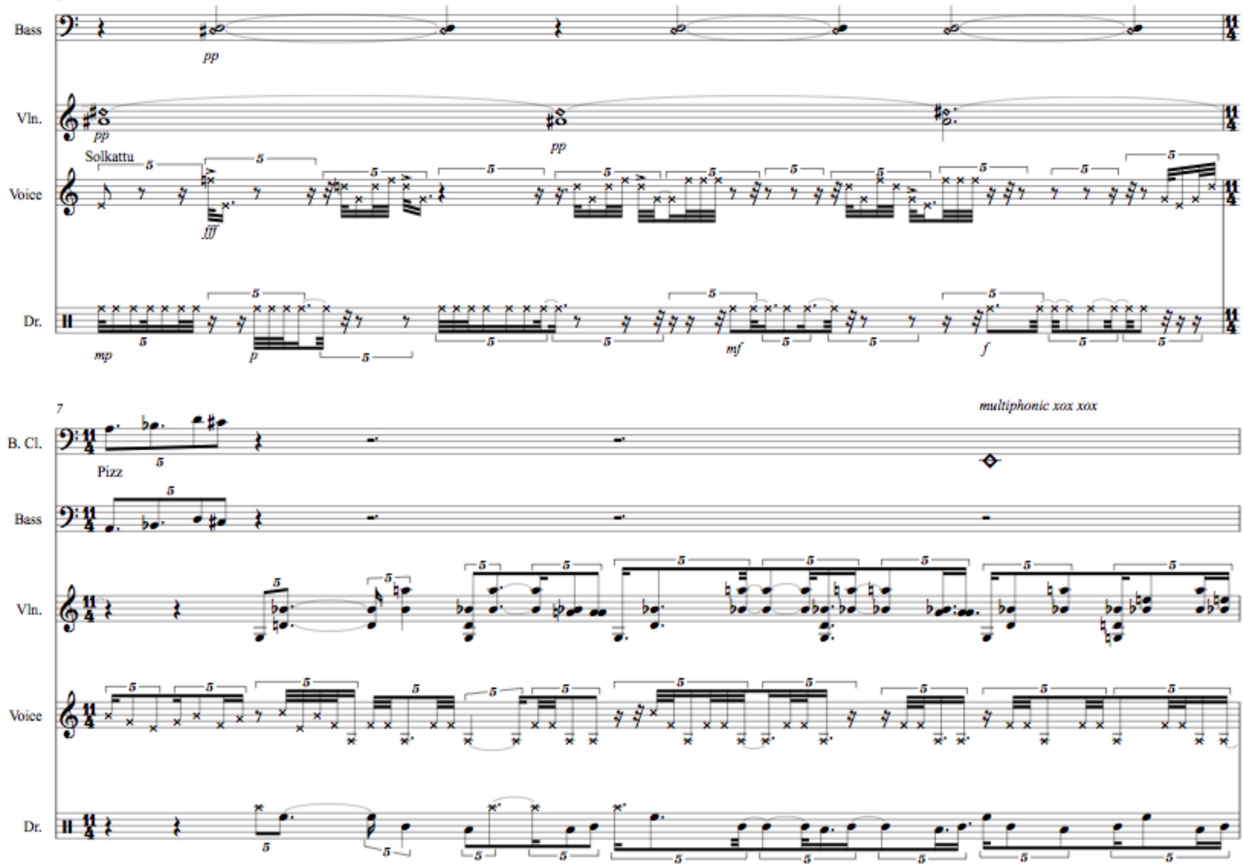
In my view, this piece is a good example of how, by studying karnatic techniques, a good piece of music can soon be created, even if it lacks the subtlety or developmental nuances of more 'mature' and knowledgeable composers.

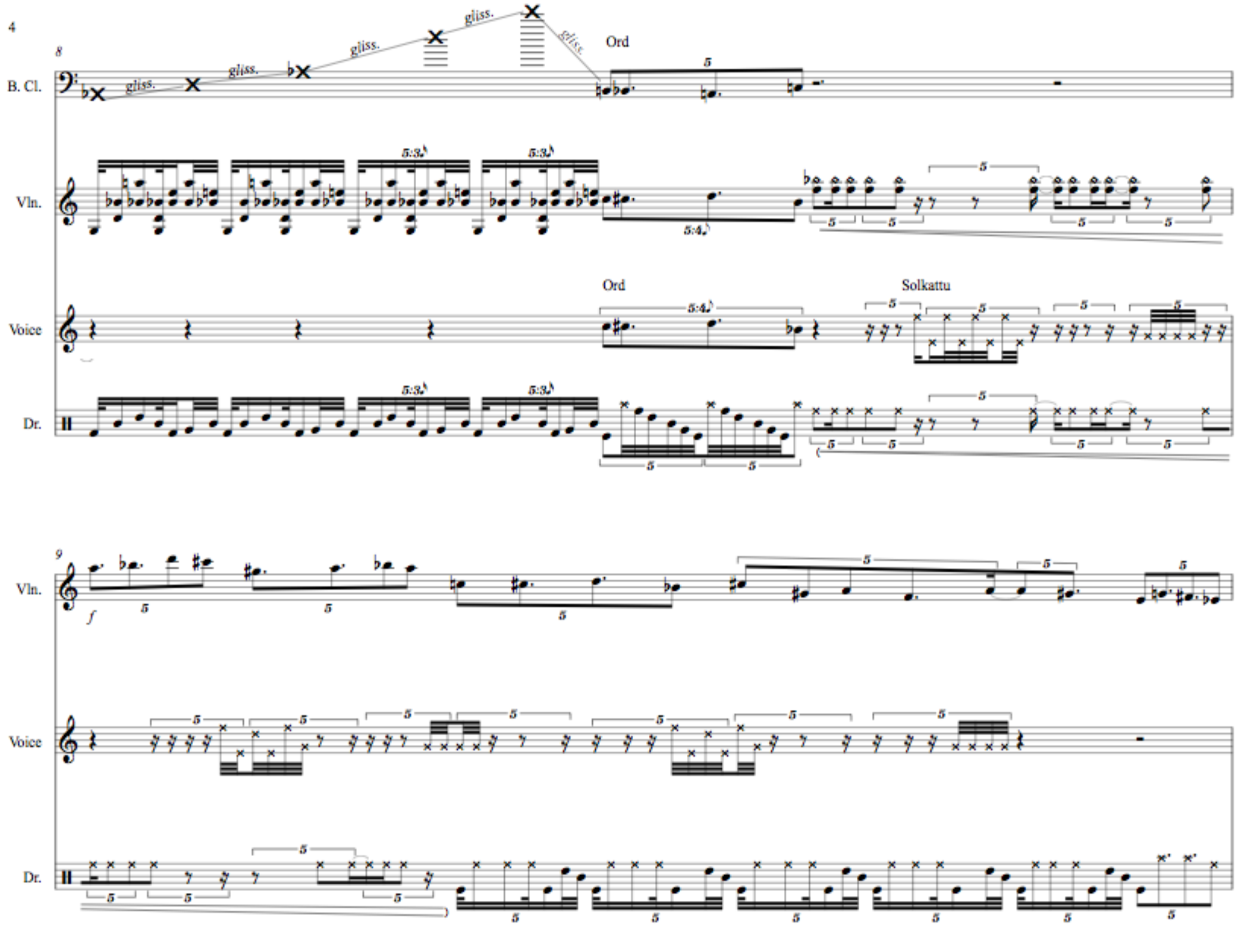
(track 284)

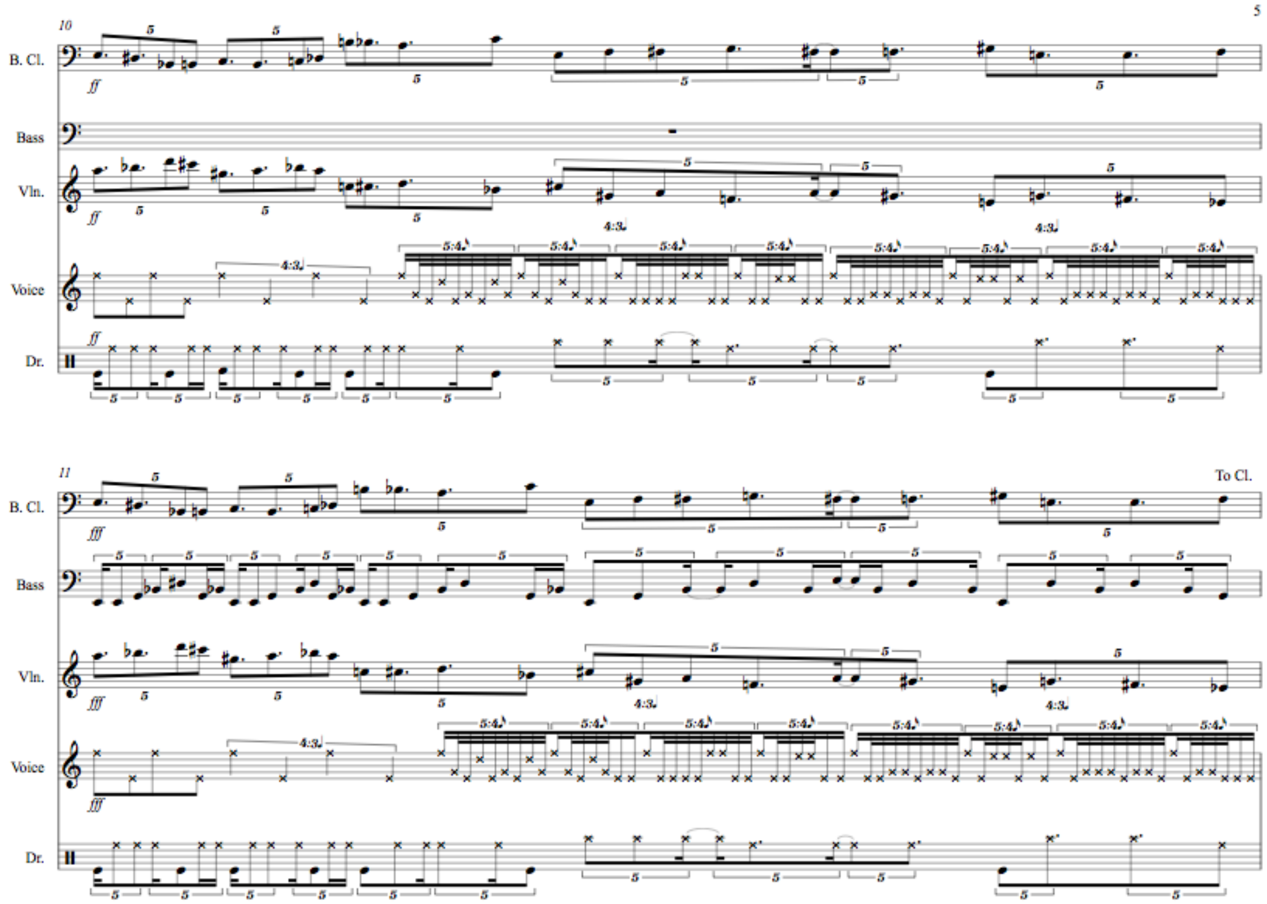
"It was always stark... ...this just makes it starker."

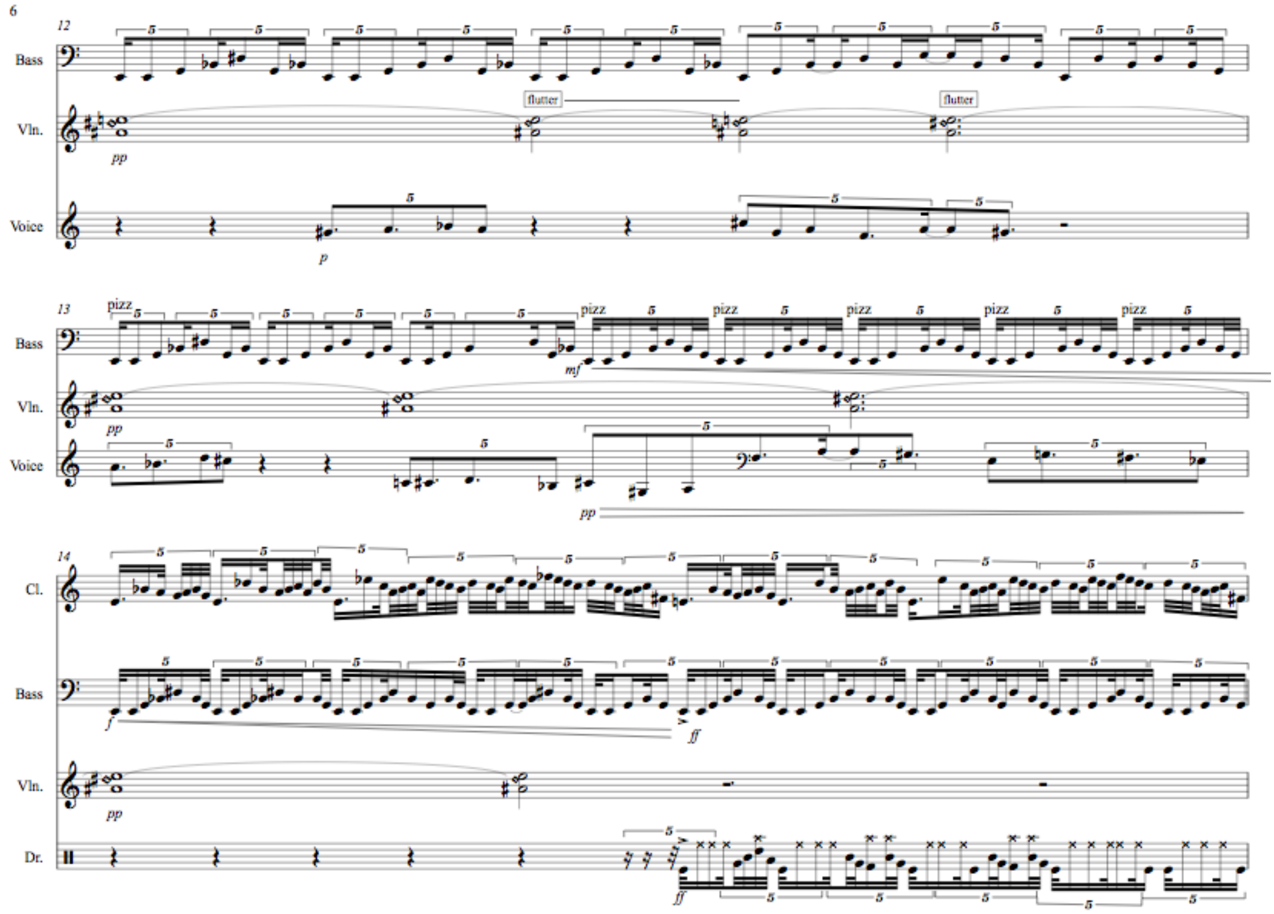
Dolan Jones

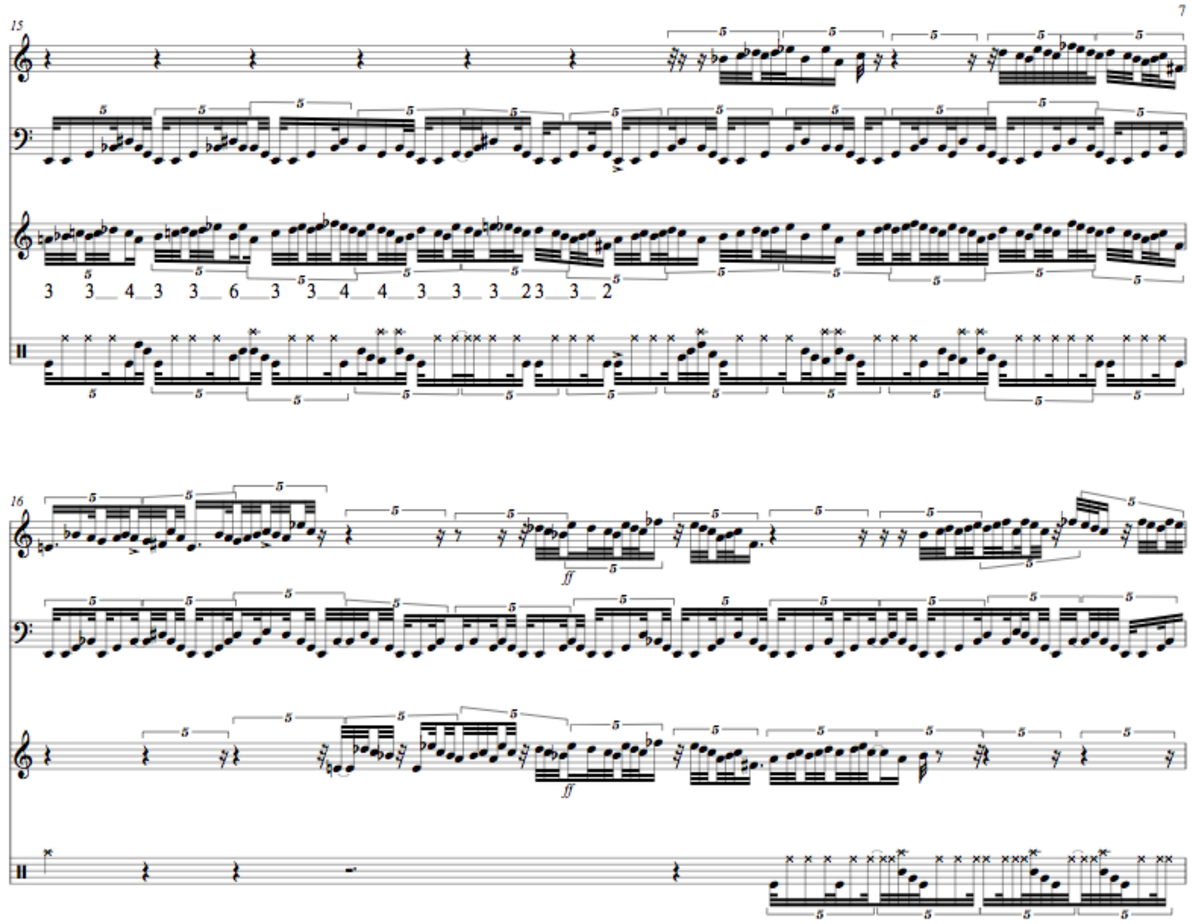

♩ = 44
multiphonic xox xox
Bass Clarinet in B♭
5-string Bass Guitar
Violin
Voice
Drum Set
Tremolando on body of bass
pp
fsp
flutter
3
B. Cl.
Bass
Vln.
Dr.
Pizz
Temple Blocks
p
2
Ord
4
5
Voice

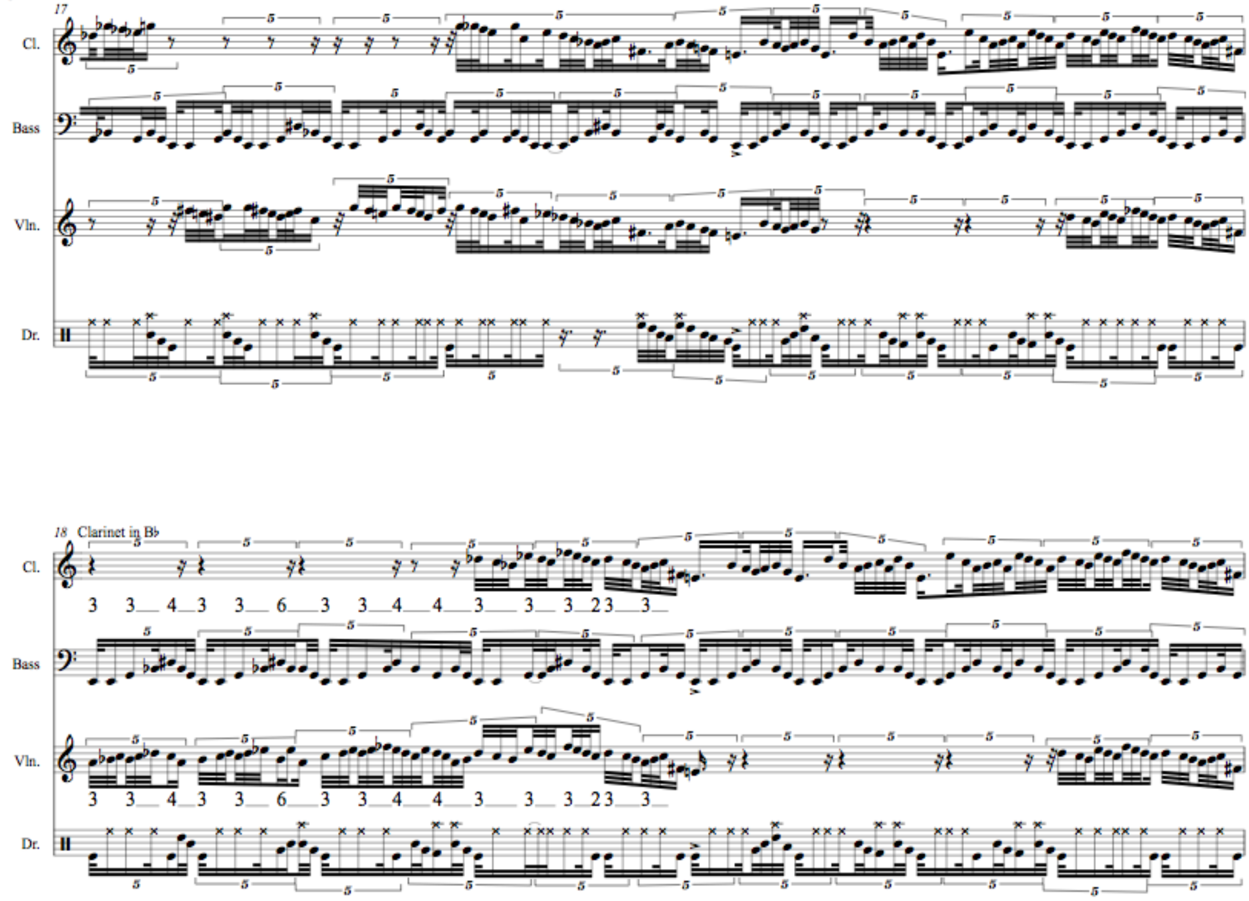

6
porruttam block 1
Bass
pp
Vln.
pp
pp
Solkattu
Voice
fff
Dr.
mp
p
mf
f
7
B. Cl.
multiphonic xox xox
Pizz
Bass
Vln.
Voice
Dr.

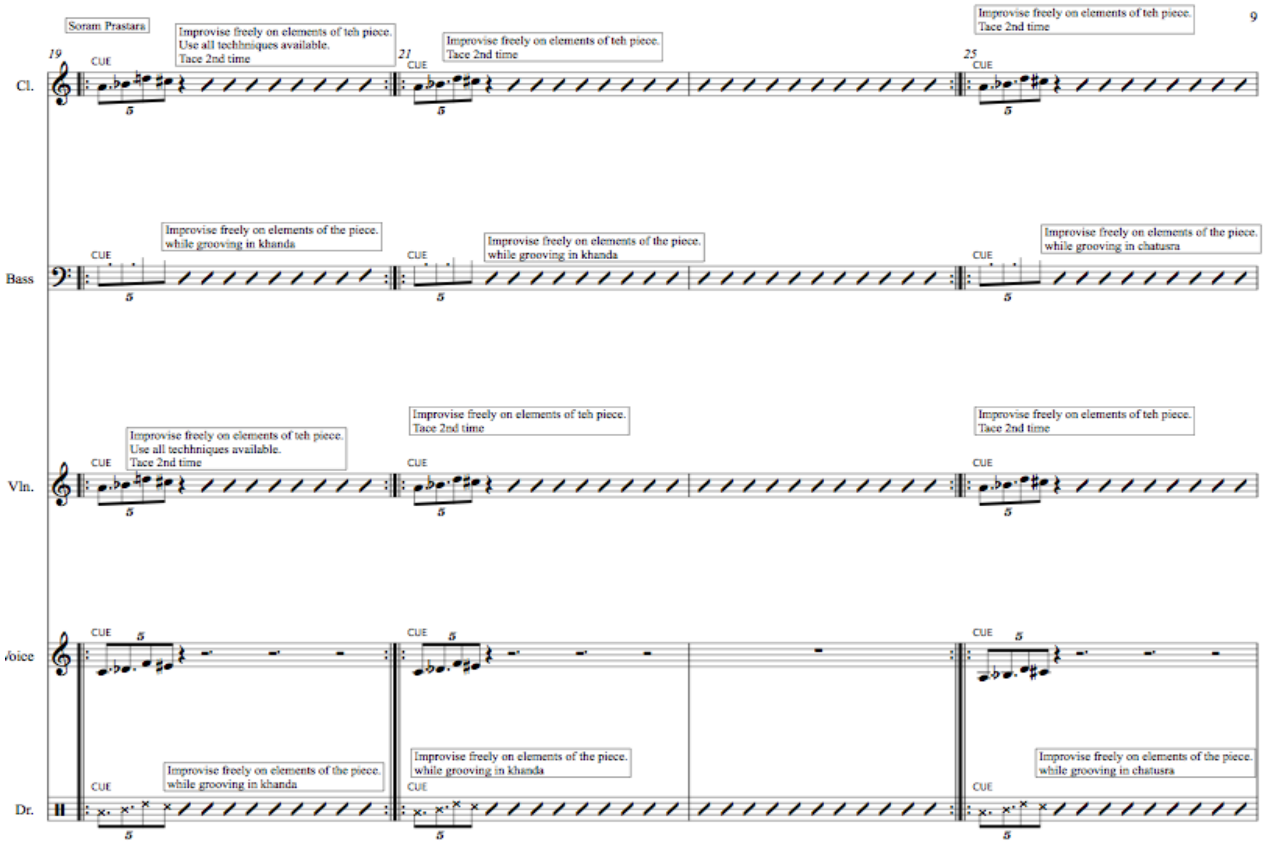

8
B. Cl.
gliss.
gliss.
gliss.
gliss.
gliss.
Ord
Vln.
5:3♪
5:3♪
5:4♪
Voice
Ord
5:4♪
Solkattu
Dr.
5:3♪
5:3♪
9
Vln.
f
Voice
Dr.

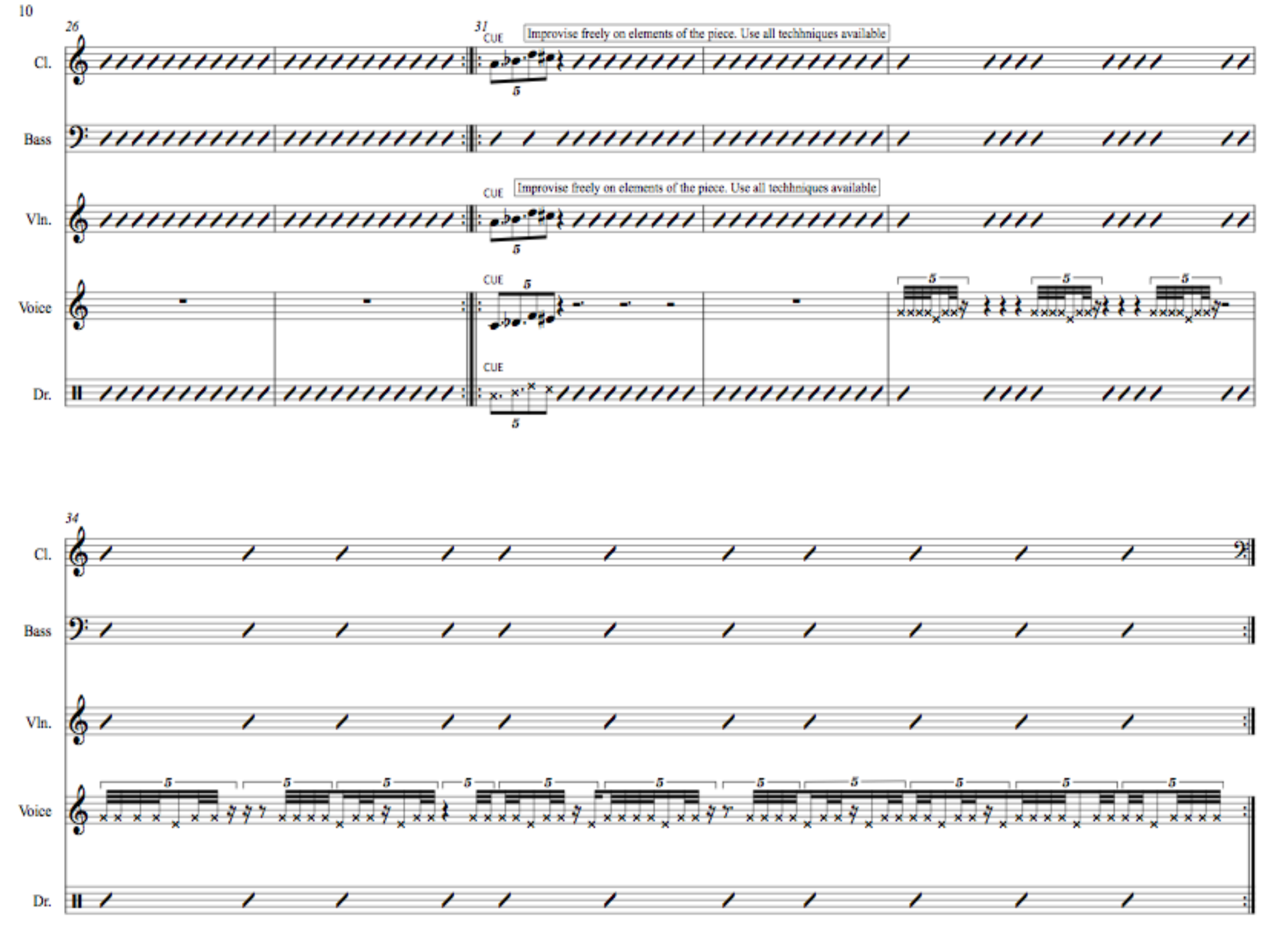

5
10
B. Cl.
Bass
Vln.
Voice
Dr.
ff
4:3
5:4
11
To Cl.
fff

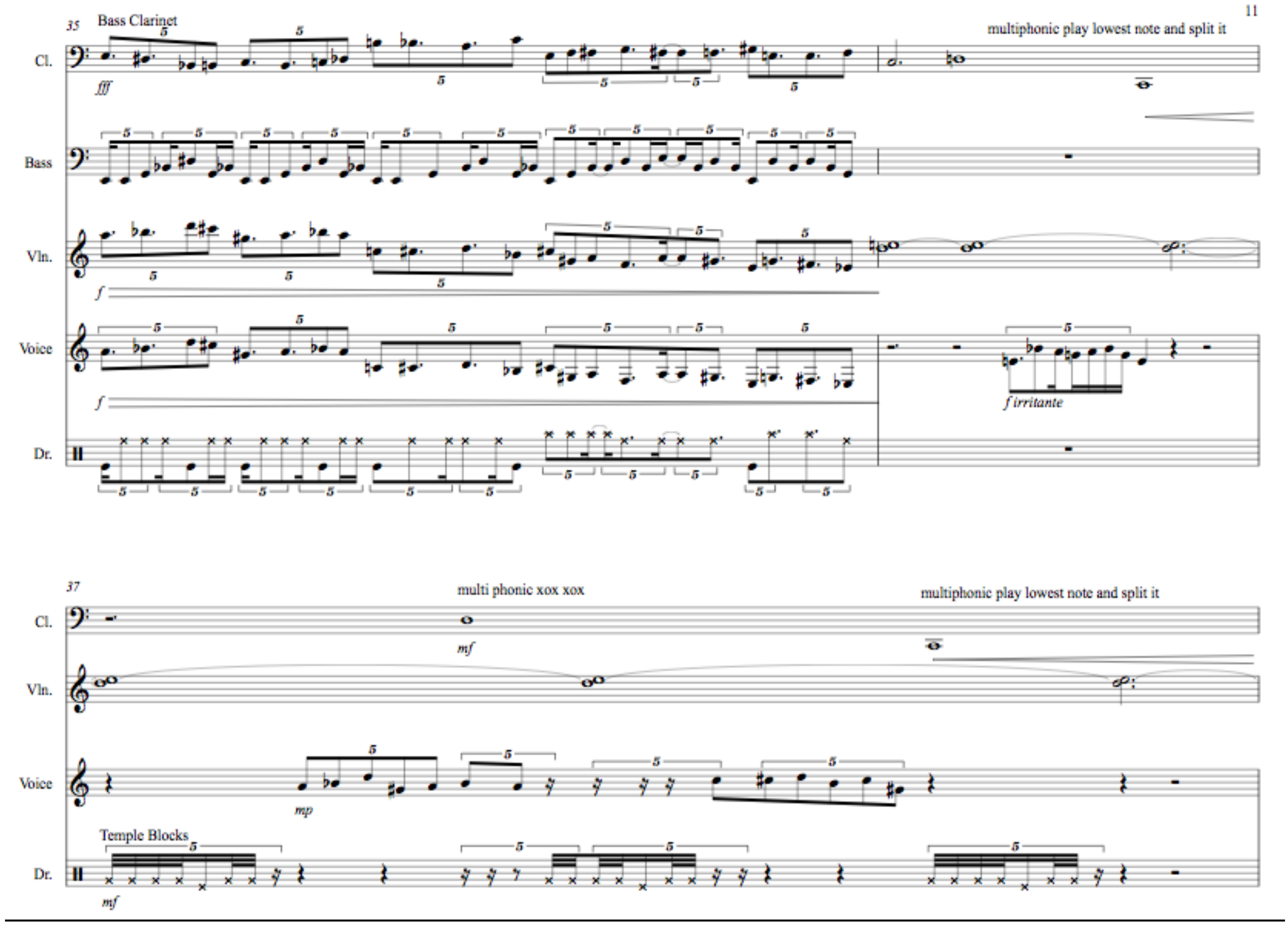

6
12
Bass
Vln.
Voice
flutter
pp
p
13
pizz
mf
14
Cl.
Dr.
f
ff

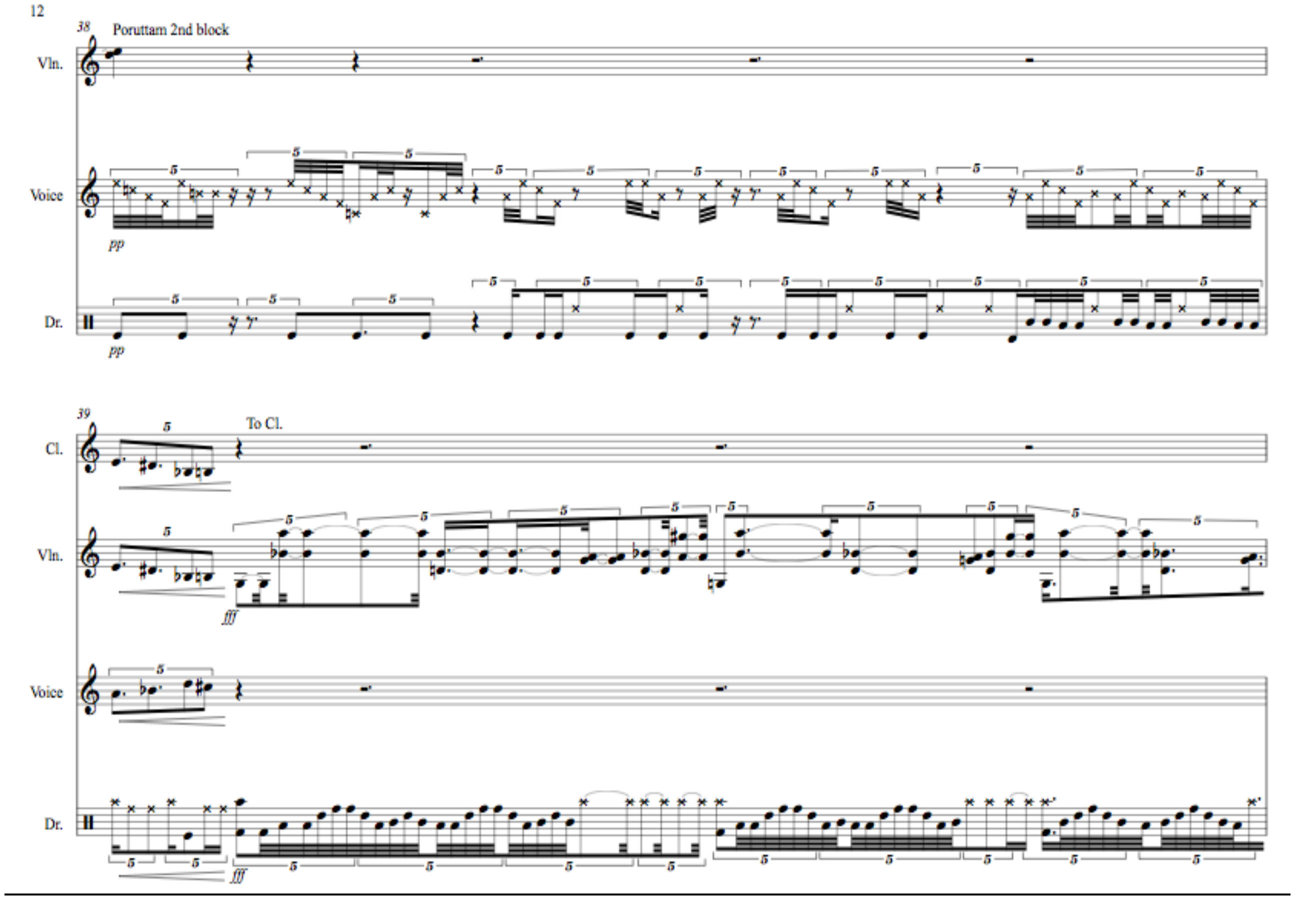

15
Cl.
Bass
Vln.
Dr.
3 3 4 3 3 6 3 3 4 4 3 3 3 2 3 3 2
16
ff
ff

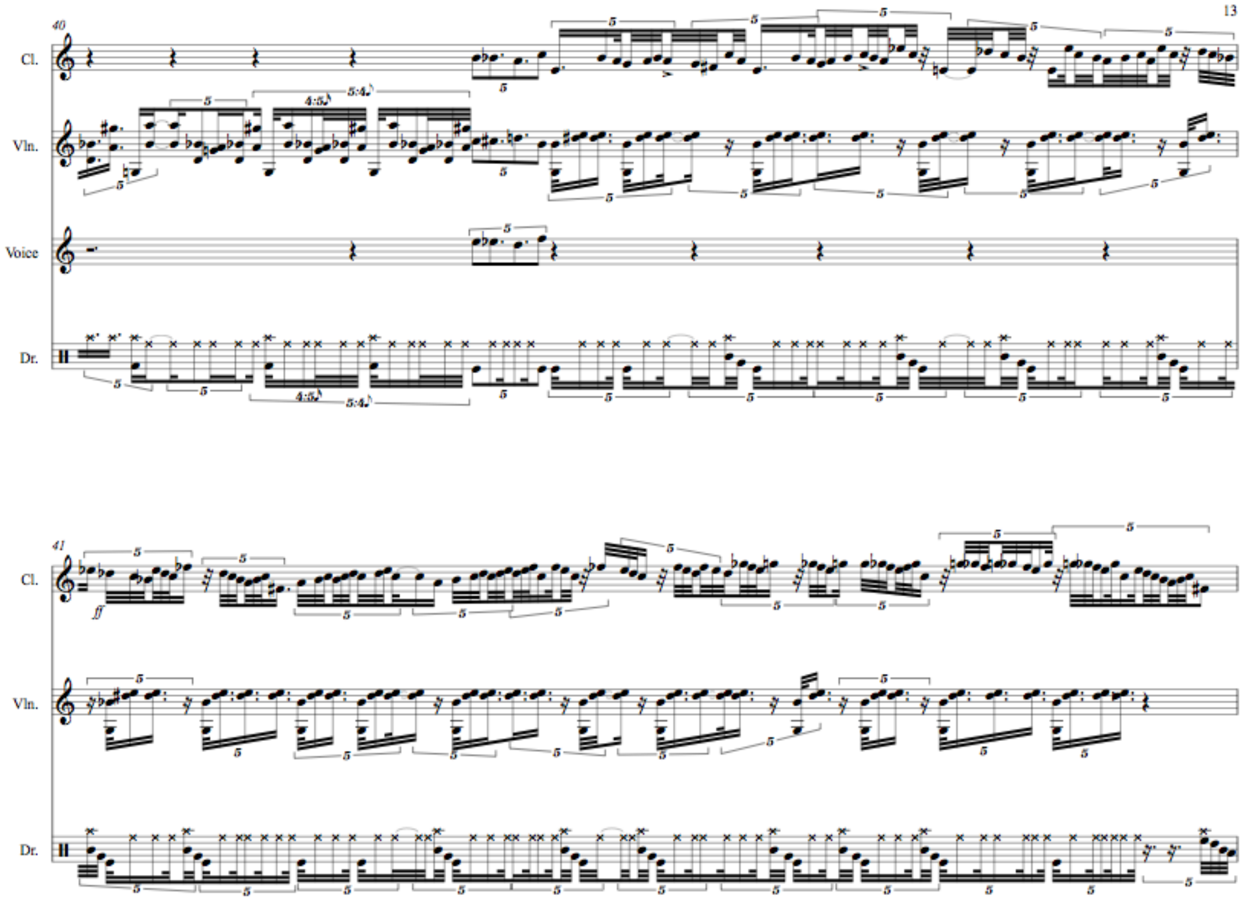

17
Cl.
Bass
Vln.
Dr.
18
Clarinet in B♭
3 3 4 3 3 6 3 3 4 4 3 3 3 2 3 3
3 3 4 3 3 6 3 3 4 4 3 3 3 2 3 3

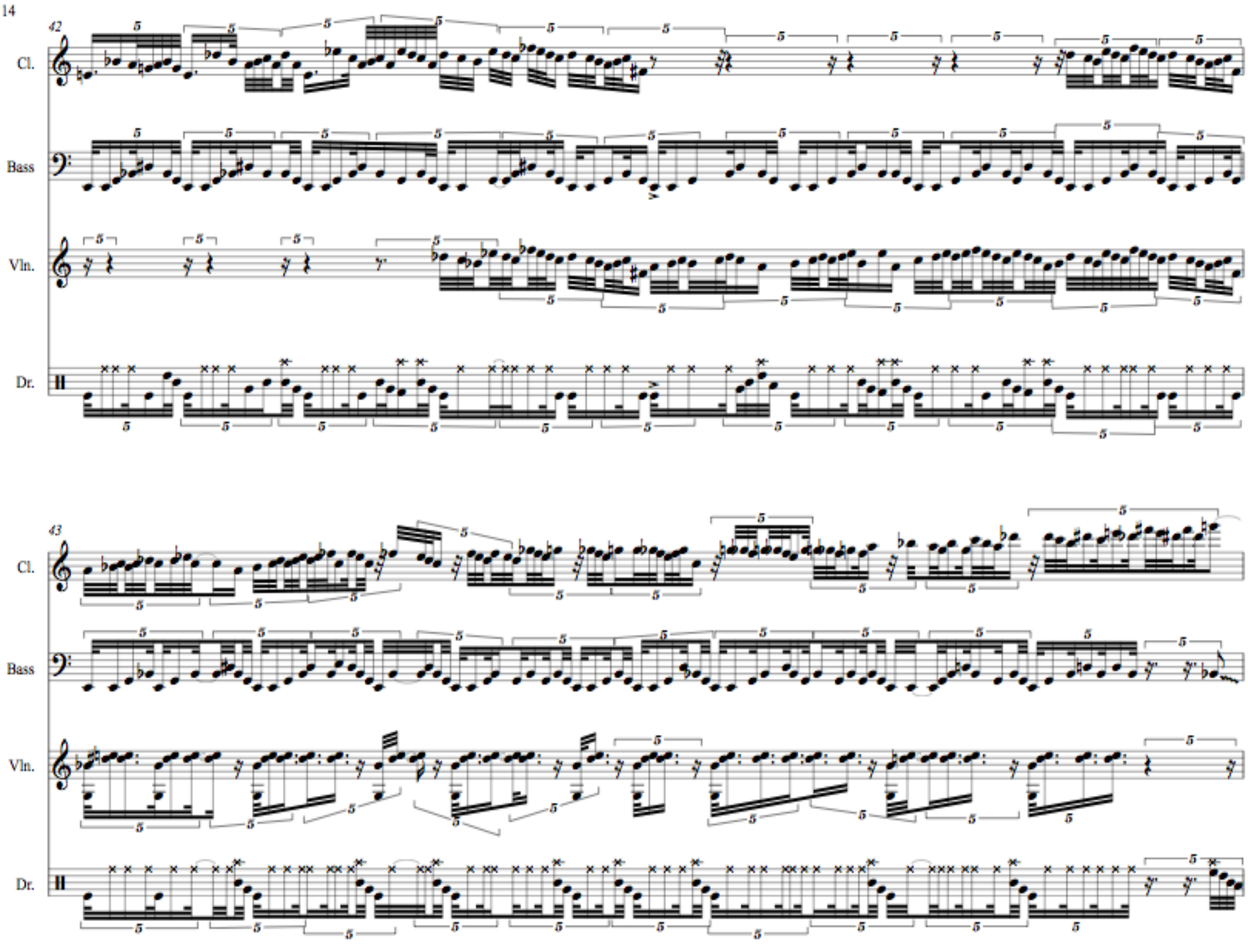

9
Soram Prastara
19
21
25
CUE
Improvise freely on elements of teh piece.
Use all techhniques available.
Tace 2nd time
Improvise freely on elements of teh piece.
Tace 2nd time
Improvise freely on elements of teh piece.
Tace 2nd time
Cl.
Improvise freely on elements of the piece.
while grooving in khanda
Improvise freely on elements of the piece.
while grooving in khanda
Improvise freely on elements of the piece.
while grooving in chatusra
Bass
Improvise freely on elements of teh piece.
Use all techhniques available.
Tace 2nd time
Improvise freely on elements of teh piece.
Tace 2nd time
Improvise freely on elements of teh piece.
Tace 2nd time
Vln.
Voice
Improvise freely on elements of the piece.
while grooving in khanda
Improvise freely on elements of the piece.
while grooving in khanda
Improvise freely on elements of the piece.
while grooving in chatusra
Dr.
5

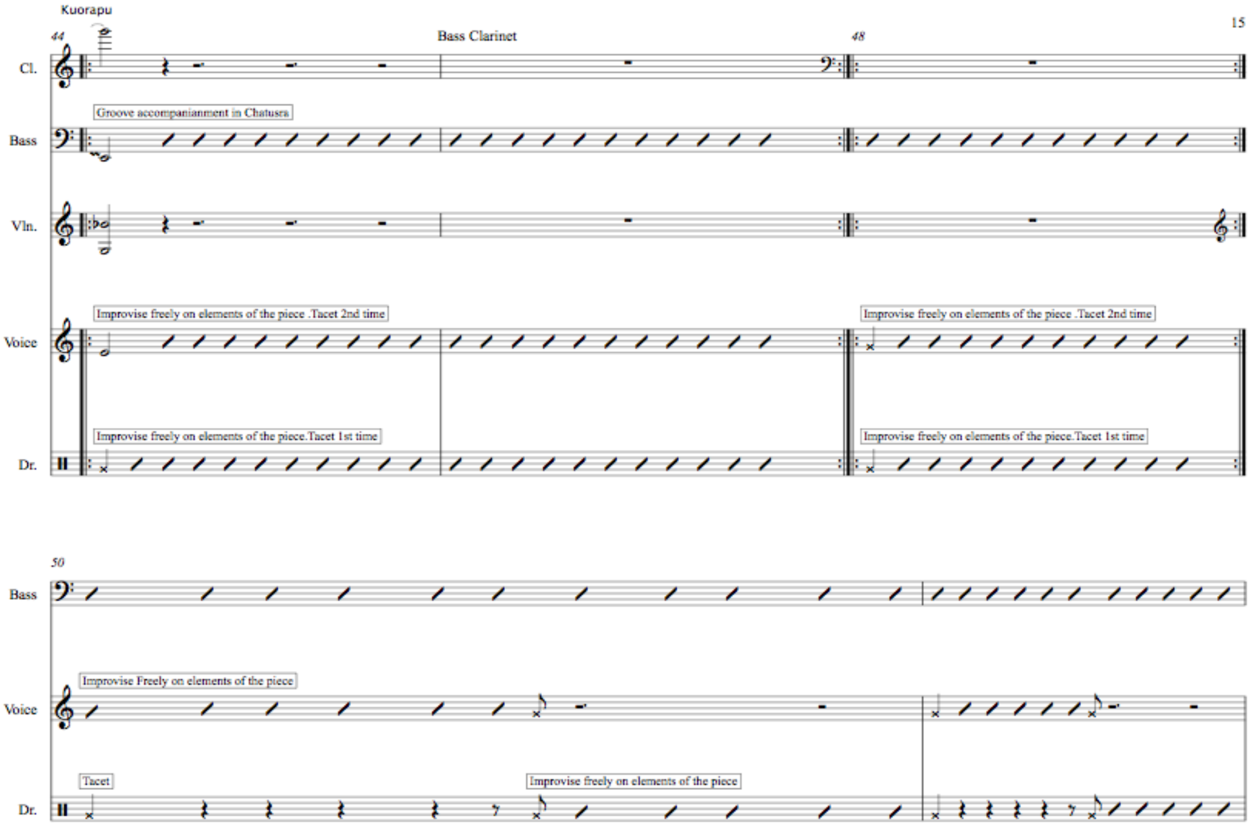

10
26
31
34
CUE
Improvise freely on elements of the piece. Use all techhniques available
Cl.
Bass
Improvise freely on elements of the piece. Use all techhniques available
Vln.
Voice
Dr.
5

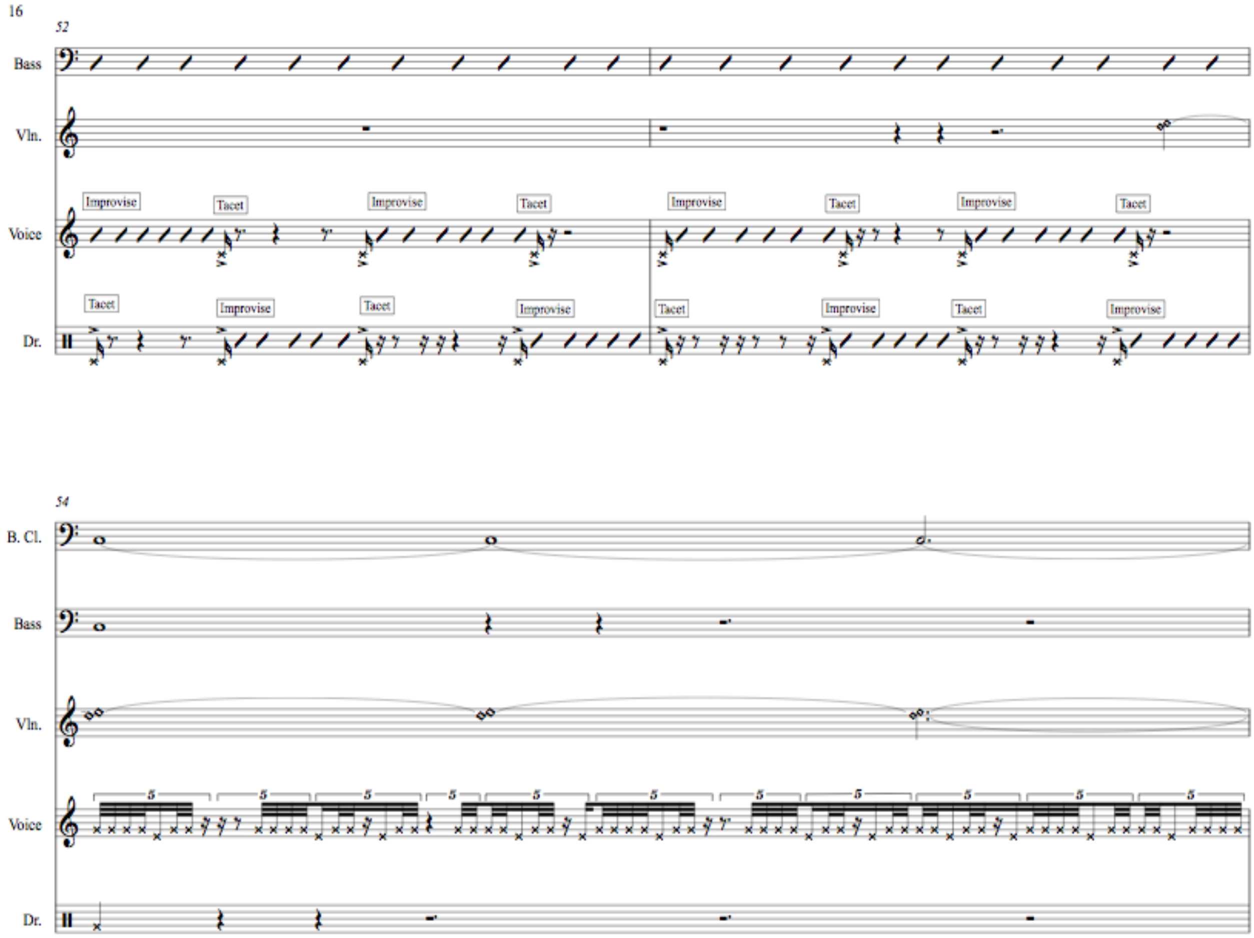

11
35
Bass Clarinet
Cl.
Bass
Vln.
Voice
Dr.
fff
f
f
multiphonic play lowest note and split it
f irritante
37
multi phonic xox xox
mf
multiphonic play lowest note and split it
mp
Temple Blocks
mf

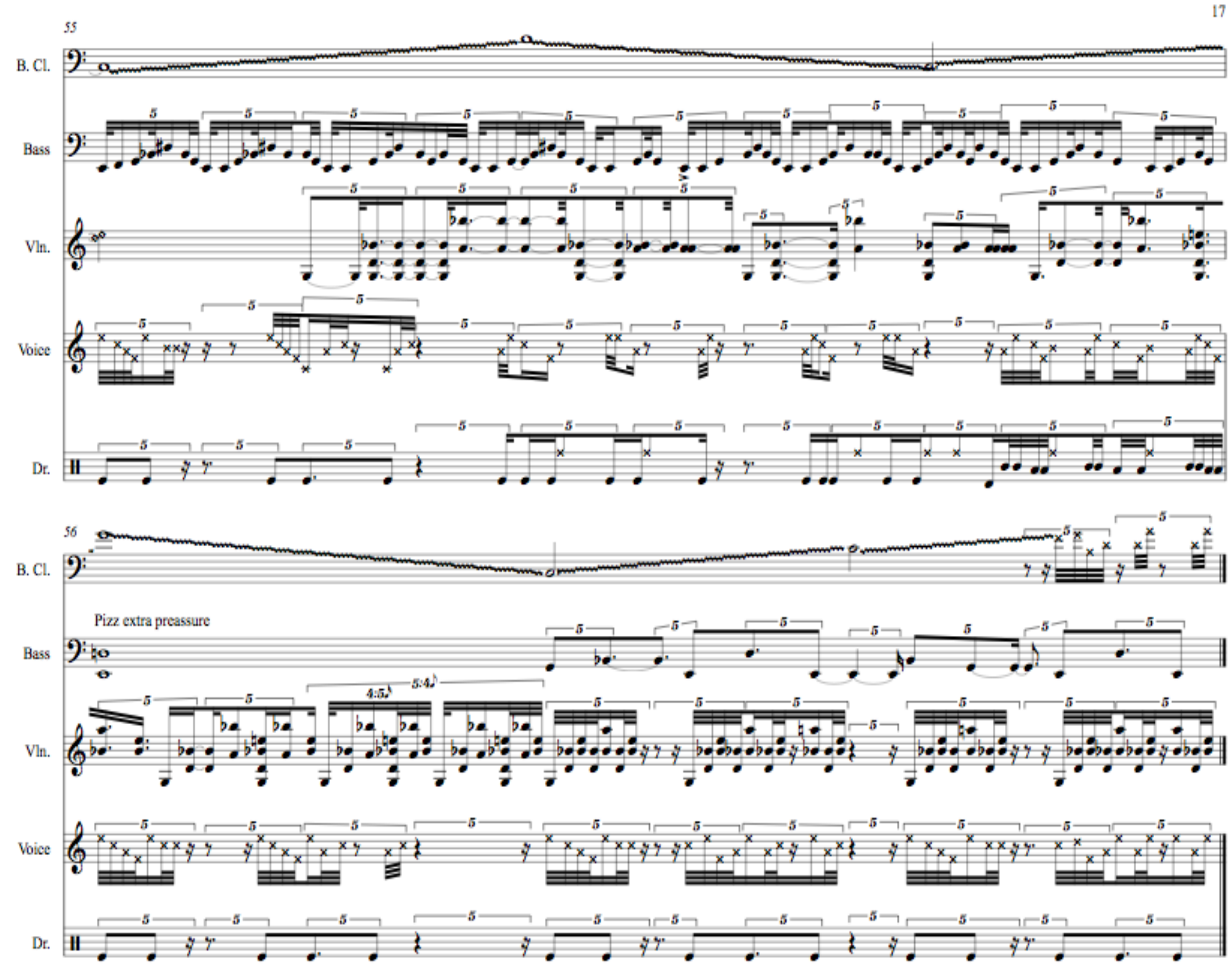

12
38
Poruttam 2nd block
Vln.
Voice
Dr.
pp
pp
39
To Cl.
Cl.
Vln.
Voice
Dr.
fff
fff


40
Cl.
Vln.
Voice
Dr.
4:5♪
5:4♪
41
ff


42
Cl.
Bass
Vln.
Dr.
43


Kuorapu
15
44
Bass Clarinet
48
Cl.
Bass
Vln.
Voice
Dr.
Groove accompaniament in Chatusra
Improvise freely on elements of the piece .Tacet 2nd time
Improvise freely on elements of the piece.Tacet 1st time
Improvise freely on elements of the piece .Tacet 2nd time
Improvise freely on elements of the piece.Tacet 1st time
50
Bass
Voice
Dr.
Improvise Freely on elements of the piece
Tacet
Improvise freely on elements of the piece


16
52
Bass
Vln.
Voice
Dr.
Improvise
Tacet
Improvise
Tacet
Improvise
Tacet
Improvise
Tacet
Tacet
Improvise
Tacet
Improvise
Tacet
Improvise
Tacet
Improvise
54
B. Cl.
Bass
Vln.
Voice
Dr.
5



4) Oru a Yemayá y Obba (Louis Aguirre)

for Trumpet, Clarinet, two Pianos and Percussion

This quintet (as well as the final octet ending this section) is part of a cycle of six compositions named **'Oru de Igbodú II'**, in which this Cuban composer explores his ample knowledge of African music and rituals in combination with karnatic rhythmical structures.

The red-thread established by the composer in this cycle of pieces is the Fibonacci series which is applied to the number of instruments used in each composition. There are two solos (one for violin and another for voice), a duo (for clarinet and flute), a trio (for 3 percussionists), this quintet and the closing octet. In each piece the composer tries to musically evoke and allude the different rituals and offerings of the African religion that form the source of Cuban 'Santeria'.

Considering that the total length of the cycle is around 40 minutes, I have chosen to analyse the last two pieces.

The composer reflects on his music and the influence of karnatic rhythm on it:

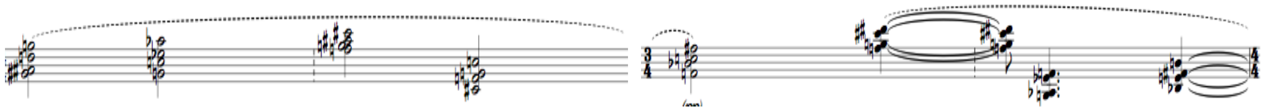
> *"Oru is a sequence of chants and percussive strokes dedicated to the Orishas (the pantheon of African Gods who rule and represent all aspects of our world and life). My sequence of pieces is dedicated to invoke, worship and communicate with the Orishas.*
>
> *My music is nourished by Santería ceremonies, where music forms an integral part of making contact with 'other worlds': Gods, ancestors; and with 'another reality' - trance, possession, divination. In most of my music, sound is the vehicle of catharsis and sacred meaning. It was indeed, my spiritual beliefs that made me realise I needed a sound that would reflect the atmosphere of these rituals. A sound capable of transmitting the frantic and complex sonorities of the ceremony.*
>
> *I was educated as a violin player within the old soviet school, (transplanted to Cuba) and within the most conservative western traditions. But the fact of being Cuban made me understand the importance of knowing different cultures as a way to enrich my own creative process and my own life. It is exactly this idea of global integration between different components of different cultures that has become one of my main characteristics as a composer. To this end, I came to Amsterdam to study the programme 'Contemporary music through non-western techniques'. I somehow knew that the complexity of karnatic rhythms could be an answer to my search.*
>
> *Whilst at the beginning I composed scrupulously following the rules learnt in this programme, shortly after my graduation I began to use the techniques in a much more intuitive way. I let myself be inspired by the 'spirit' of a technique even if I had to break the rules or adapt it to the musical needs of the moment. Cycles become shortened or stretched; techniques such as mukthays, yati phrases or mixed jathi nadai bhedam were more like brush strokes on a canvas that rarely finished as they do in karnatic music. What interested me of karnatic music was the unfolding of rhythmical richness that this system has created and how I could use it for my own aims.*
>
> *In this cycle of pieces I tried to be more aware of the concept of cycle and to respect many structural aspects of karnatic music. Nonetheless, cycles and techniques are still broken, but all the pieces ooze karnatic techniques even if these are often difficult to perceive or even analyse".*

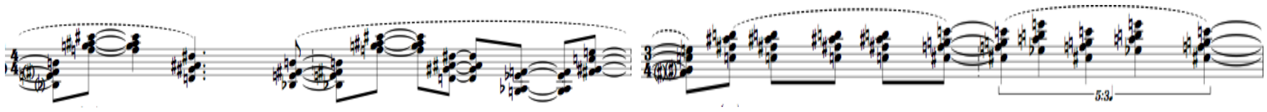
The piece is structured, rather loosely, on a cycle of 14 beats. This cycle is represented in most of the piece by the sequence 4/4, 4/4, 3/4, 3/4. Towards the end of the piece, the time signatures change to 5/4, 5/4, 4/4. However, very few cycles are completed as such. Many a times a bar is added or omitted, or a couple of times a time signature, different to the ones used throughout, breaks the system. Nonetheless, the thinking behind is quite cyclic in general.

Except for the commencing measures, the whole piece is constructed on a spider web of different tirmanas used simultaneously in both pianos and vibraphone.

I would like to focus exclusively on how the vibraphone part has used some tirmanas to illustrate the point the composer makes in his introduction.

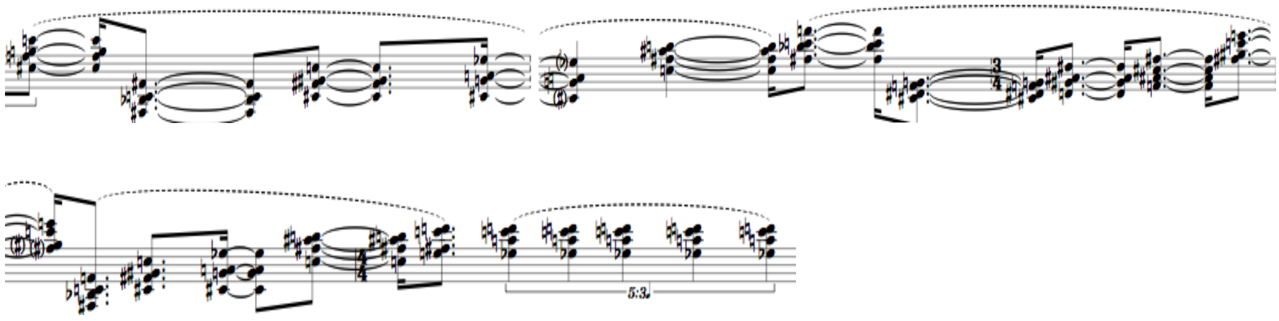
1) Measures 23-30 – 5x8, 5x6, 5x4, 5x2, 5:3♩





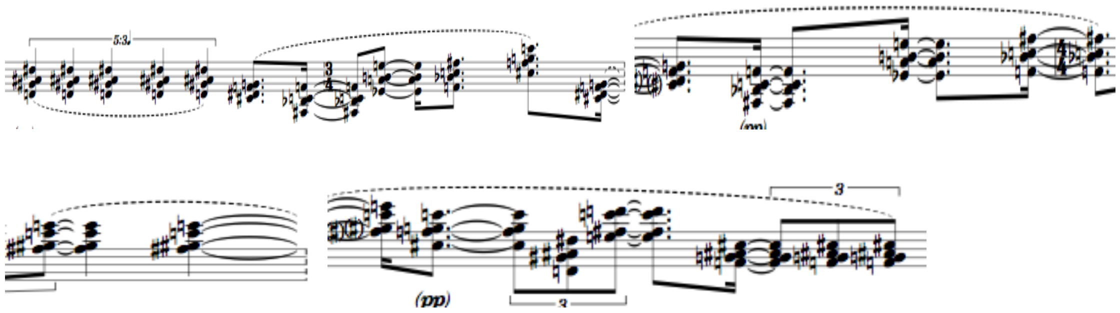
Whilst the first three steps ‘religiously’ follow the calculations, the last chord of the 5x2 step is tied-over to the first chord of the last step. I find this way of breaking the tirmana a very clever manner of eliminating any possible ‘predictability’ that tirmanas may produce.

2) Measures 31-35 – 5x5, 5x4, 5x3, 5:3♩



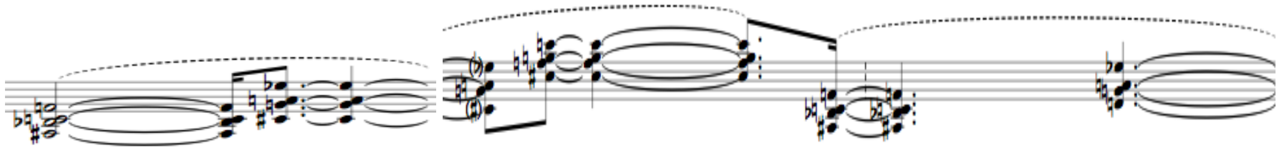
After breaking the system by utilising a triplet, the composer takes the notion (explained in chapter 14) by which each note of a tirmana is a field or space of specific duration rather than a note of a particular length, and plays with combining gatis in the creation of the first chord of the first step of the sequence (5 matras long) by adding four matras of tisra and one matra of chatusra.

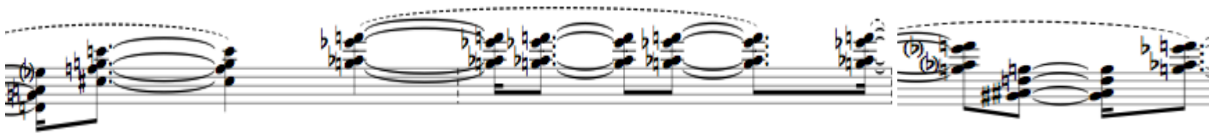
3) Measures 36-40 – Viloma version of the previous sequence 5:3♩, 5x3, 5x4, 5x5



The composer plays with the same idea in the last step, where the last chord is repeated three times in a triplet. However, ultimately, the total duration of the chord is once again 5 matras.

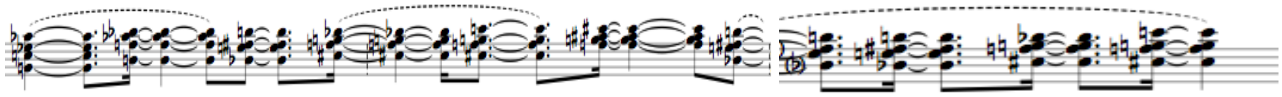
4) Measures 47-52 – 3x9, 3x7, 3x5, 3x3





Possibly, one of the few times where the composer uses a tirmana in its most standard way.

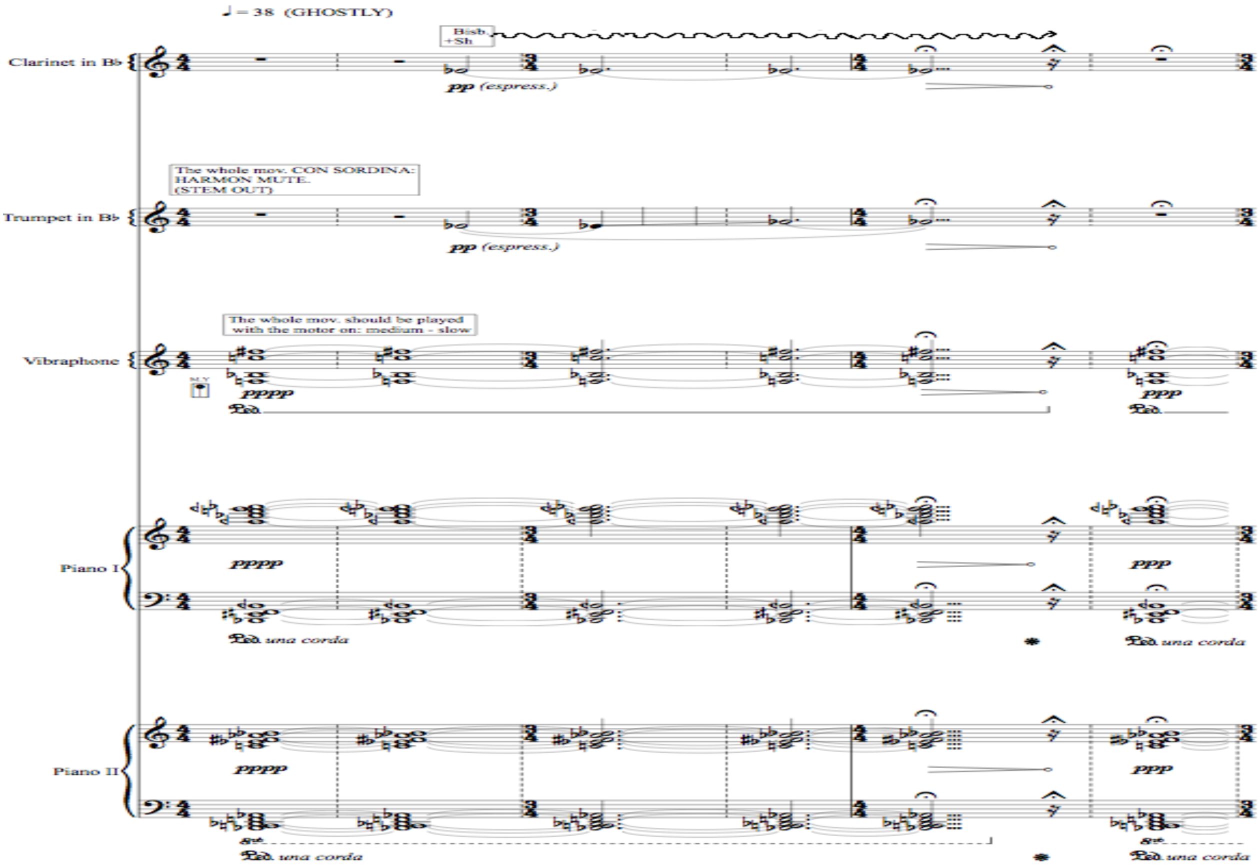
5) Measures 59-61 & 62-64 – 2x7, 5 matras, 2x6, 7 matras, 5, 4, 4, 5



This last example quite clearly illustrates the 'intuitive' approach the composer mentions above. It can be seen as a sort of yatis prastara, with one element being a tirmana of 2 notes, decreased by one matra the second time, combined with a chord that also increases systematically. However, the sequence is broken by chords of the same duration as the time signatures used at that particular moment, reflecting the change in the cycle pattern at a micro structural level.

(track 285)

V - ORU A YEMAYÁ Y OBBA


♩ = 38 (GHOSTLY)
Clarinet in B♭
Bisb. +Sh
pp (espress.)
Trumpet in B♭
The whole mov. CON SORDINA: HARMON MUTE. (STEM OUT)
pp (espress.)
Vibraphone
The whole mov. should be played with the motor on: medium - slow
M.Y
pppp
Ped.
ppp
Ped.
Piano I
pppp
ppp
Ped. una corda
Ped. una corda
Piano II
pppp
ppp
8vb
Ped. una corda
Ped. una corda

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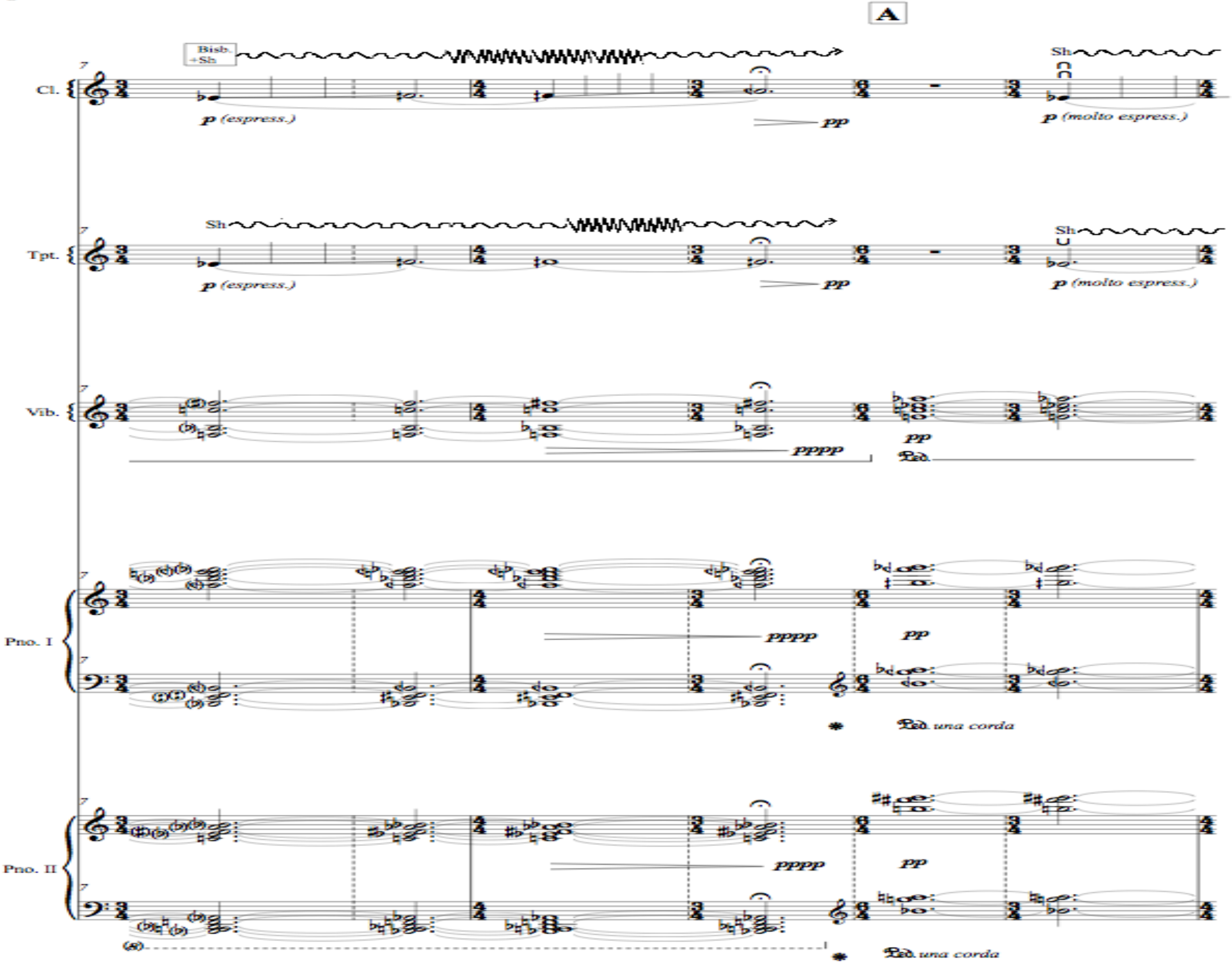
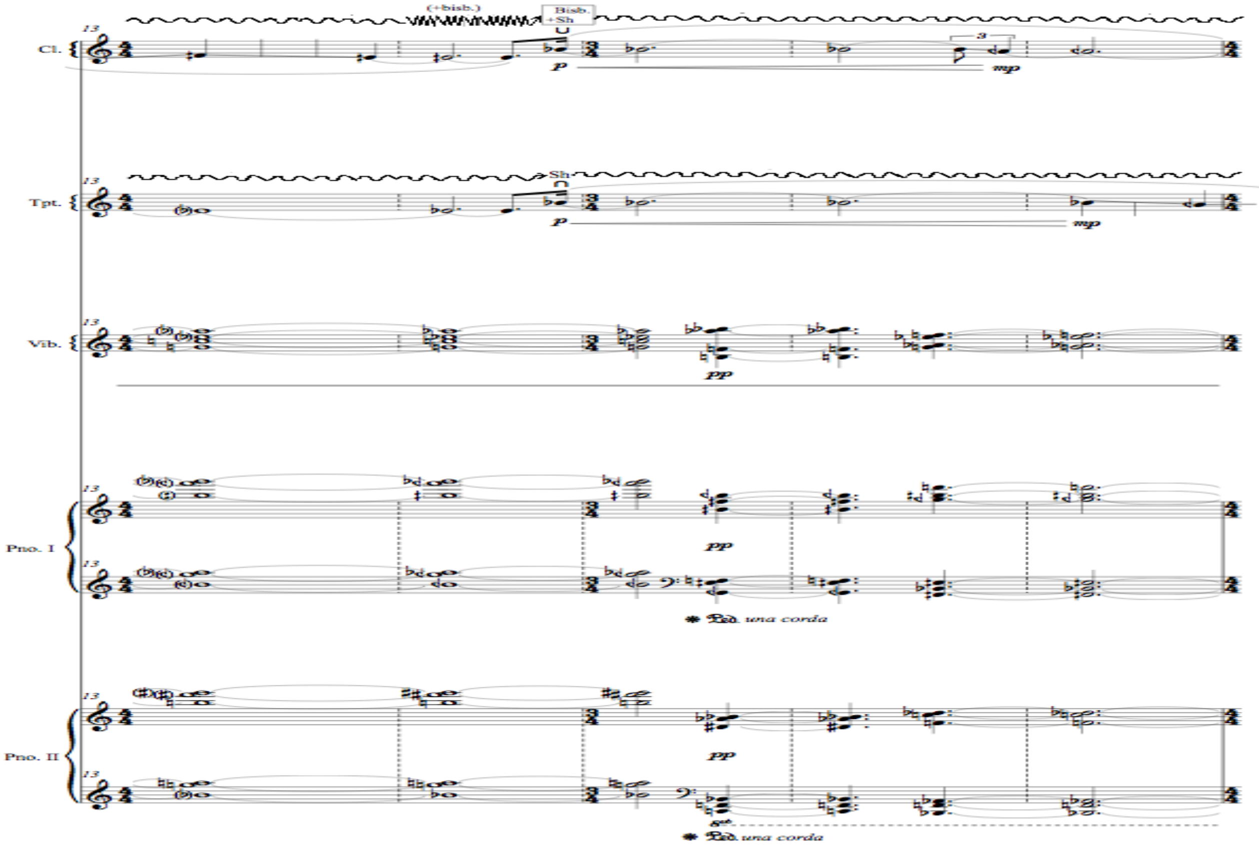
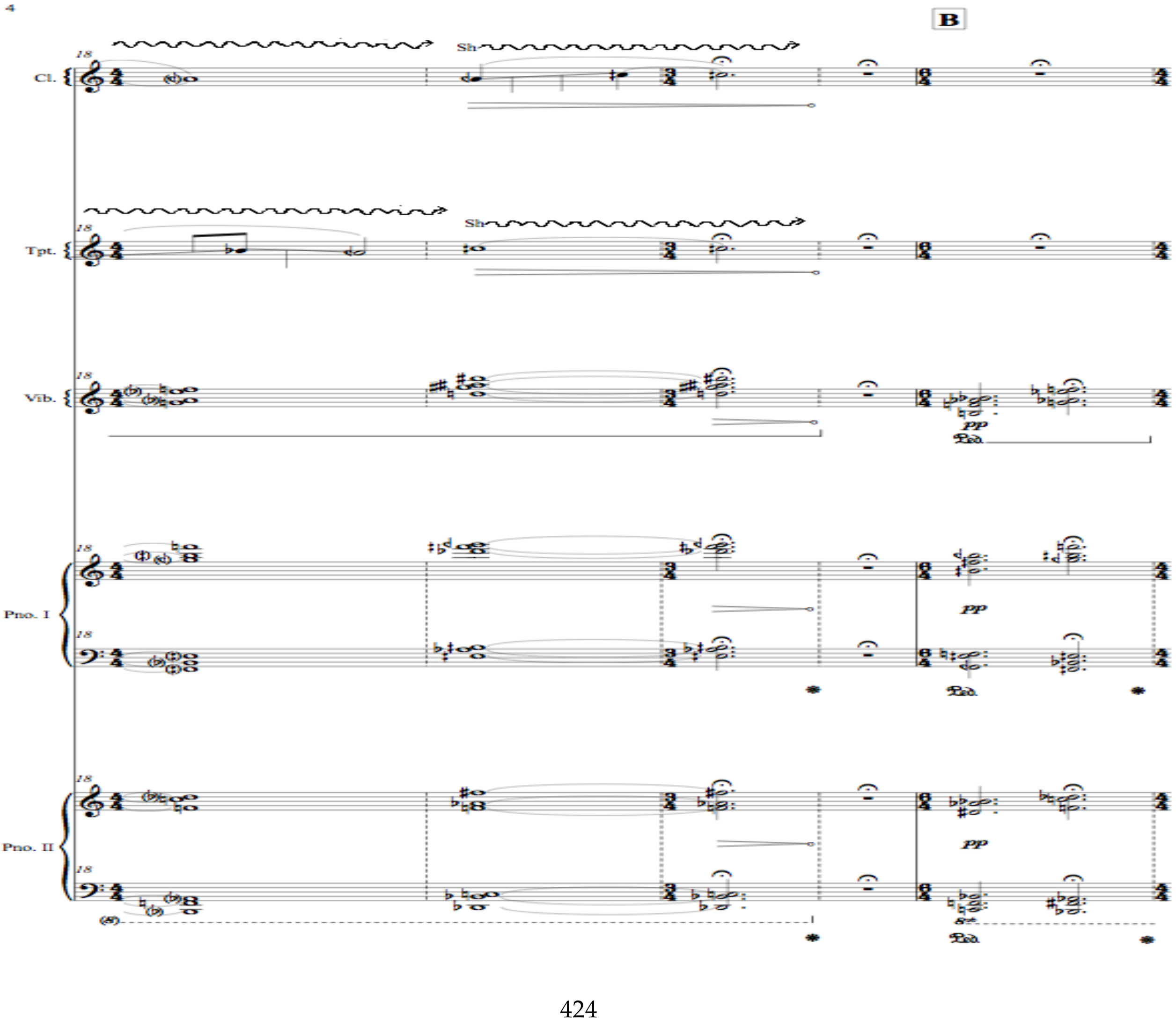
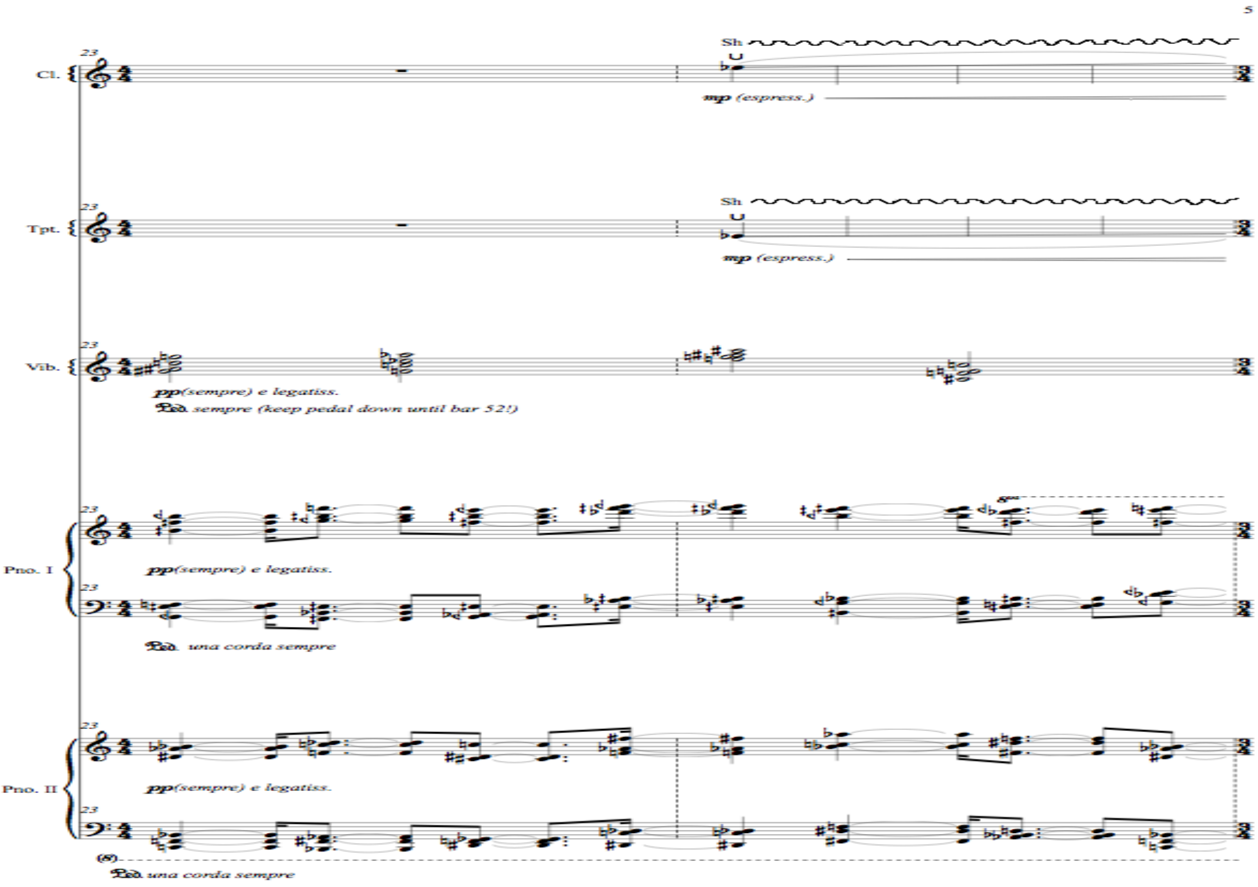
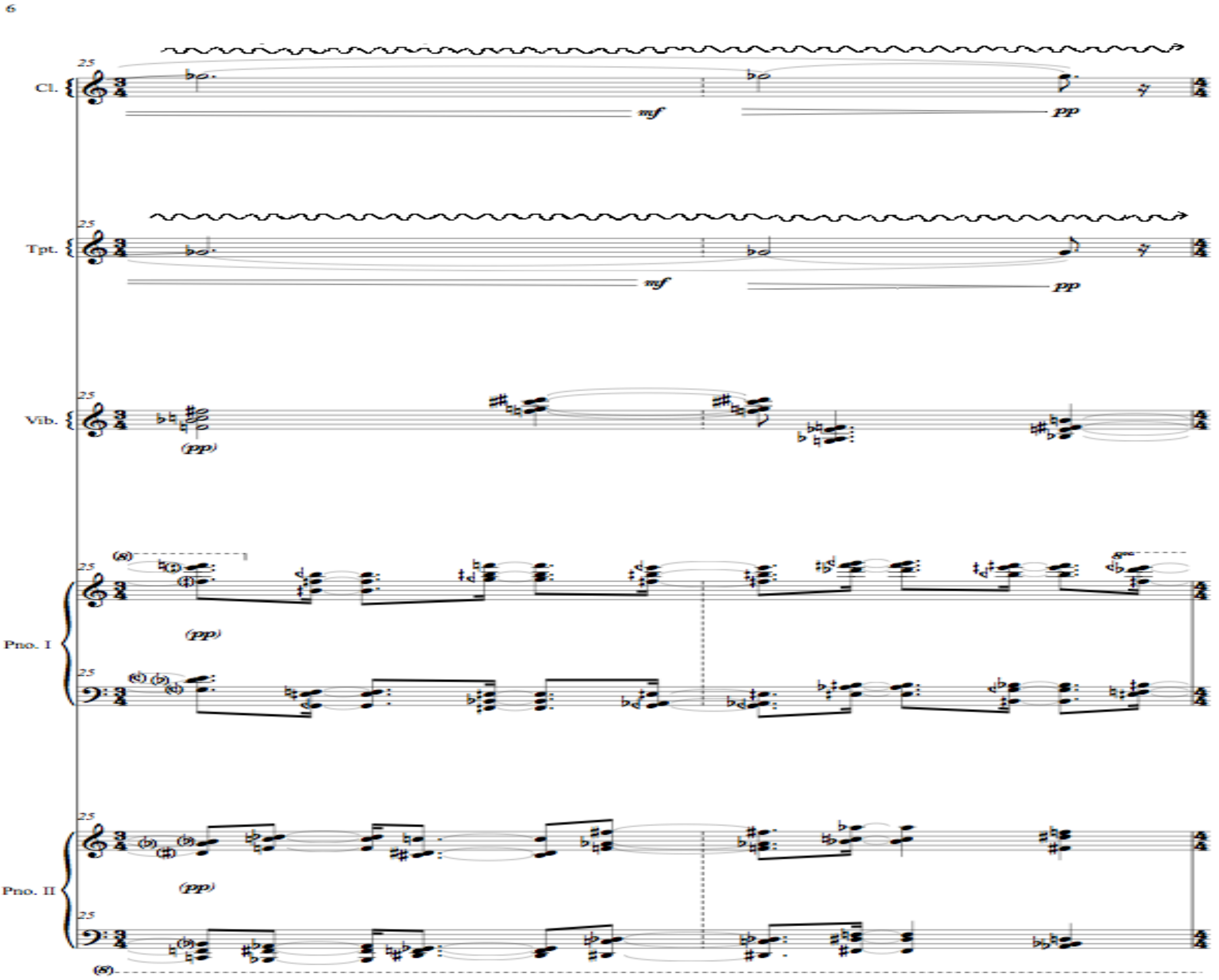
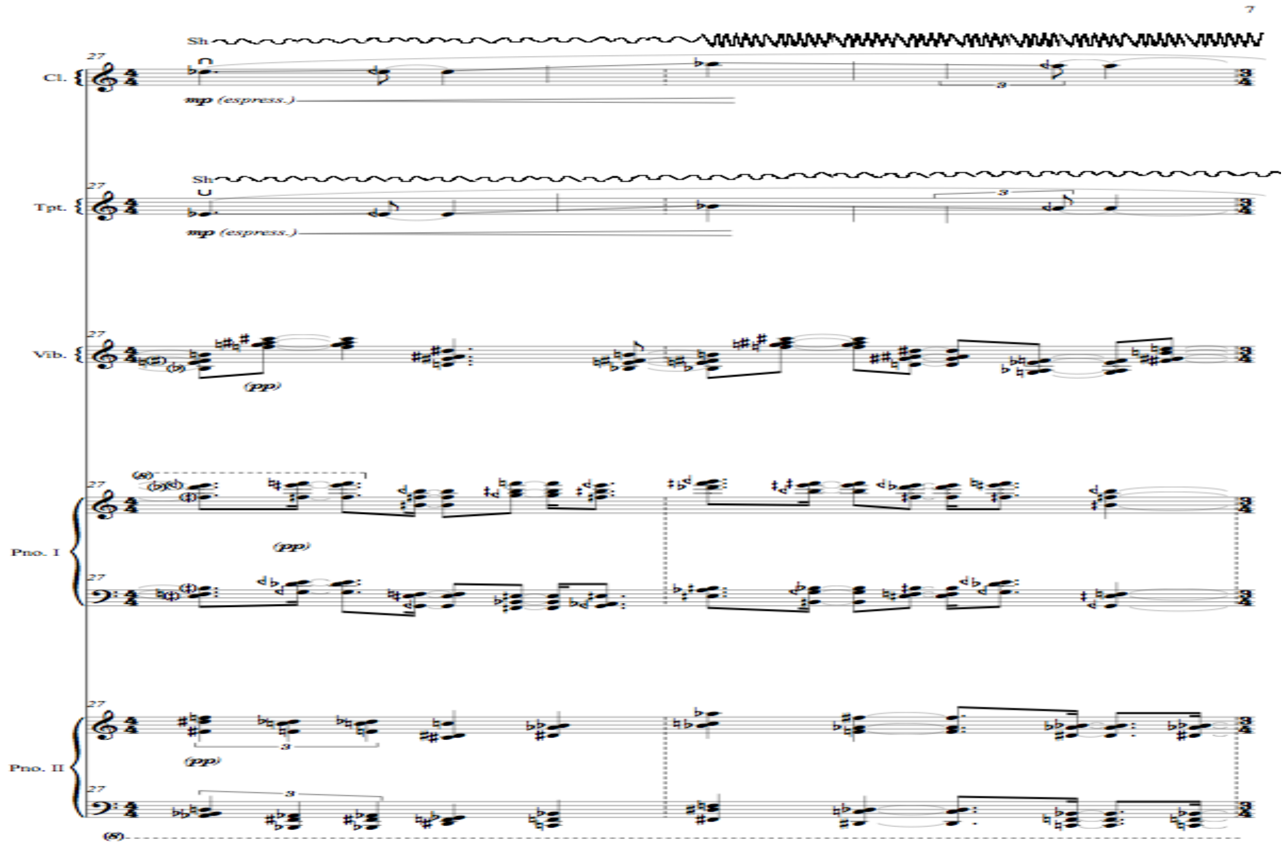

A
Cl.
Bisb. +Sh
p (espress.)
pp
Sh
p (molto espress.)
Tpt.
Sh
p (espress.)
pp
Sh
p (molto espress.)
Vib.
pppp
pp
Ped.
Pno. I
pppp
pp
Ped. una corda
Pno. II
pppp
pp
(8)
Ped. una corda

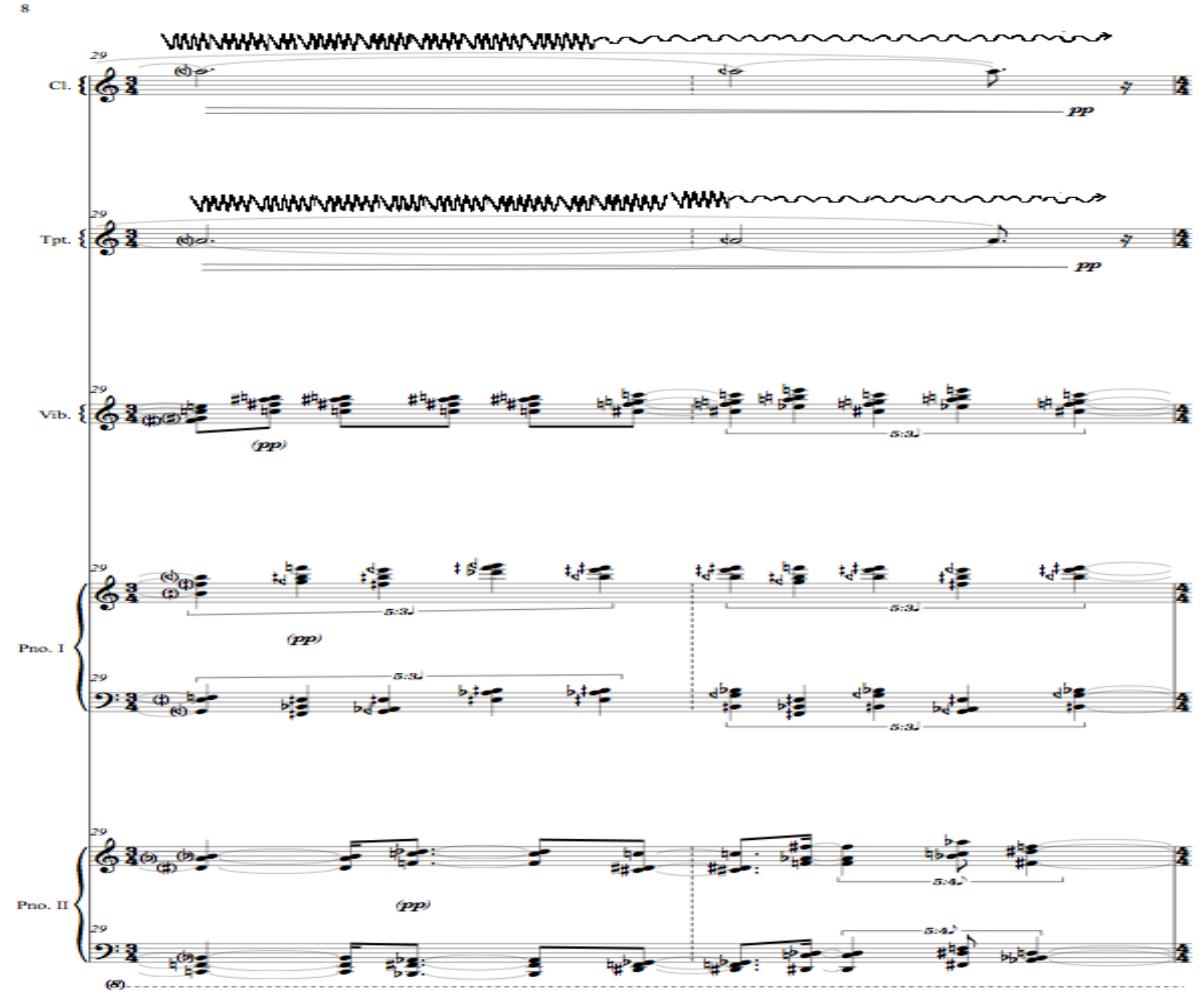

13
(+bisb.)
Bisb.
+Sh
Cl.
p
3
mp
Sh
Tpt.
p
mp
Vib.
pp
Pno. I
pp
✻ Ped. una corda
Pno. II
pp
8va
✻ Ped. una corda

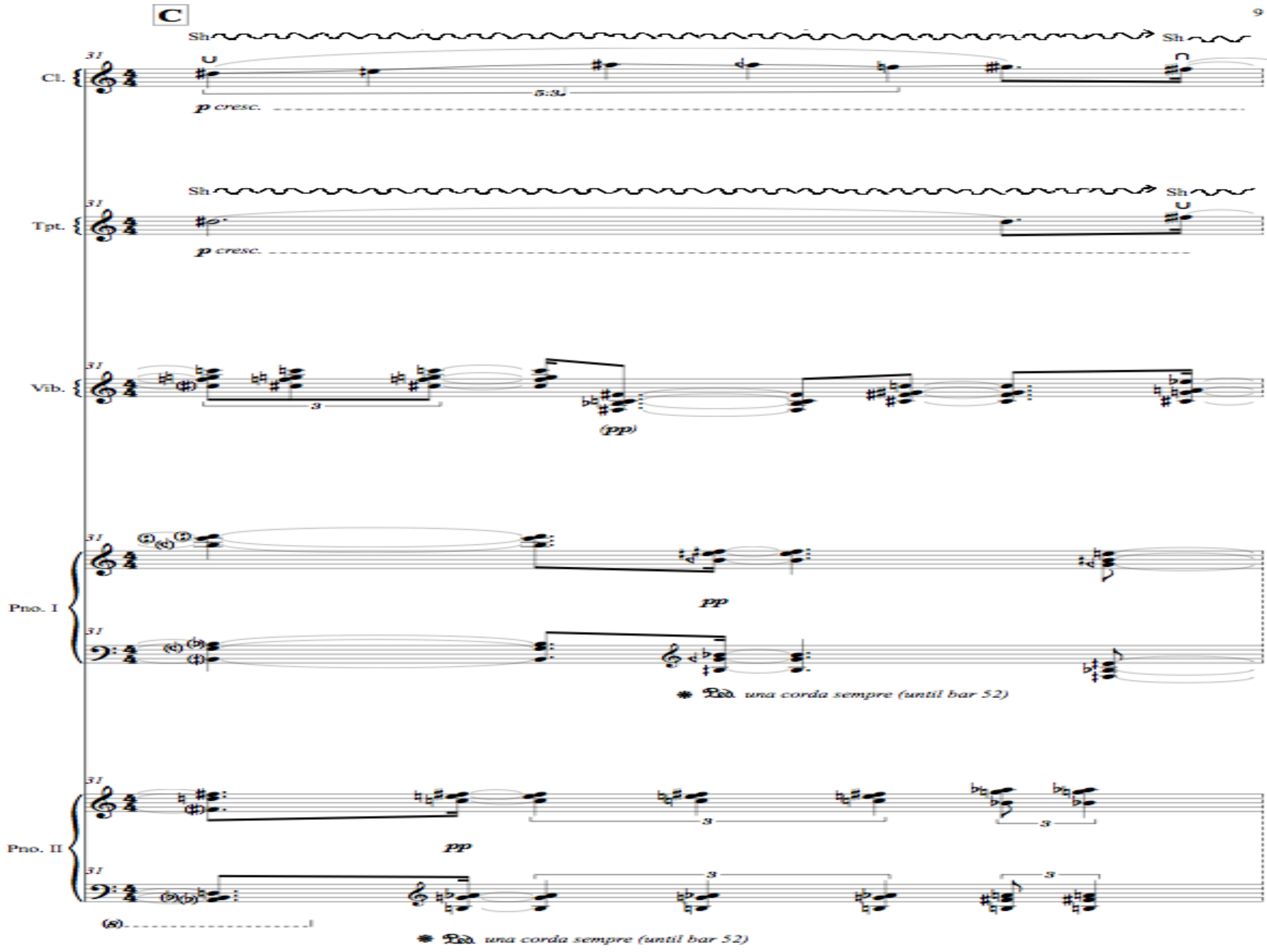

B
18
Cl.
Sh
Tpt.
Sh
Vib.
pp
Ped.
Pno. I
pp
✻
Ped.
✻
Pno. II
pp
(8)
8va
✻
Ped.
✻

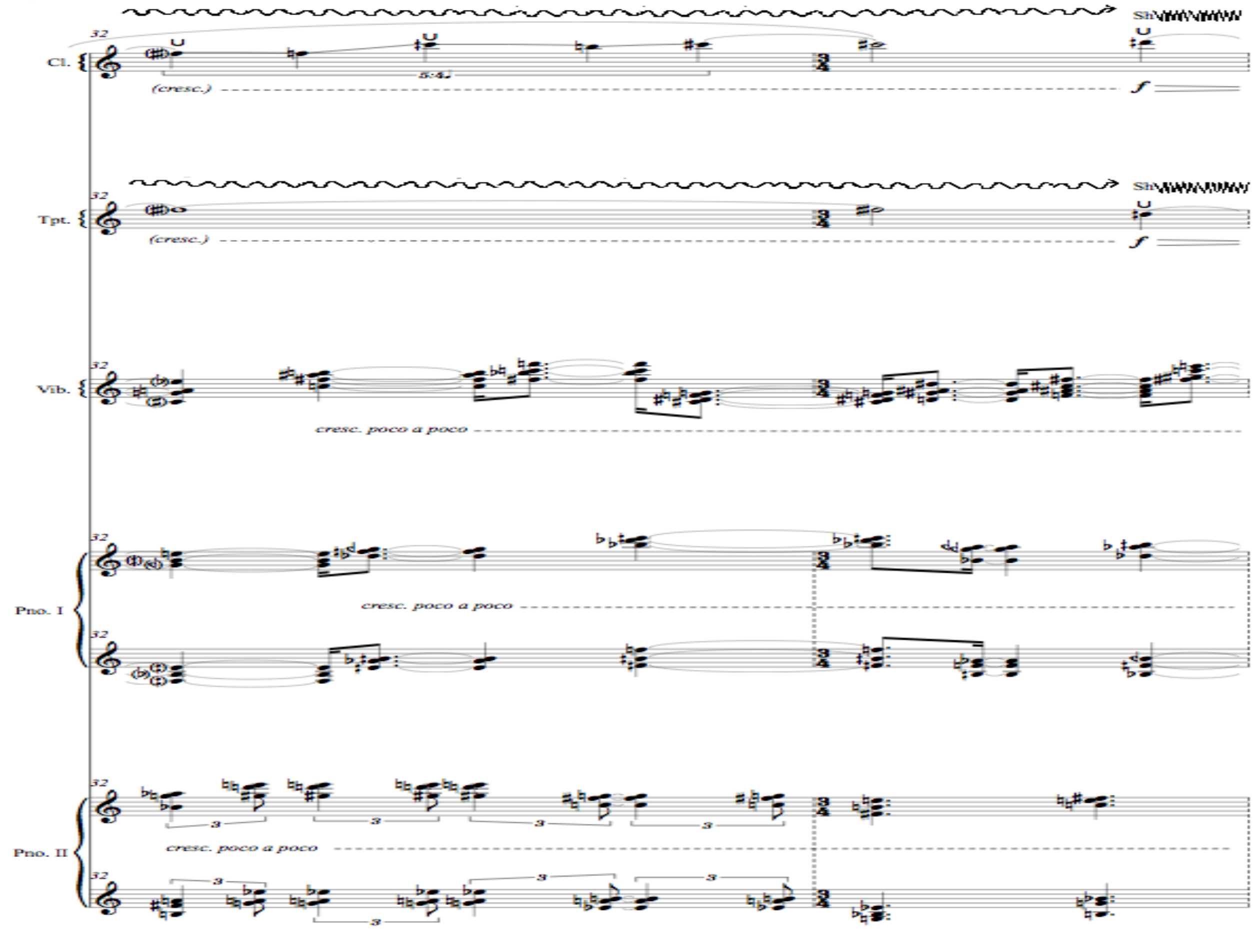

5
23
Cl.
Sh
mp (espress.)
Tpt.
Sh
mp (espress.)
Vib.
pp(sempre) e legatiss.
Ped. sempre (keep pedal down until bar 52!)
Pno. I
pp(sempre) e legatiss.
Ped. una corda sempre
8va
Pno. II
pp(sempre) e legatiss.
(8)
Ped. una corda sempre

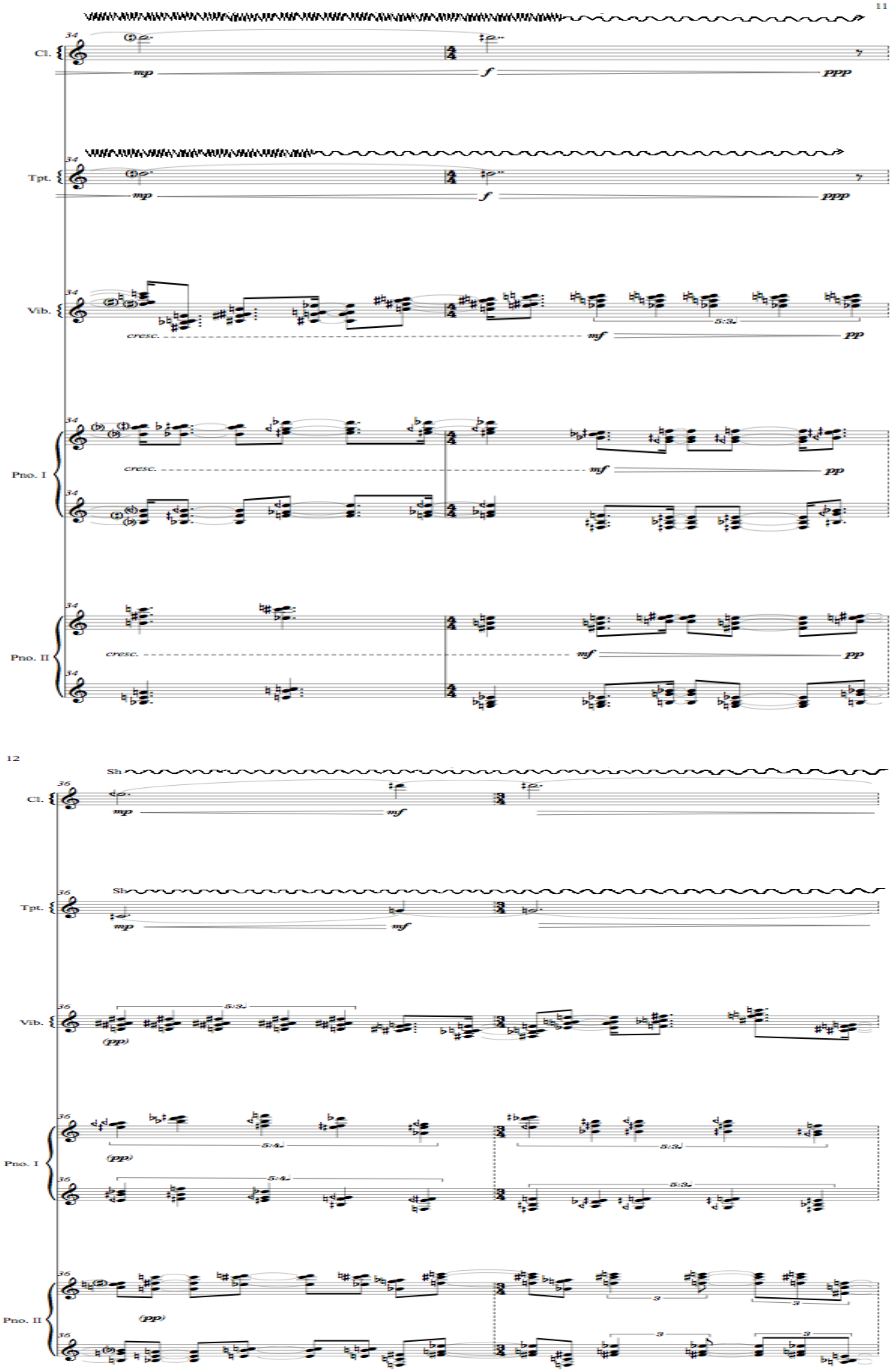

6
25
Cl.
mf
pp
Tpt.
mf
pp
Vib.
(pp)
Pno. I
(8)
(pp)
8va
Pno. II
(pp)
(8)

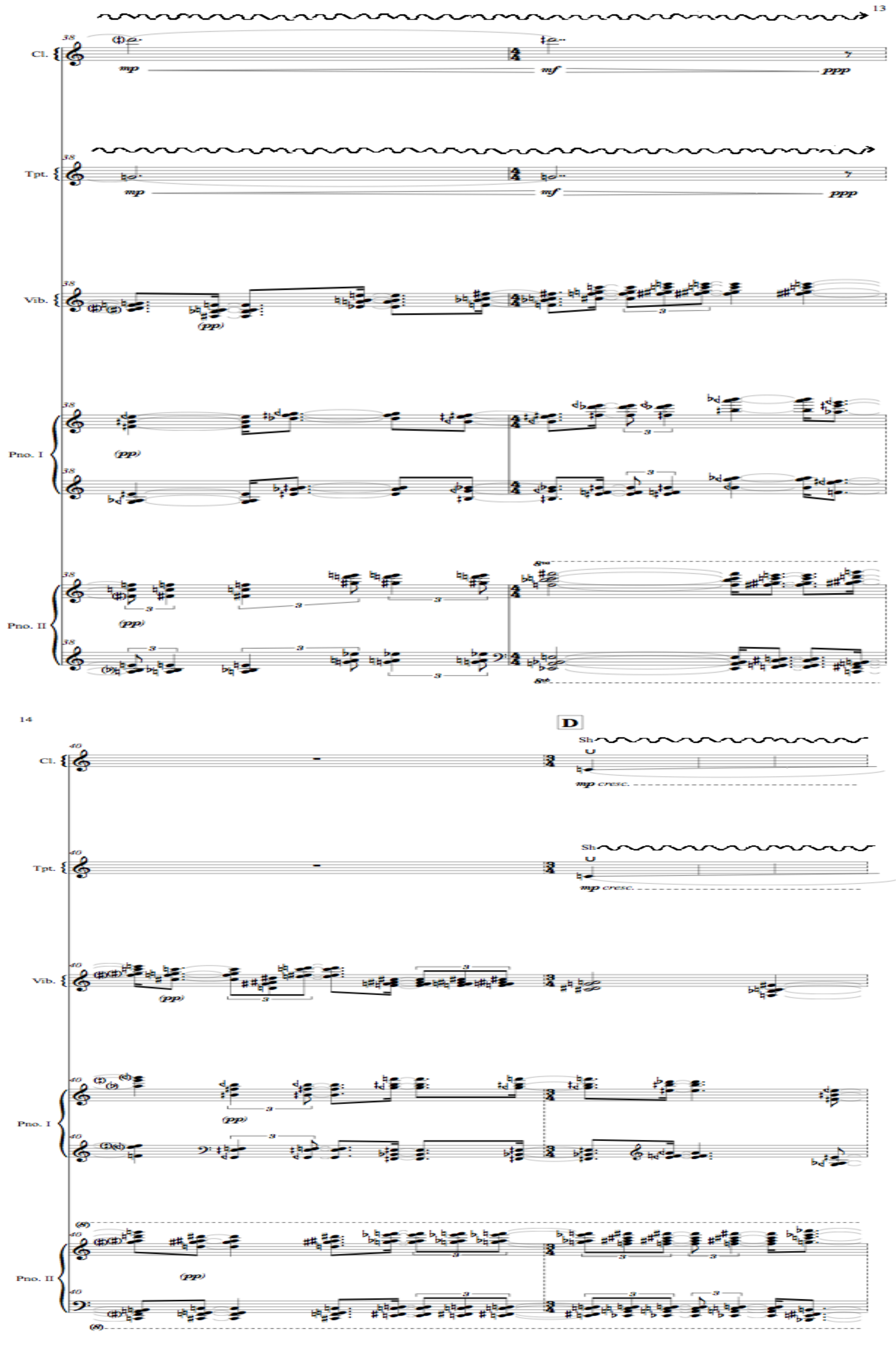

7
27
Sh
Cl.
mp (espress.)
3
Tpt.
Vib.
(pp)
(8)
Pno. I
Pno. II

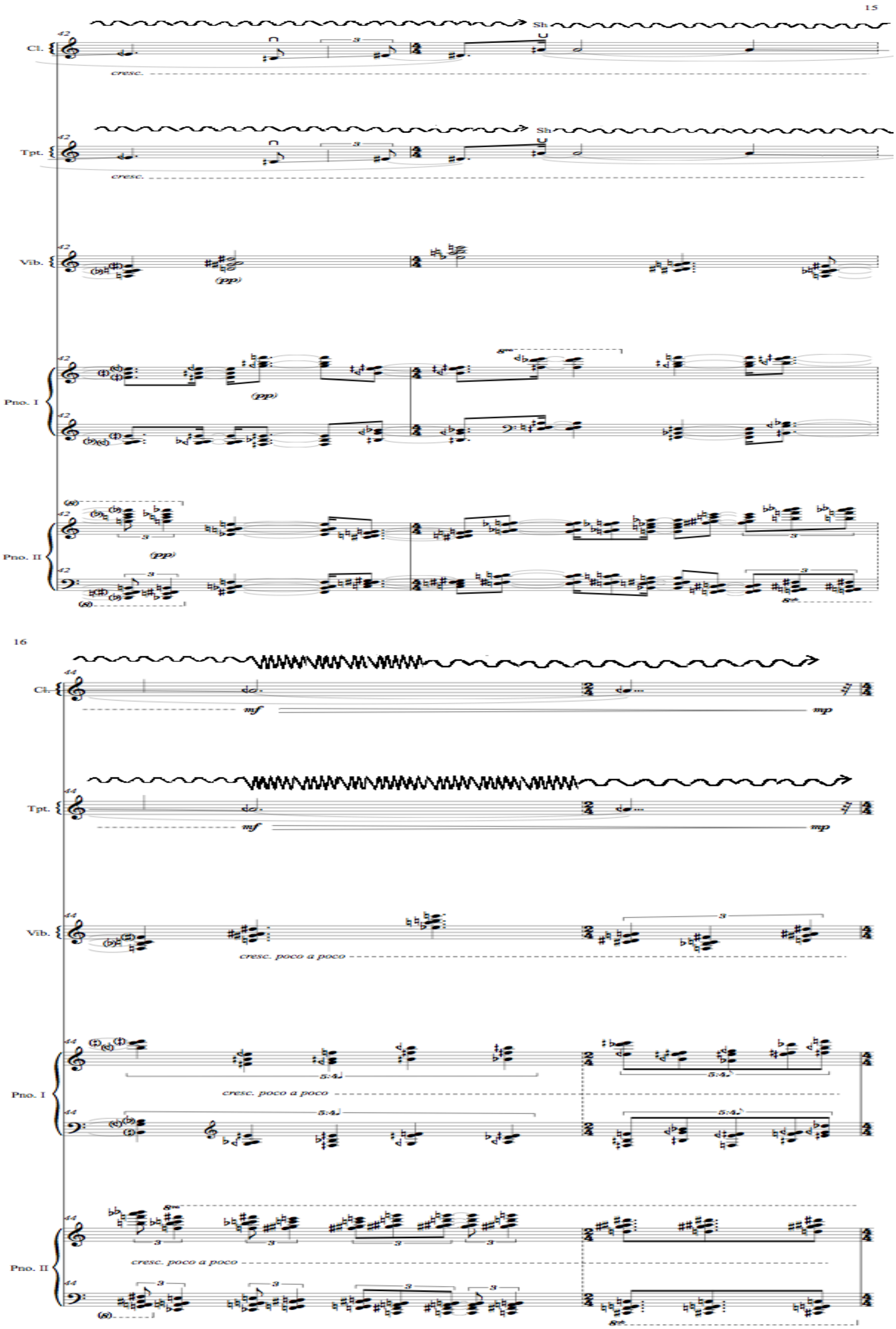

8
29
Cl.
pp
Tpt.
Vib.
(pp)
5:3♩
Pno. I
Pno. II
5:4♪
(8)

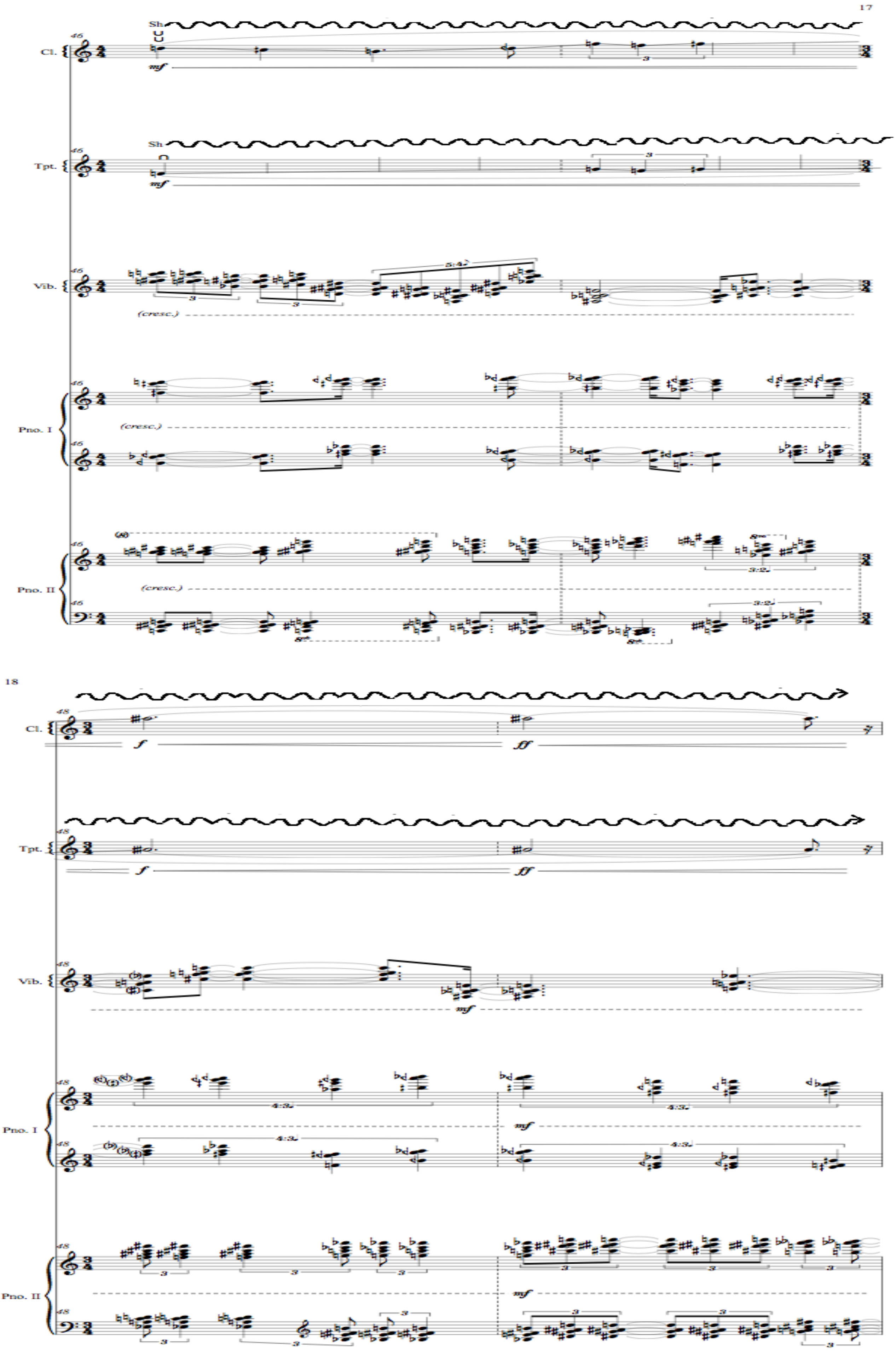

C
Sh
Sh
31
Cl.
5:3
p cresc.
Sh
Sh
31
Tpt.
p cresc.
31
Vib.
3
(pp)
31
Pno. I
pp
31
❋ Ped. una corda sempre (until bar 52)
31
Pno. II
3
3
pp
31
3
3
(8)
❋ Ped. una corda sempre (until bar 52)

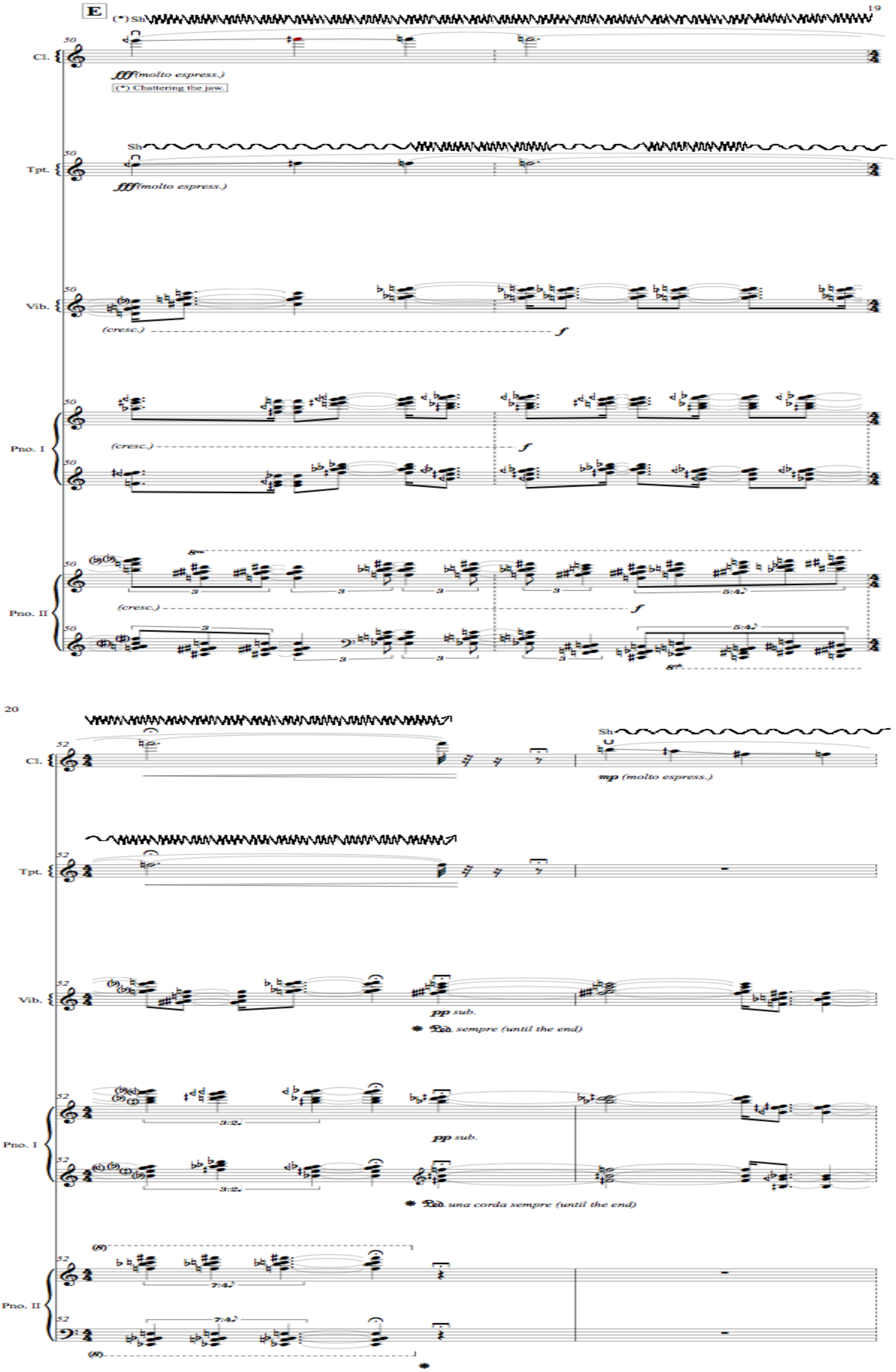

Sh
32
Cl.
5:4
(cresc.)
f
Sh
32
Tpt.
(cresc.)
f
32
Vib.
cresc. poco a poco
32
Pno. I
cresc. poco a poco
32
32
Pno. II
3
3
3
3
cresc. poco a poco
32
3
3
3
3
3

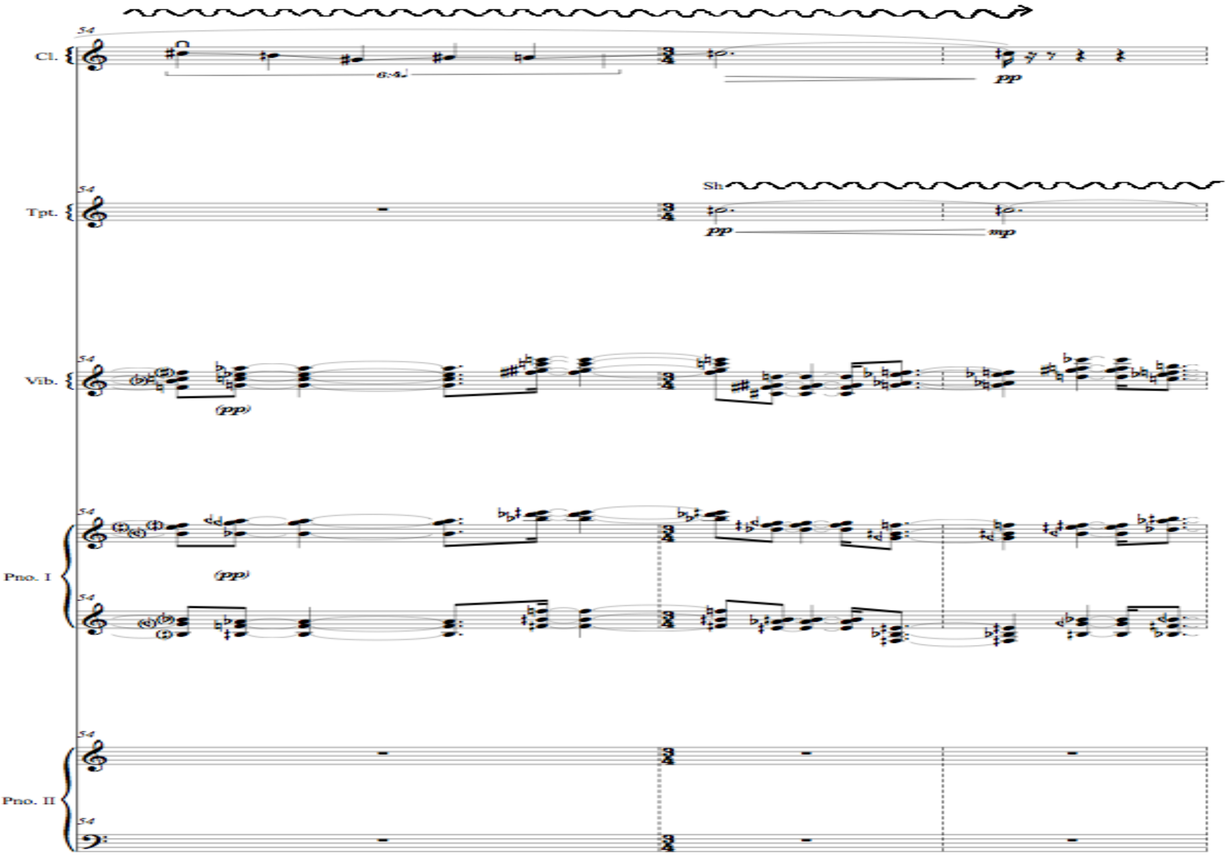

11
Cl.
Tpt.
Vib.
Pno. I
Pno. II
mp
f
ppp
cresc.
mf
pp
5:3
12
Sh
(pp)
5:4
3

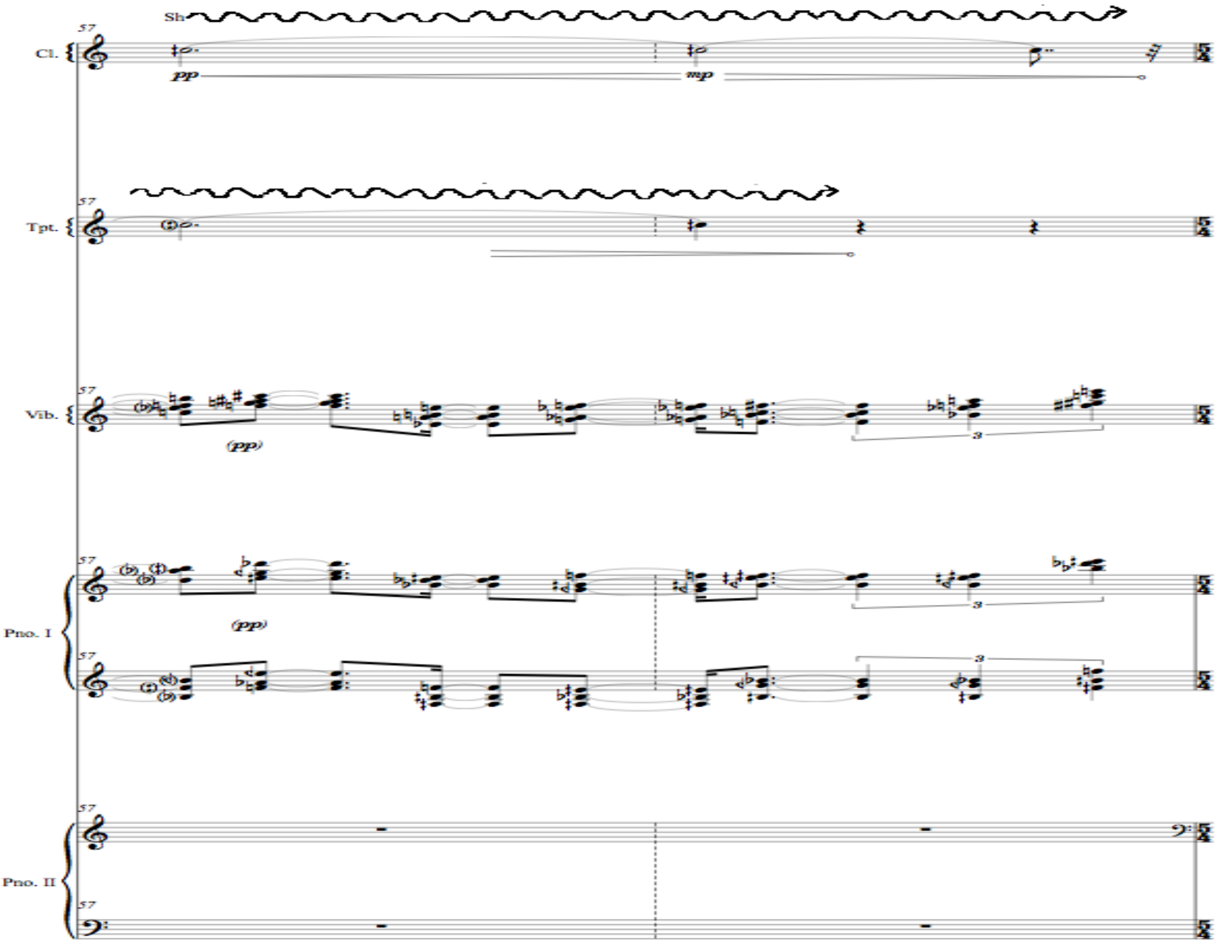

13
38
Cl.
mp
mf
ppp
Tpt.
mp
mf
ppp
Vib.
(pp)
3
Pno. I
(pp)
3
Pno. II
(pp)
3
8va
8va
14
D
40
Cl.
Sh
mp cresc.
Tpt.
Sh
mp cresc.
Vib.
(pp)
3
Pno. I
(pp)
3
Pno. II
(8)
(pp)
3
(8)

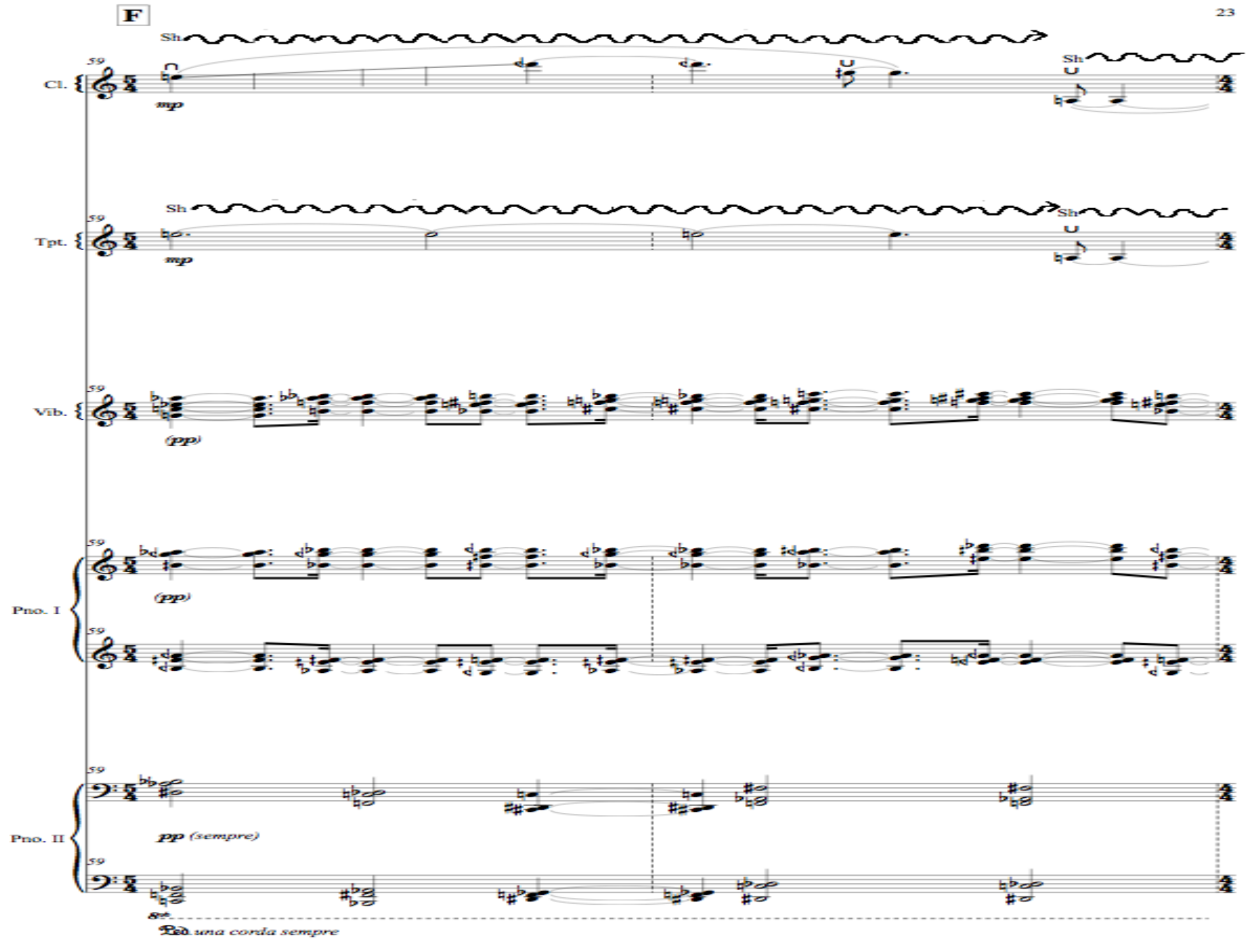

15
Sh
Cl.
cresc.
Tpt.
Vib.
(pp)
Pno. I
Pno. II
8va
3
16
mf
mp
cresc. poco a poco
5:4

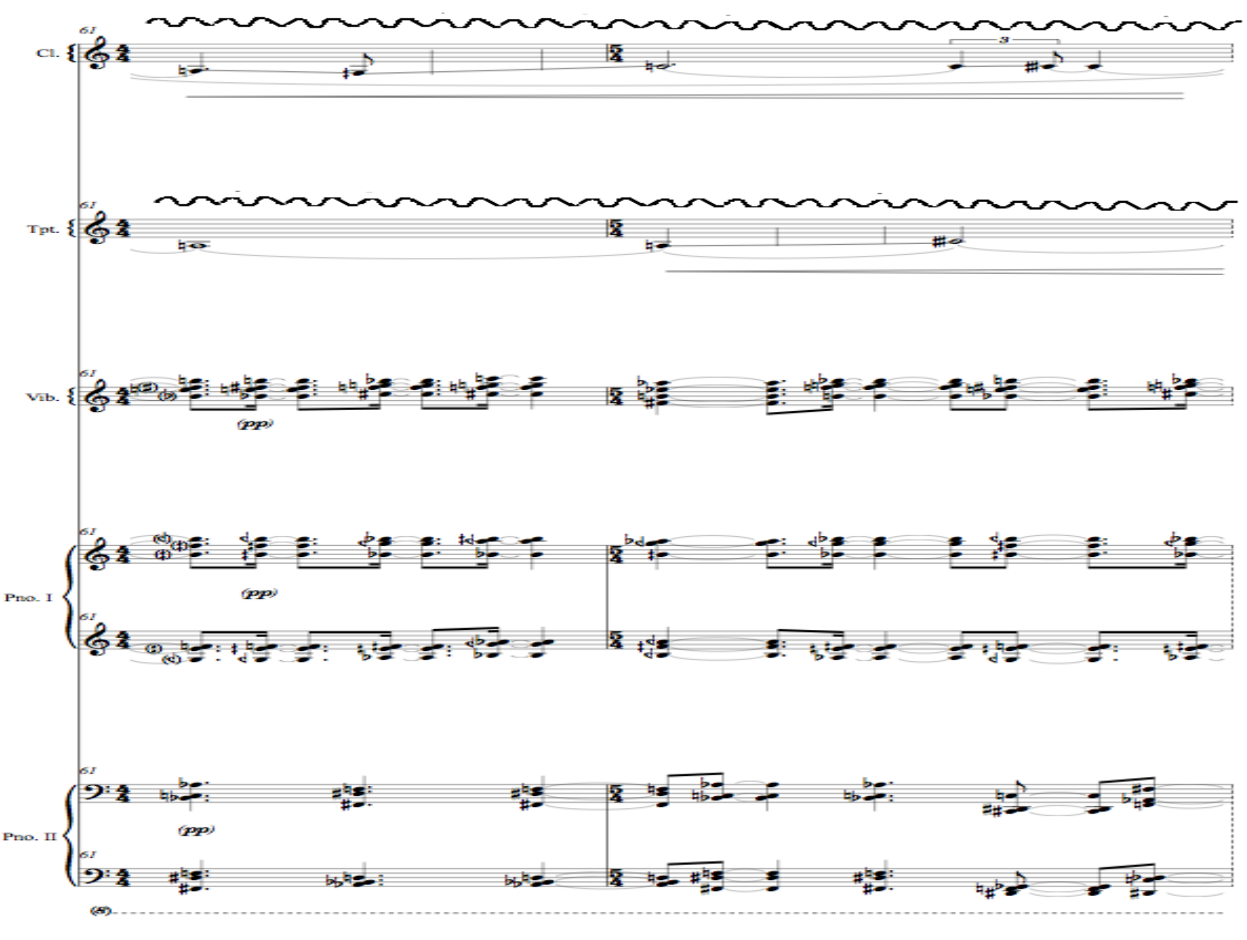

17
Sh
Cl.
mf
Tpt.
Sh
mf
3
Vib.
5:4♩
3
(cresc.)
Pno. I
(cresc.)
Pno. II
(8)
(cresc.)
8va
3:2♩
18
Cl.
f
ff
Tpt.
f
ff
Vib.
mf
Pno. I
4:3♩
mf
Pno. II
3
mf

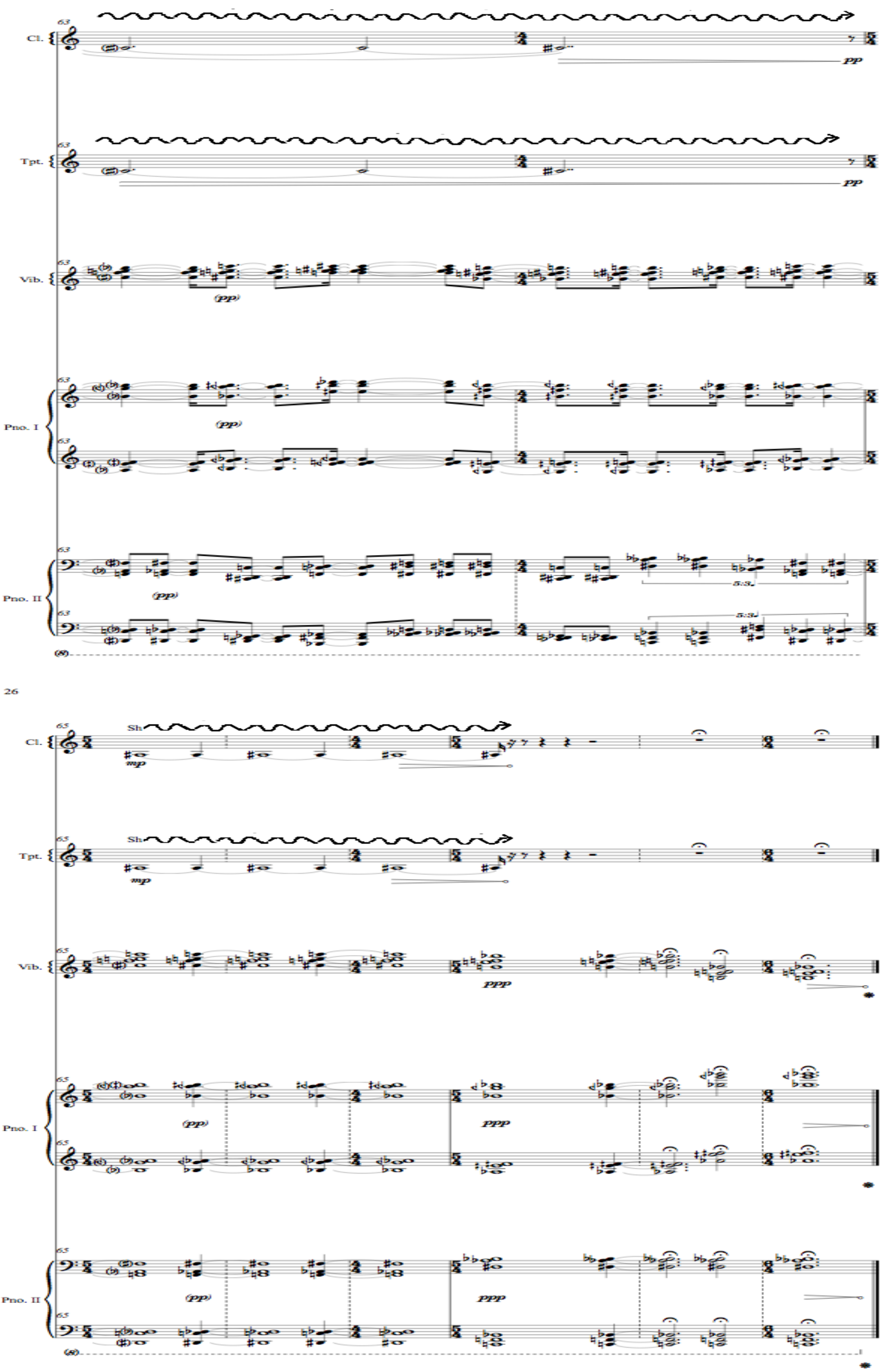
E
19
(*) Sh
50
Cl.
fff (molto espress.)
(*) Chattering the jaw.
Sh
Tpt.
fff (molto espress.)
Vib.
(cresc.)
f
Pno. I
(cresc.)
f
8va
3
5:4♪
Pno. II
(cresc.)
f
8va
20
52
Sh
mp (molto espress.)
pp sub.
Ped. sempre (until the end)
3:2♪
pp sub.
Ped. una corda sempre (until the end)
(8)
7:4♪
(8)


54
Cl.
6:4
pp
Tpt.
Sh
pp
mp
Vib.
(pp)
Pno. I
(pp)
Pno. II


57
Sh
Cl.
pp
mp
Tpt.
Vib.
(pp)
3
Pno. I
(pp)
3
Pno. II


23
F
Sh
Cl.
Tpt.
Vib.
Pno. I
Pno. II
59
mp
(pp)
pp (sempre)
8va
Ped. una corda sempre


24
61
Cl.
Tpt.
Vib.
Pno. I
Pno. II
3
(pp)
(8)


63
Cl.
pp
Tpt.
pp
Vib.
(pp)
Pno. I
(pp)
Pno. II
(pp)
5:3
(8)
65
Sh
mp
Sh
mp
ppp
(pp)
ppp
(pp)
ppp
(8)

5) Toque a Oshún y Olokun (Louis Aguirre)

for Violin, Piccolo/Alto Flute, Oboe, Alto Sax, Clarinet, Piano and two Percussionists

The closing analysis of this section is an 'orchestral' piece performed by eight instruments, following a sort of violin concerto format with the other seven instruments providing all sorts of textures. The listener can again hear two elements that characterise this composer: the 'massiveness' of sounds and rhythms as well as the extreme intensity demanded from the musician. The most rhythmically demanding roles are given to the violin and the two percussionists, although the other five instruments have their share of complexity.

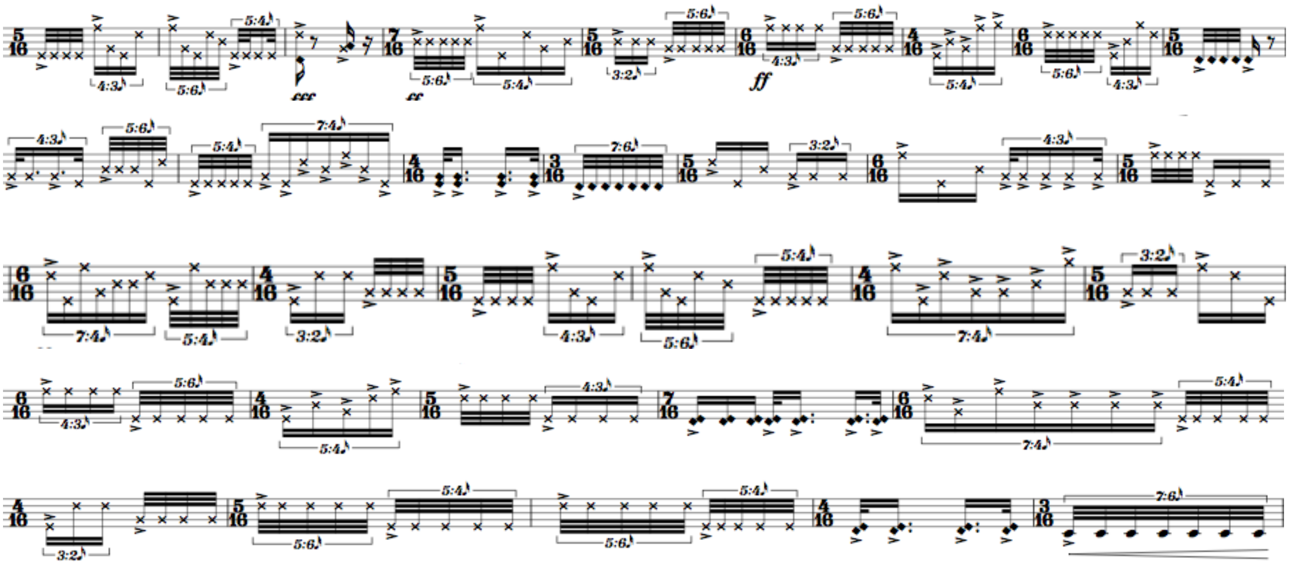
Although the composer seldom uses techniques as they were analysed in the other student's pieces, the piece is permeated with complex polyrhythms and irregular groupings. I have taken some examples to illustrate what Aguirre calls an 'intuitive' manner of utilising karnatic concepts.

The main elements around which the whole piece is constructed are:

1) Combinations Anuloma-Pratiloma

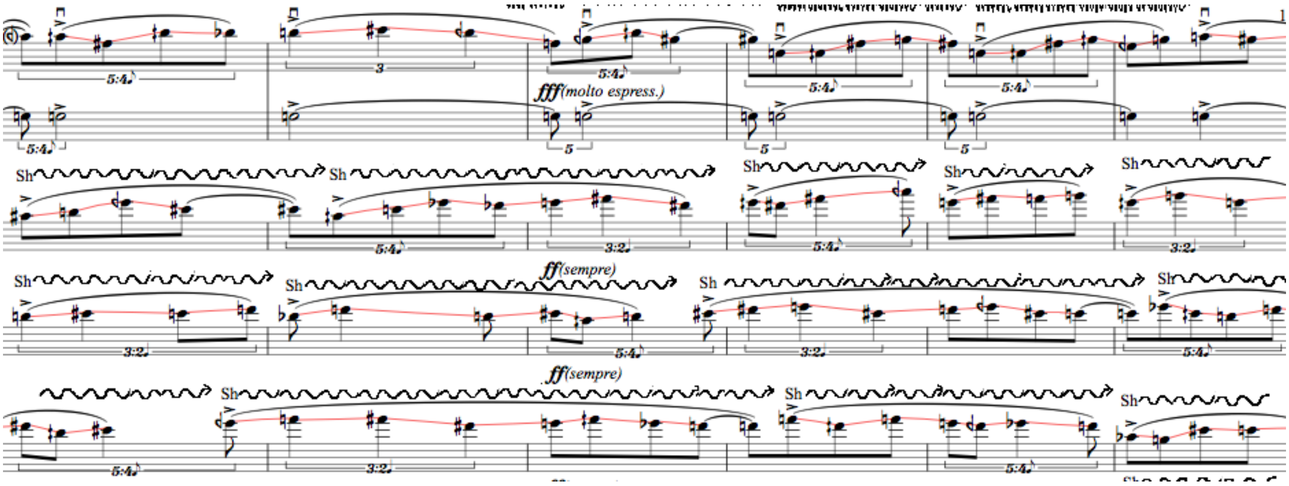
Against a backdrop of continuously changing metres, the composer mixes the different developmental techniques explained in chapter 23 (Combinations Anuloma-Pratiloma). The ones he utilises the most are the 3rd technique (keeping the same gati and speed, changing frame) and 5th (keeping the same number of beats and speed, changing gati). He alternates freely between these two techniques: if the frame changes, it is preceded by the same gati; and vice versa, if the frame remains, the gati changes.

-Measures 11-43 – Percussion II



This sequence resembles the karnatic concept of using anuloma-pratiloma on a jathi bhedam sequence, as explained in chapter 23. However, the composer unites two techniques and he remains faithful to the two common denominator notions that generates the material, even though he does not use it as karnatic musicians would. He tends to fragment every metre into two cells and apply a different irregular grouping on each cell, whilst keeping (as explained above) a clear common denominator, with changes occurring at a much faster pace.

-Measures 170-175 - Violin, flute, oboe and clarinet. The composer quite frequently uses textures where different instruments, whilst following the principles mentioned above in a linear fashion, create a spider web of the same elements but placed in different measures.



Where is the limit between a feeling of polypulse/polyrhythm and texture? And where is the borderline between texture and a feeling of chaos?

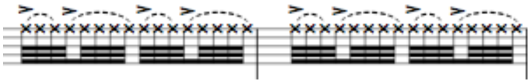
I tend to believe (but this is a personal opinion) that more than three layers of complexity result in some form of texture or, even, chaos (nothing wrong with any of these notions). However, the question that has always lingered in my mind is: why write complexity if the final musical result is a textural passage where the independent layers cannot be perceived?

That being said, this passage, as many others in this piece, does not play with extreme complexity: all matras of every irregular grouping are present in most cases, with only a few elements being used in each layer. All these factors would probably make the passage more 'understandable' to the listener.

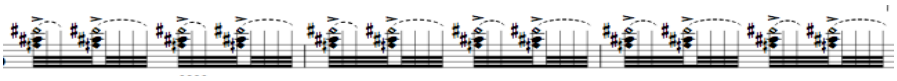
2) Mixed Jathis

Either as a musical object in itself or as a preparation for superimpositions, the composer uses this tool quite often.

-3+5 in chatusra constitutes a leitmotif of the piece, performed by different instruments.

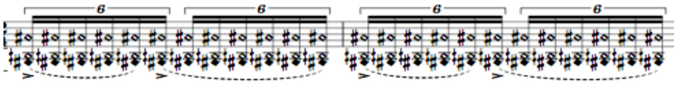
-Measures 53-54 – Percussion I 

-Measures 87-89 – Violin

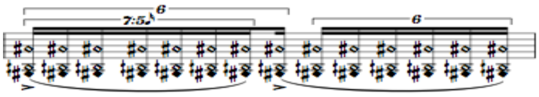


-5+7 in tisra is used more sporadically, but is the base for a superimposition in a mixed jathi nadai bhedam fashion. The composer creates the frame of 7:5♪ + 7:7♪

-Measures 125-126 – Violin



-Measures 133-135 – Violin

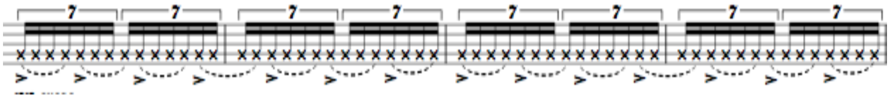


The latter irregular grouping constitutes a deepening of what has been presented in chaper 22 (Mixed jathi Nadai Bhedam). The composer creates a double accent on tisra and then superimposes a septuplet over 5 matras.

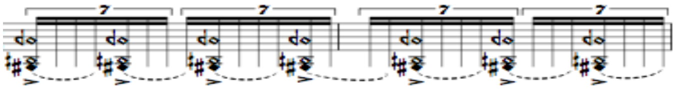
3) Misra jathi 4

This particular gati/jathi combination represents another object often repeated throughout the piece.

-Measures 69-72 – Percussion II



-Measures 101-102 - Violin

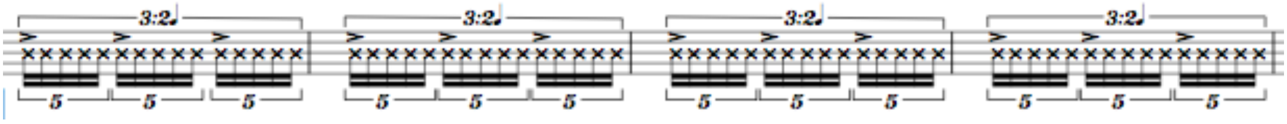


4) Nadai Bhedam

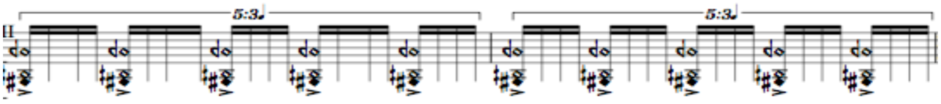
This technique, together with combinations anuloma-pratiloma, is the one used most abundantly. The composer creates with this concept in three different ways:

A) As a short occurrence: the piece is permeated with short passages where different instruments perform a nadai bhedam. None of them are prepared or developed.

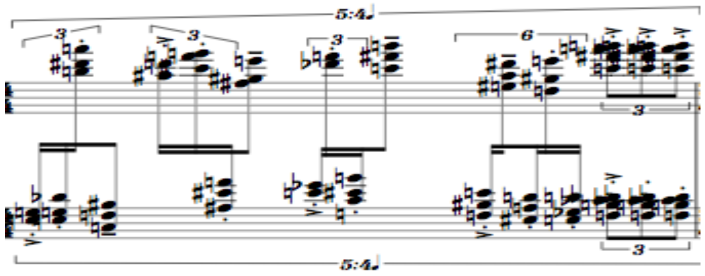
-Measures 54-57 – Percussion II: 3:2♩ with khanda nadai



-Measures 99-100 – Violin: 5:3♩ with chatusra nadai



-Measures 207 & 209 – Piano: 5:4♩ with tisra nadai

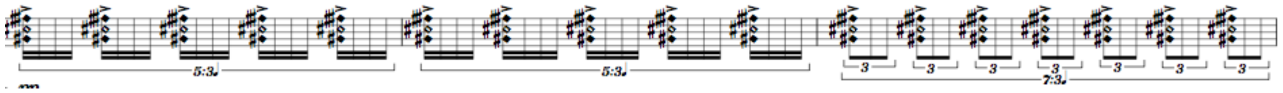


In the three previous examples, although the composer has utilised the notation of nadai bhedam, the idea behind seems to be closer to the way anuloma-pratiloma develops. There is no intention of creating any polypulse. However, in the musical context where he employs these devices, they serve the purpose of momentarily creating a feeling of different tempo in that particular instrument.

B) As a gati/nadai vruksha: this technique has not been explained in the text due to the choices I had to make in order to keep the karnatic material within certain boundaries (because this technique is rarely used in karnatic music[3] I decided to leave it out of the thesis).

A very short definition of this technique would be a sequence in which nadai bhedam frames, gati bhedam and regular phrases going with the pulse are mixed or, a simpler way of looking at this concept, is as a tree of gati bhedam enriched by the use of nadai bhedam frames.

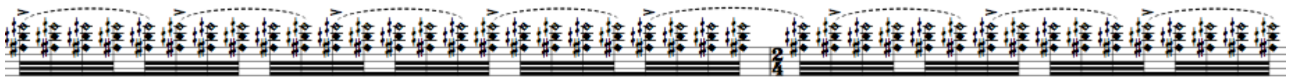
A very clear passage using this notion occurs in measures 148-150 in the violin; the two frames of 5:3♩. with chatusra nadai are followed by misra jathi 3, although the notation of 7:3♩. with tisra nadai may seem confusing.



This technique, although taught at the Amsterdam Conservatoire, seems to be more a residual of the past in karnatic music. Fundamentally, it is a way to enrich gati bhedam trees by adding some nadai bhedam frames, but the development of the latter has superseded this technique. However, I still find it very useful within a western context, and Louis Aguirre has actually used it frequently throughout the whole cycle of six pieces.

C) As a longer passage with preparation and development: this happens only once, performed by the violin.

In measures 235-236, the violin performs a chatusra jathi 5, as a preparation for the long passage of polypulse that comes afterwards.



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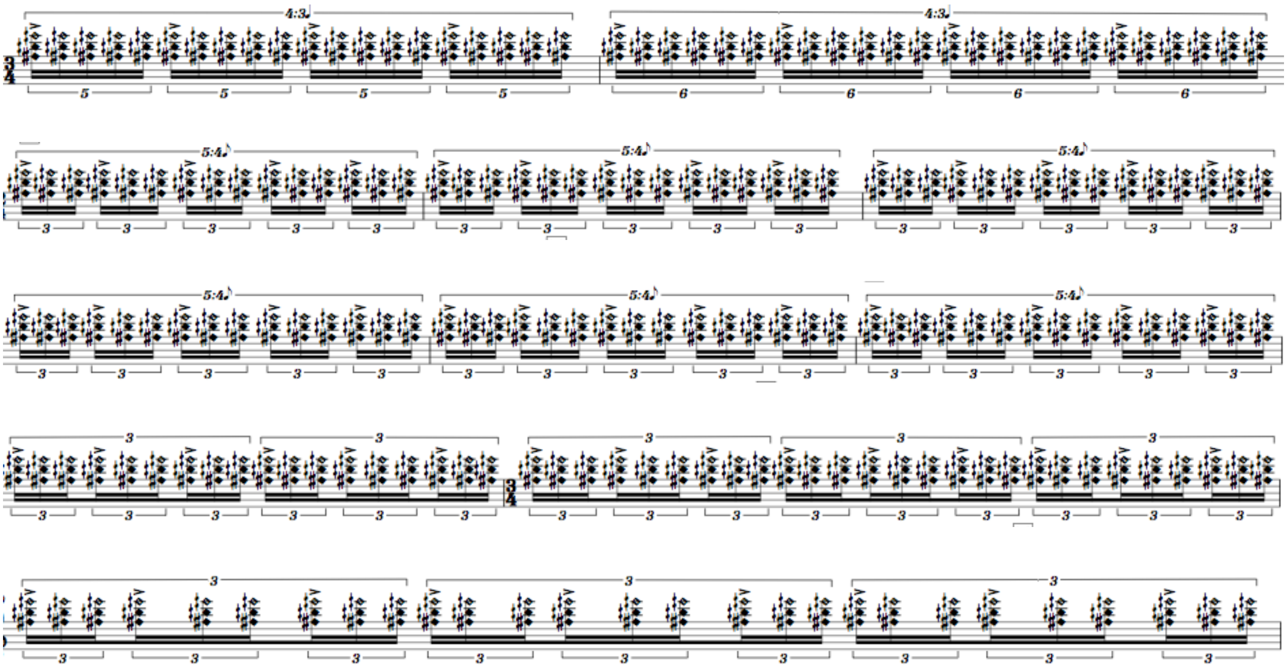
[3] *This technique possibly precedes in time the current use of nadai bhedam.*

The chatusra jathi 5 does not serve the purpose of creating a frame of 4:5♩, but rather the jathi 5 becomes the nadai (khanda) within a frame of 4:3♩; changes succeed one another much faster than in karnatic music. In the second frame tisra nadai replaces khanda and in the third one (which, at a certain point stays without changing any parameter), tisra nadai is the common denominator whilst the frame changes to 5:4♩

In measure 265, after the previous combination has been performed a few times, usually interrupted by a short metre change, the violin goes to tisra 3rd speed pratiloma (9 matras), although because of the context, it is written as 3:1♩ with tisra nadai.

The passage reaches a climax, followed by a change in atmosphere, and therefore the sequence does not have any of the resolutions explained in chapter 21 (Nadai Bhedam).



Notwithstanding the lack of resolution, this is one of the few times where the composer seems to create material quite faithfully following the premises of nadai bhedam as a source for polypulse.

When I started the PhD project, I knew I had to ask this Cuban composer to write a piece. Not only I was interested in his ‘brutality’ and ‘massiveness’, but also I wanted to present a composition in which the intuitive side of karnatic techniques would play a central role.

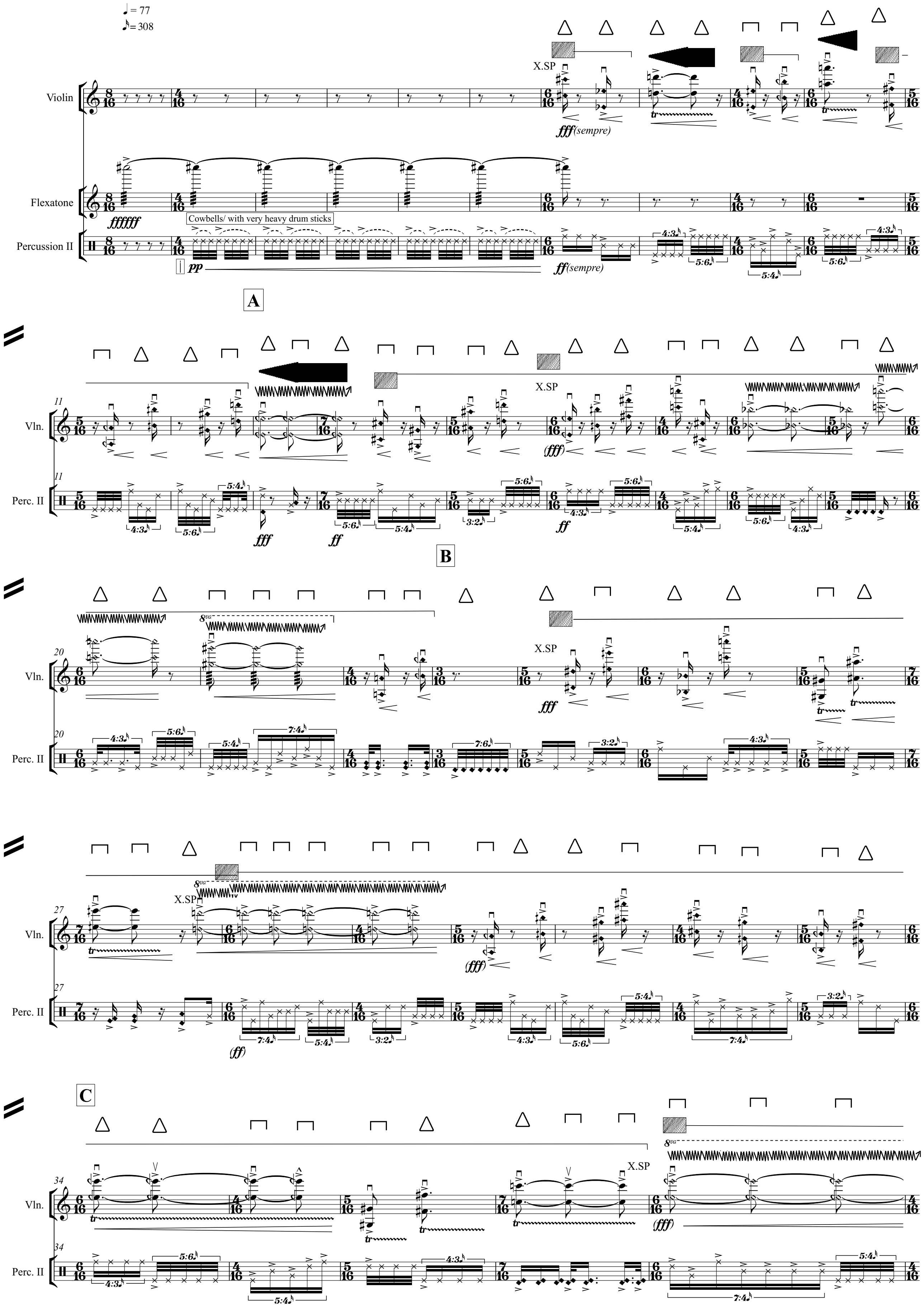
As the reader will find in the conclusion, I have strong doubts as to how karnatic techniques, except for combinations anuloma-pratiloma, can be integrated if creators do not give up a continuous or random metre change. However, the ‘brush stroke on the canvas’ Aguirre refers to, is from my point view yet another valid path to creation using karnatic techniques.

My intention in presenting four composers, was not only to show different aesthetics or influencing backgrounds, but also how every piece is conceived in a completely different manner; some composers use almost exclusively karnatic techniques in every parameter, others have personalised them and use them with almost complete disregard for the original architecture of the concepts, while others use any combination of both approaches.

I think my ultimate purpose for this part of the thesis has been demonstrated: learning and using karnatic rhythmical structures can produce a myriad of completely different pieces, even by the same composer (as the two pieces by Louis Aguirre demonstrate). The fear that some creators may a priori have to sound 'Indian' (expressed by many beginners students), should be dispelled after reading the analysis and listening to the chosen pieces.

(track 286)

TOQUE A OSHÚN Y OLOKUN


♩= 77
♪=308
Violin
Flexatone
Percussion II
X.SP
fff(sempre)
ffffff
Cowbells/ with very heavy drum sticks
pp
ff(sempre)
4:3
5:6
5:4
A
11
Vln.
Perc. II
(fff)
fff
ff
B
20
8va
3:2
7:4
7:6
27
(ff)
C
34
tr

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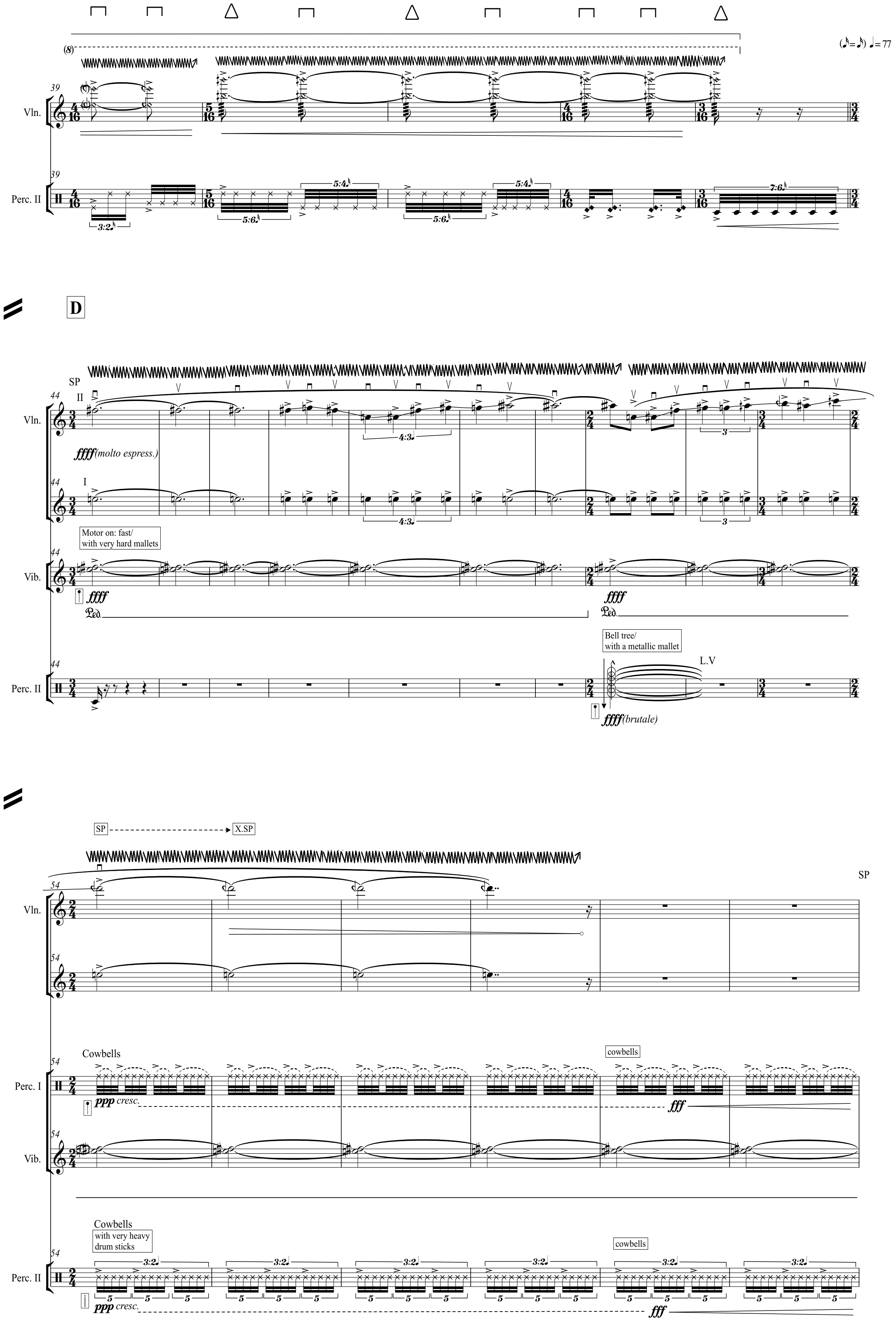
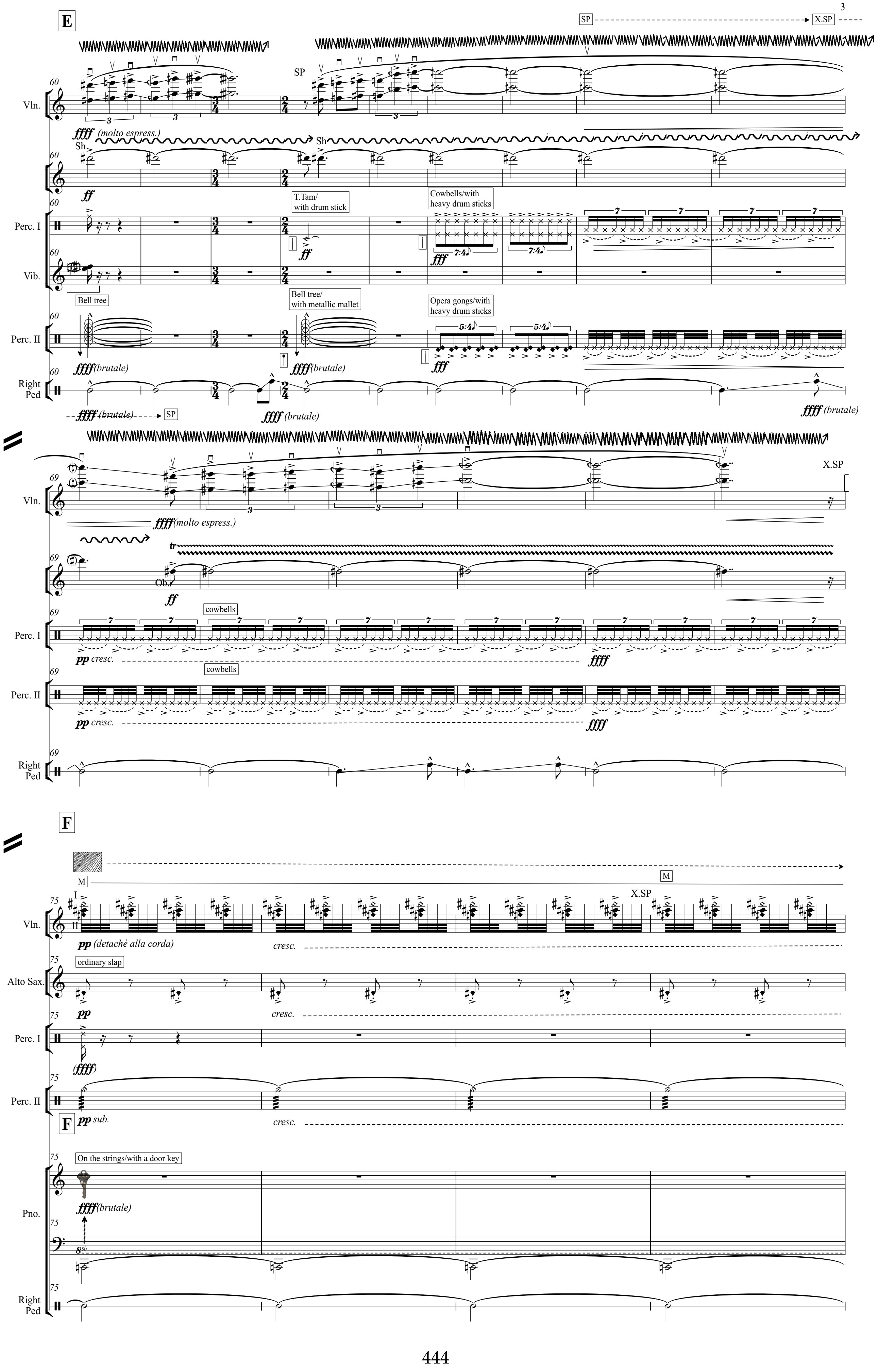
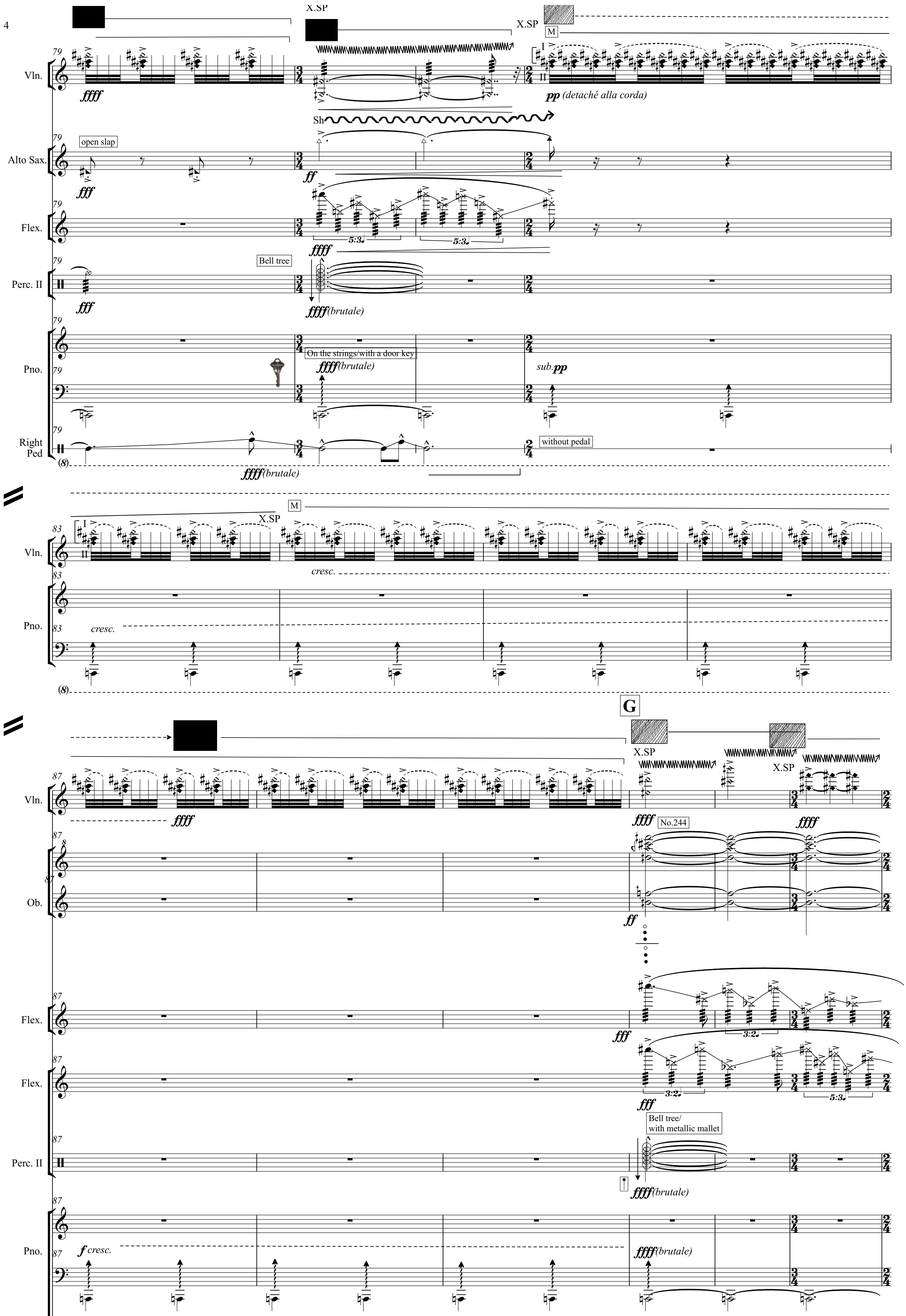
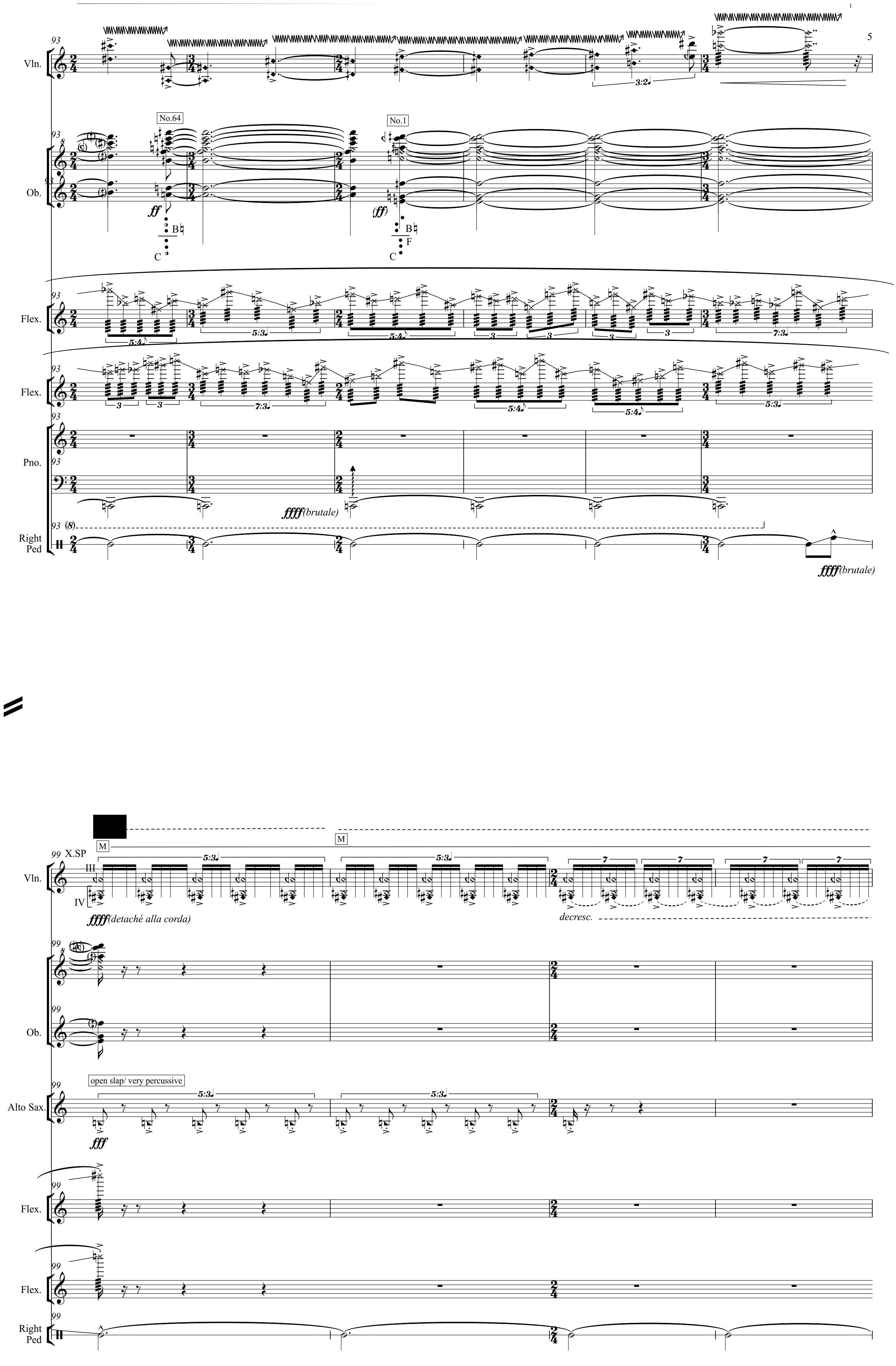
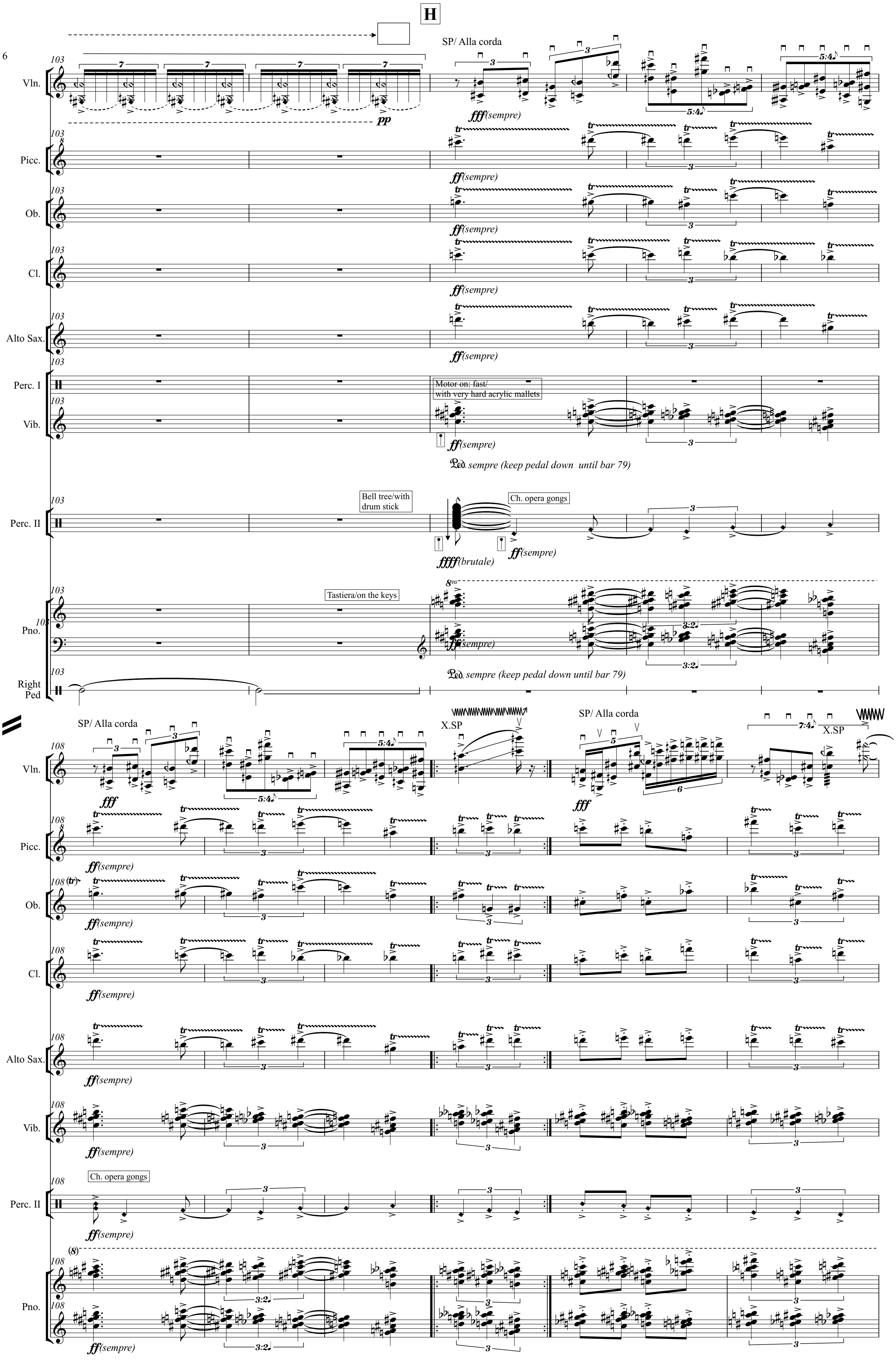
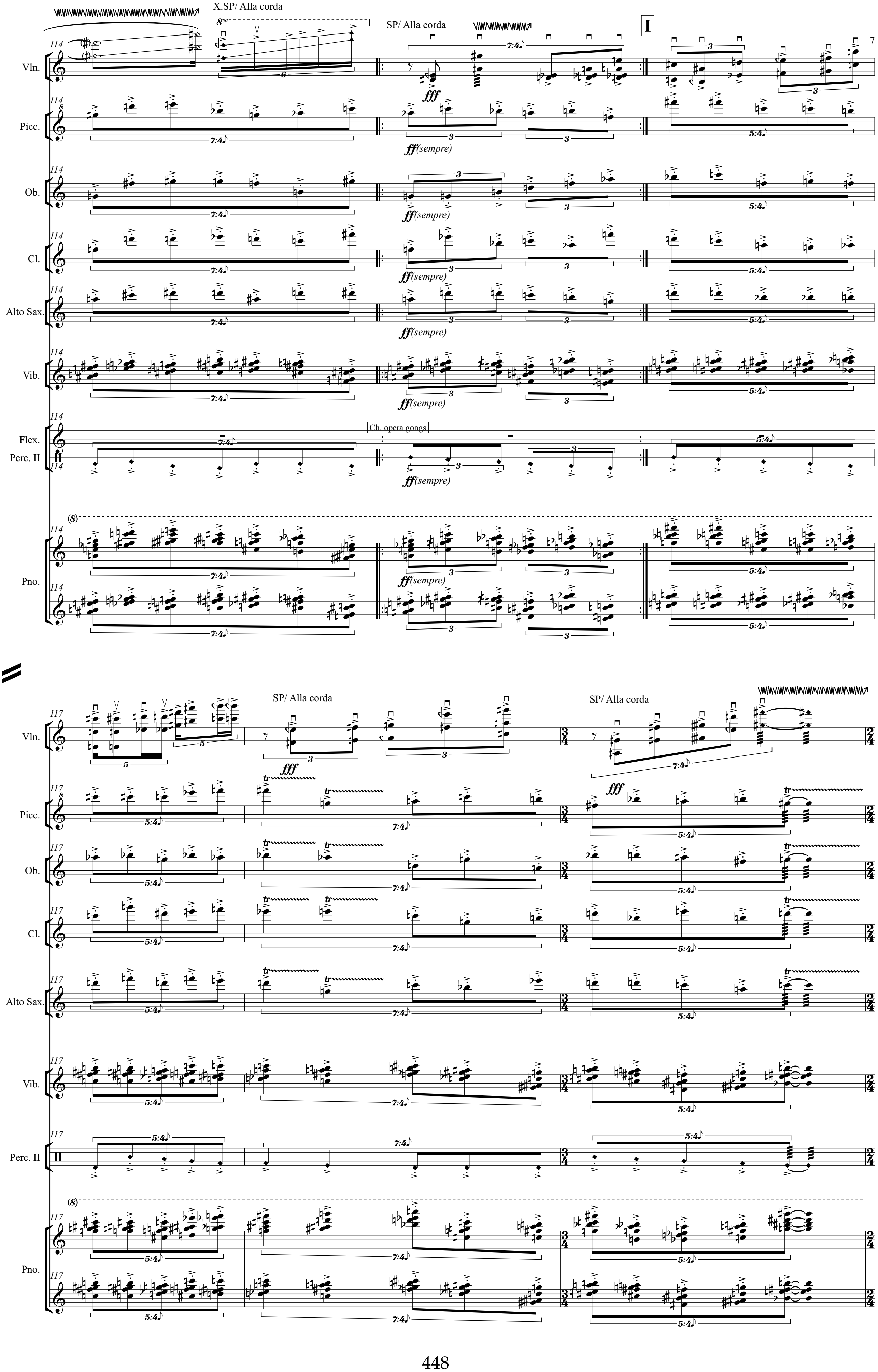

(♪=♪) ♩= 77
(8)
39
Vln.
Perc. II
3:2
5:6
5:4
7:6
D
SP
II
I
44
ffff (molto espress.)
4:3
3
Motor on: fast/
with very hard mallets
Vib.
ffff
Ped.
Bell tree/
with a metallic mallet
L.V
ffff (brutale)
SP
X.SP
54
Cowbells
Perc. I
ppp cresc.
fff
cowbells
with very heavy
drum sticks
5

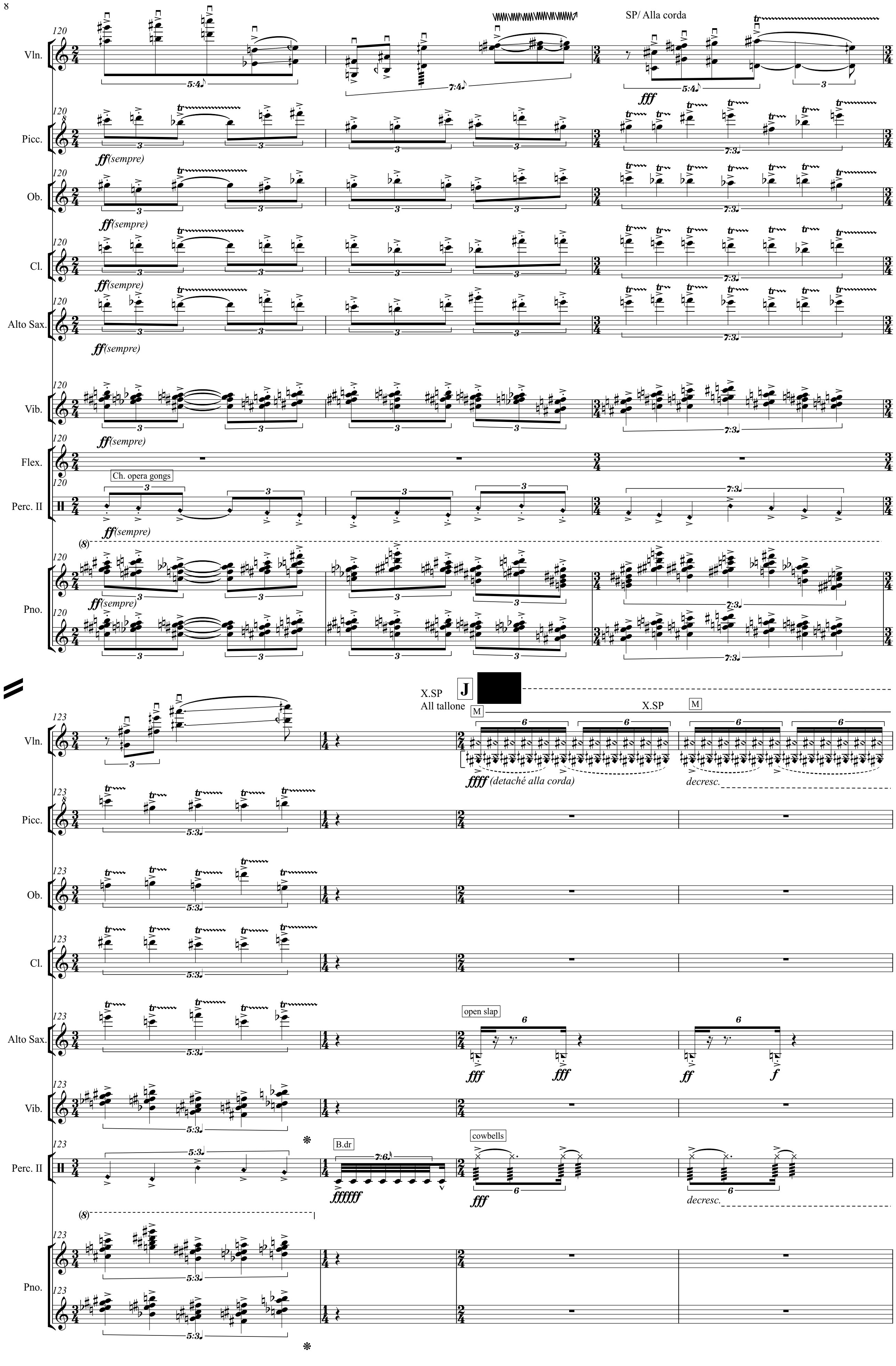

E
SP
X.SP
60
Vln.
ffff (molto espress.)
Sh
ff
T.Tam/
with drum stick
Cowbells/with
heavy drum sticks
Perc. I
7:4
7
Vib.
Bell tree
Bell tree/
with metallic mallet
Opera gongs/with
heavy drum sticks
Perc. II
5:4
ffff (brutale)
fff
Right
Ped
ffff (brutale)
SP
69
ffff (molto espress.)
tr
Ob.
cowbells
pp cresc.
ffff
F
M
75
I
II
pp (detaché alla corda)
cresc.
ordinary slap
Alto Sax.
pp
(ffff)
pp sub.
On the strings/with a door key
Pno.
ffff (brutale)
8vb

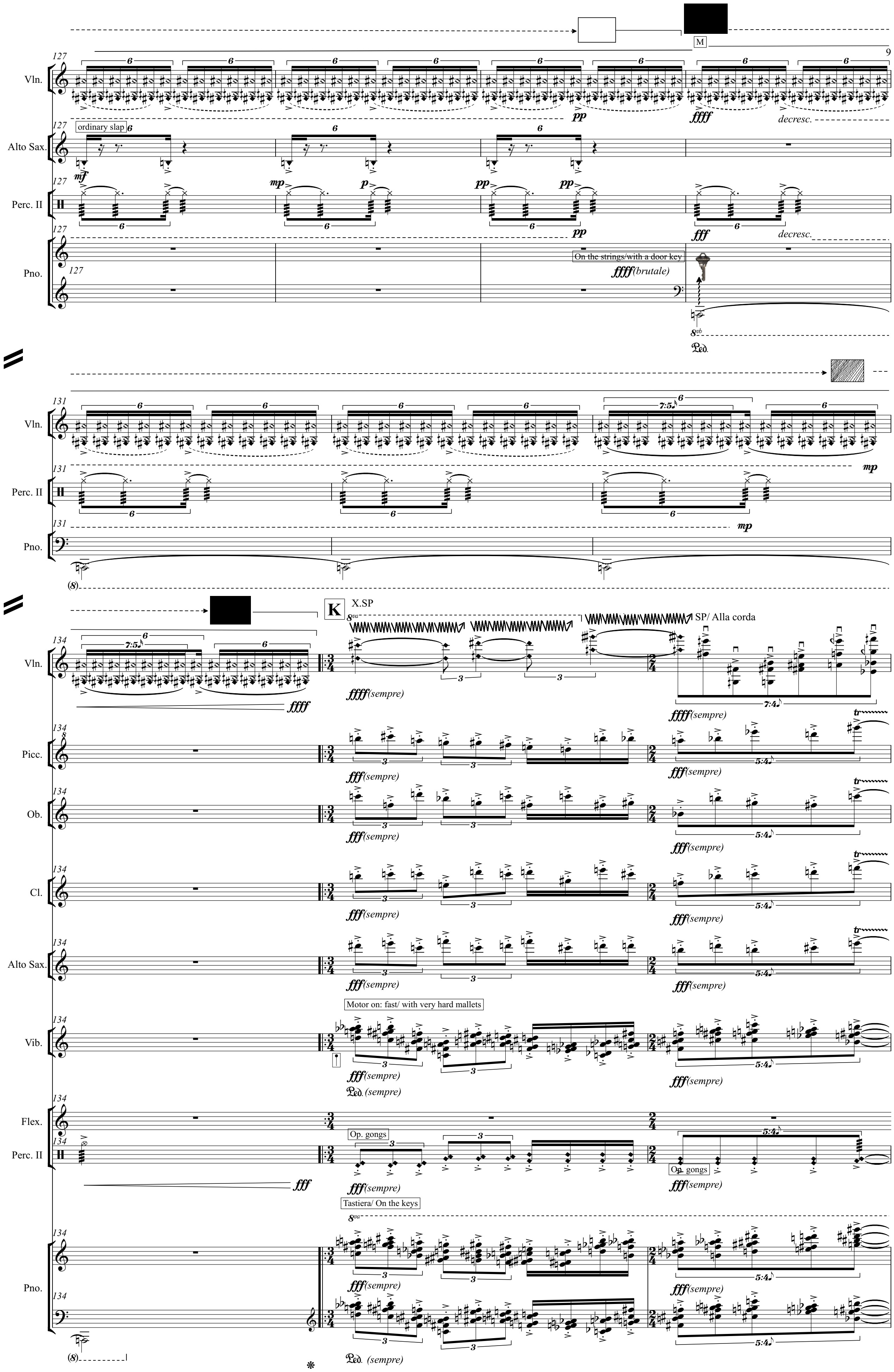

X.SP
X.SP
M
I
II
Vln.
ffff
pp (detaché alla corda)
Sh
Alto Sax.
open slap
fff
ff
Flex.
5:3.
ffff
Bell tree
Perc. II
fff
ffff (brutale)
Pno.
On the strings/with a door key
ffff (brutale)
sub. pp
Right Ped
without pedal
(8)
ffff (brutale)
cresc.
cresc.
G
ffff
No.244
Ob.
ff
3:2.
fff
Bell tree/ with metallic mallet
ffff (brutale)
f cresc.
ffff (brutale)
ffff (brutale)

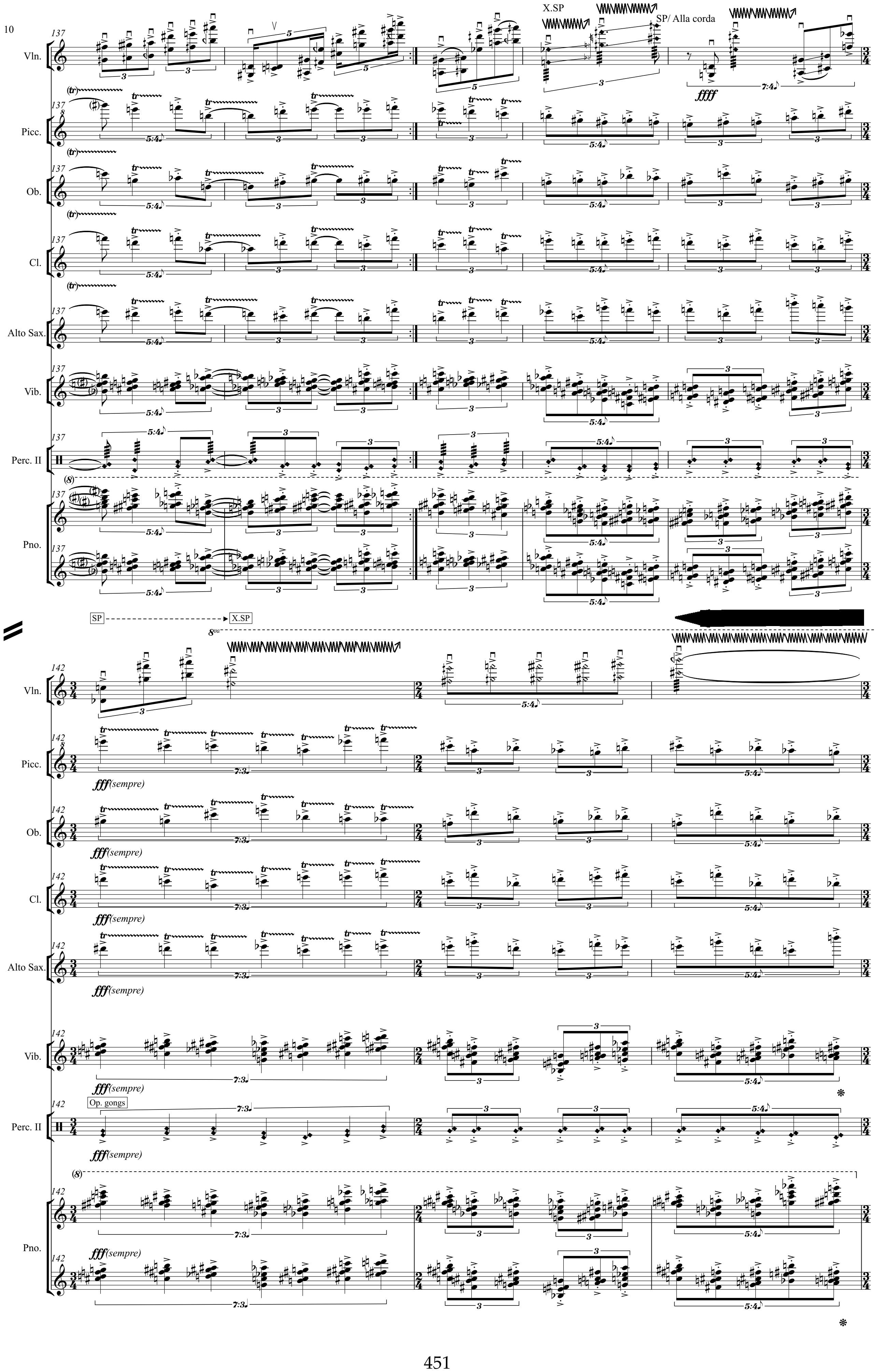

5
Vln.
No.64
No.1
Ob.
ff
(ff)
B♮
C
F
Flex.
5:4
5:3
7:3
3:2
3
Pno.
ffff(brutale)
Right Ped
X.SP
M
III
IV
ffff(detaché alla corda)
decresc.
open slap/ very percussive
Alto Sax.
fff
7

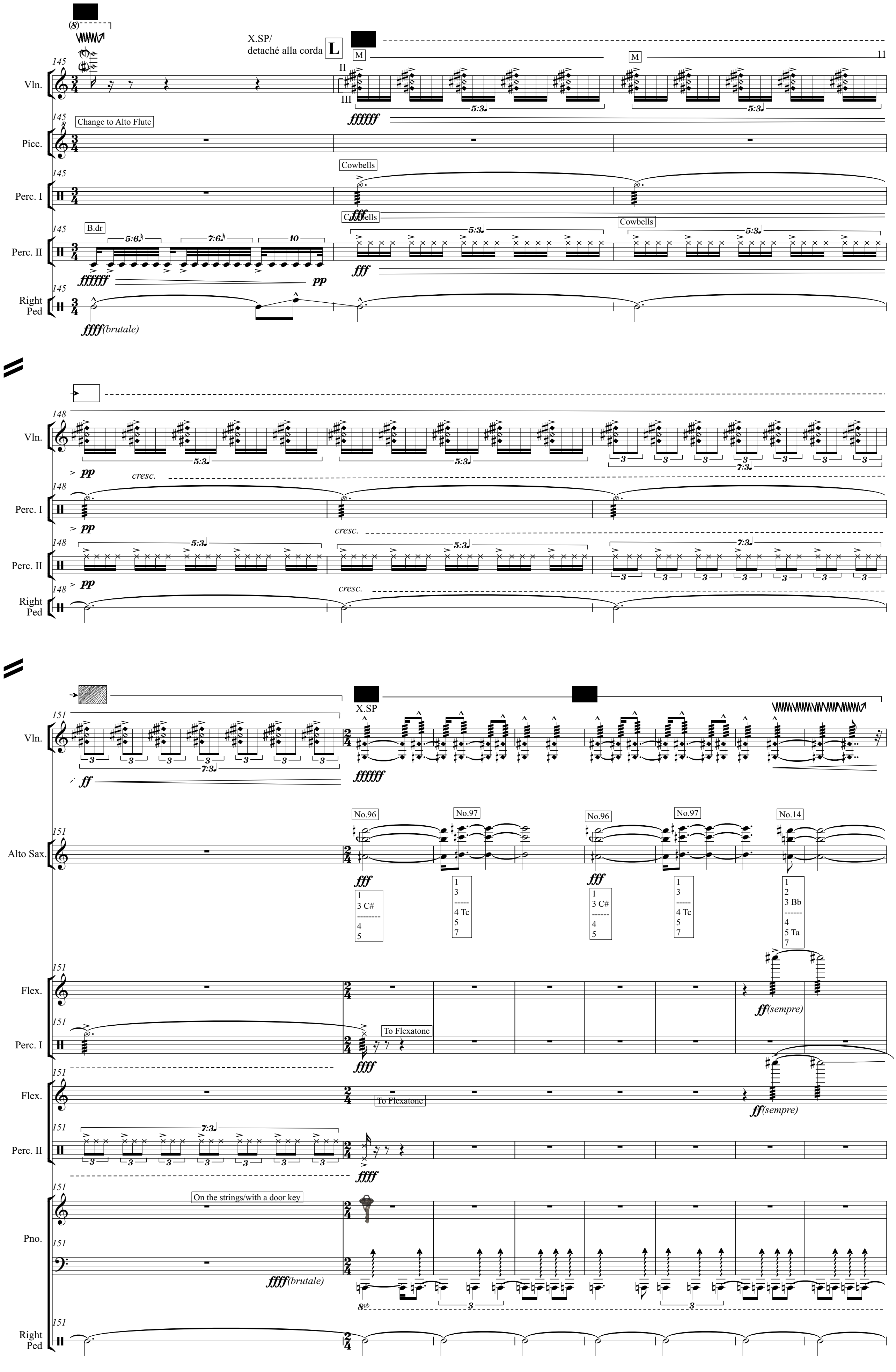

H
SP/ Alla corda
7
3
5:4♪
pp
fff(sempre)
103
Vln.
Picc.
Ob.
Cl.
Alto Sax.
Perc. I
Vib.
Perc. II
Pno.
Right Ped
tr
ff(sempre)
Motor on: fast/ with very hard acrylic mallets
Ped. sempre (keep pedal down until bar 79)
Bell tree/with drum stick
Ch. opera gongs
ffff(brutale)
Tastiera/on the keys
8va
3:2♩
108
fff
X.SP
6
7:4♪
(tr)
(8)

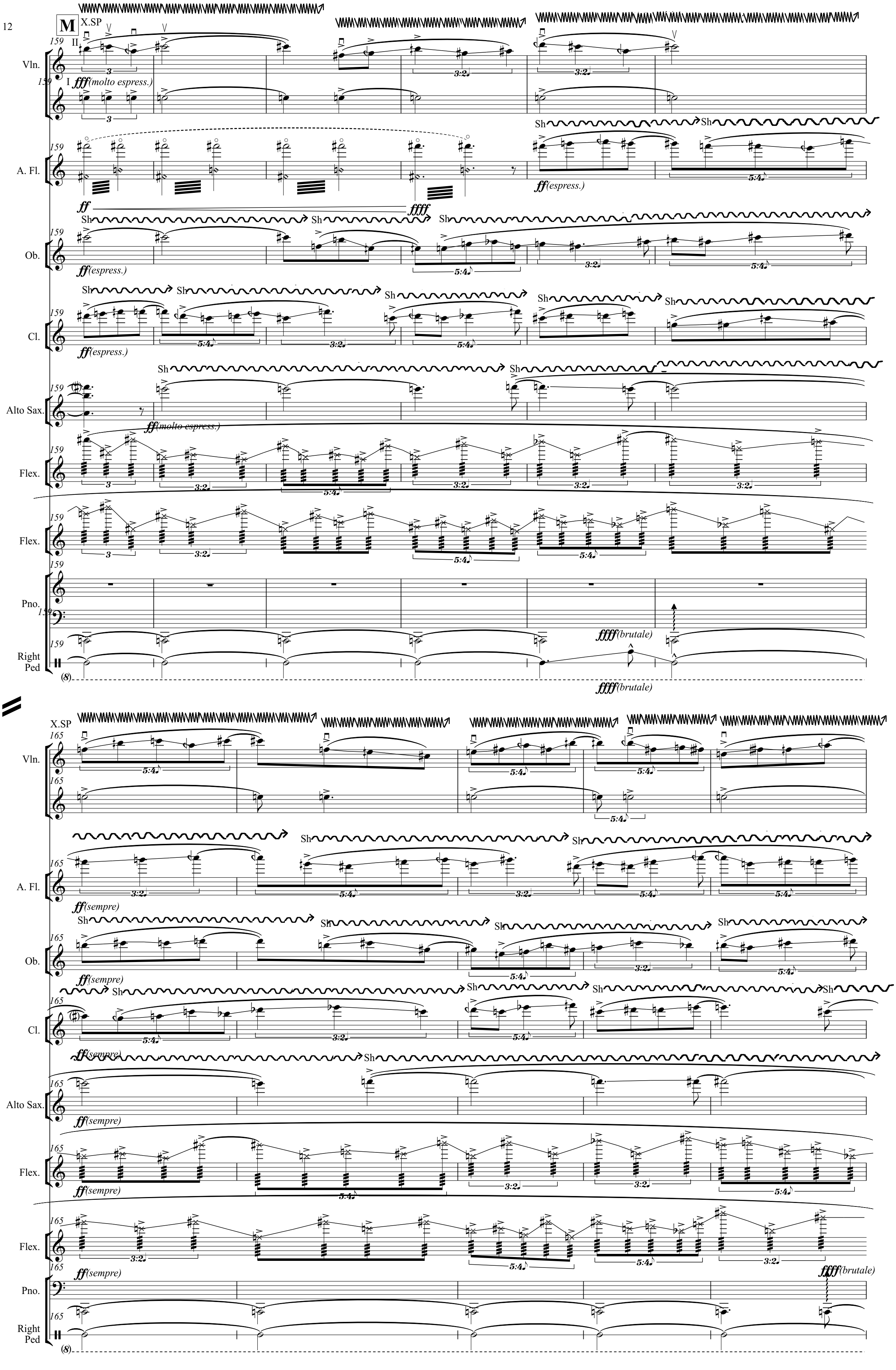

X.SP/ Alla corda
8va
SP/ Alla corda
I
7
114
Vln.
Picc.
Ob.
Cl.
Alto Sax.
Vib.
Flex.
Perc. II
Pno.
fff
ff(sempre)
Ch. opera gongs
7:4
5:4
3
6
(8)
117
SP/ Alla corda
SP/ Alla corda
5
tr
fff

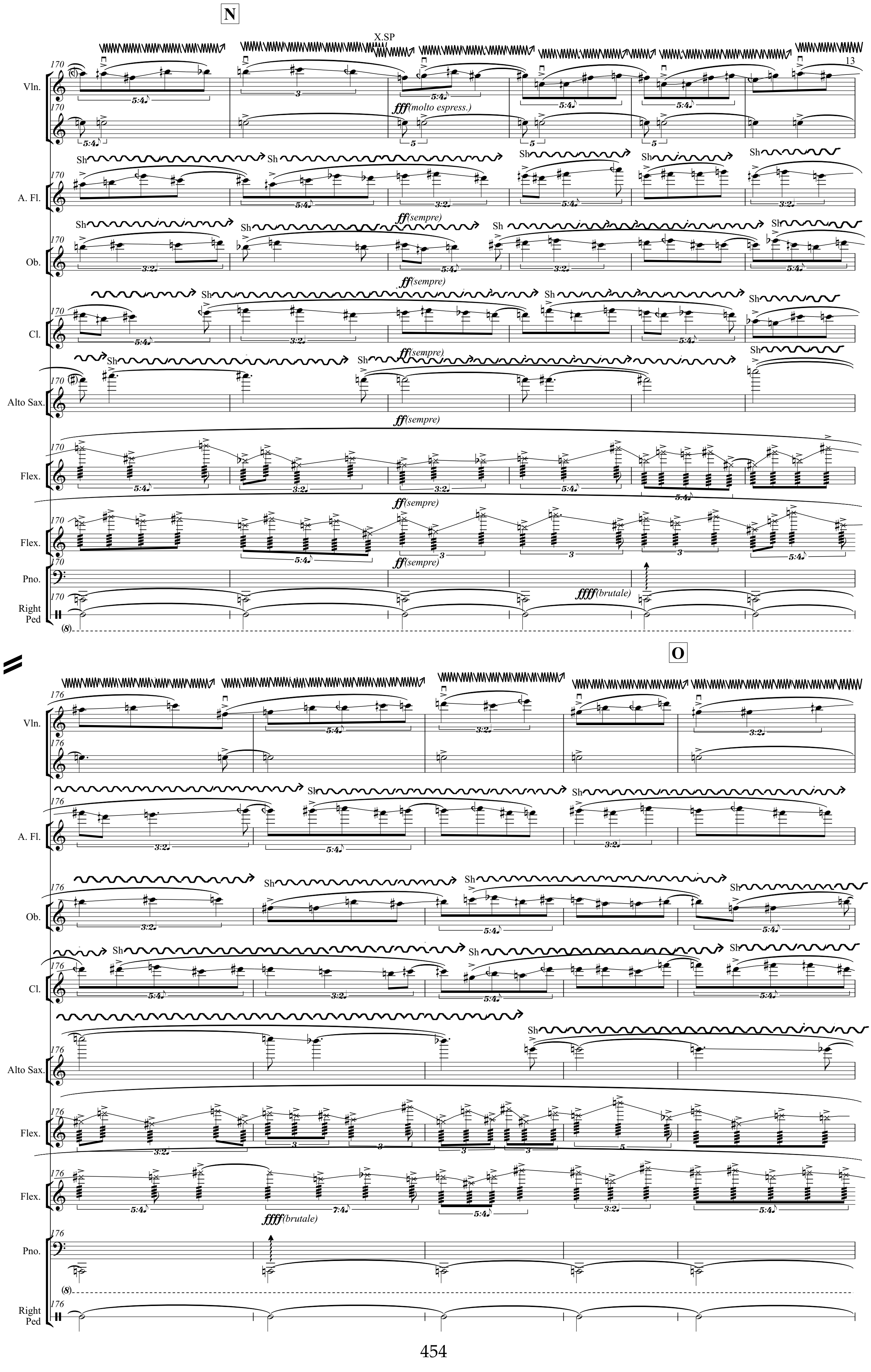

120
Vln.
Picc.
Ob.
Cl.
Alto Sax.
Vib.
Flex.
Perc. II
Pno.
SP/ Alla corda
fff
ff(sempre)
Ch. opera gongs
(8)
123
X.SP
All tallone
J
M
X.SP
M
ffff (detaché alla corda)
decresc.
open slap
fff
fff
ff
f
B.dr
ffffff
cowbells
fff
decresc.

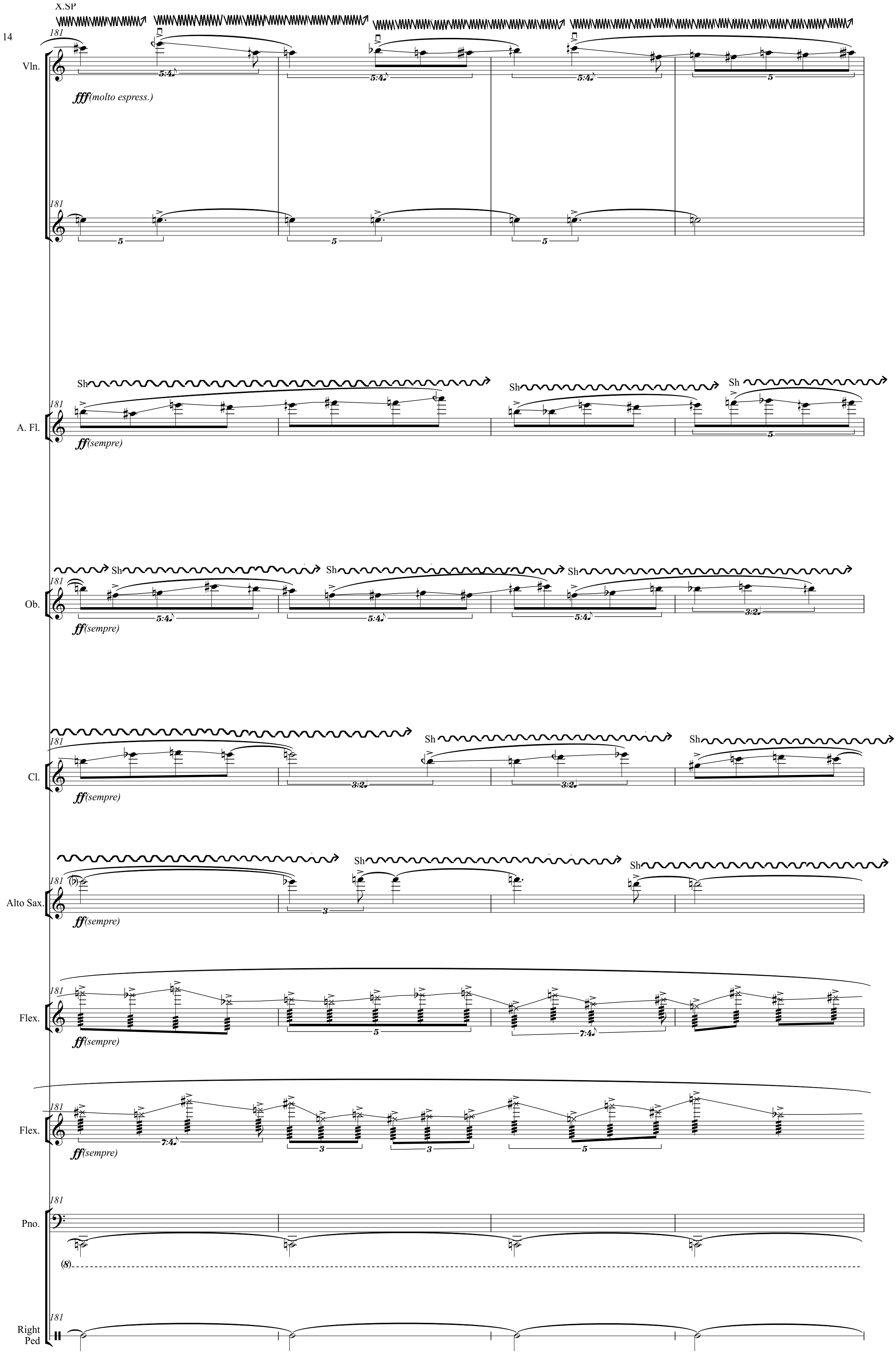
M
9
127
Vln.
pp
ffff
decresc.
ordinary slap
Alto Sax.
mf
mp
p
pp
Perc. II
fff
Pno.
On the strings/with a door key
ffff(brutale)
8vb
Ped.
131
7:5
mp
(8)
134
K
X.SP
8va
SP/ Alla corda
ffff(sempre)
7:4
Picc.
fff(sempre)
5:4
Ob.
Cl.
Vib.
Motor on: fast/ with very hard mallets
Ped. (sempre)
Flex.
Op. gongs
Tastiera/ On the keys
ffff
fff
3
6

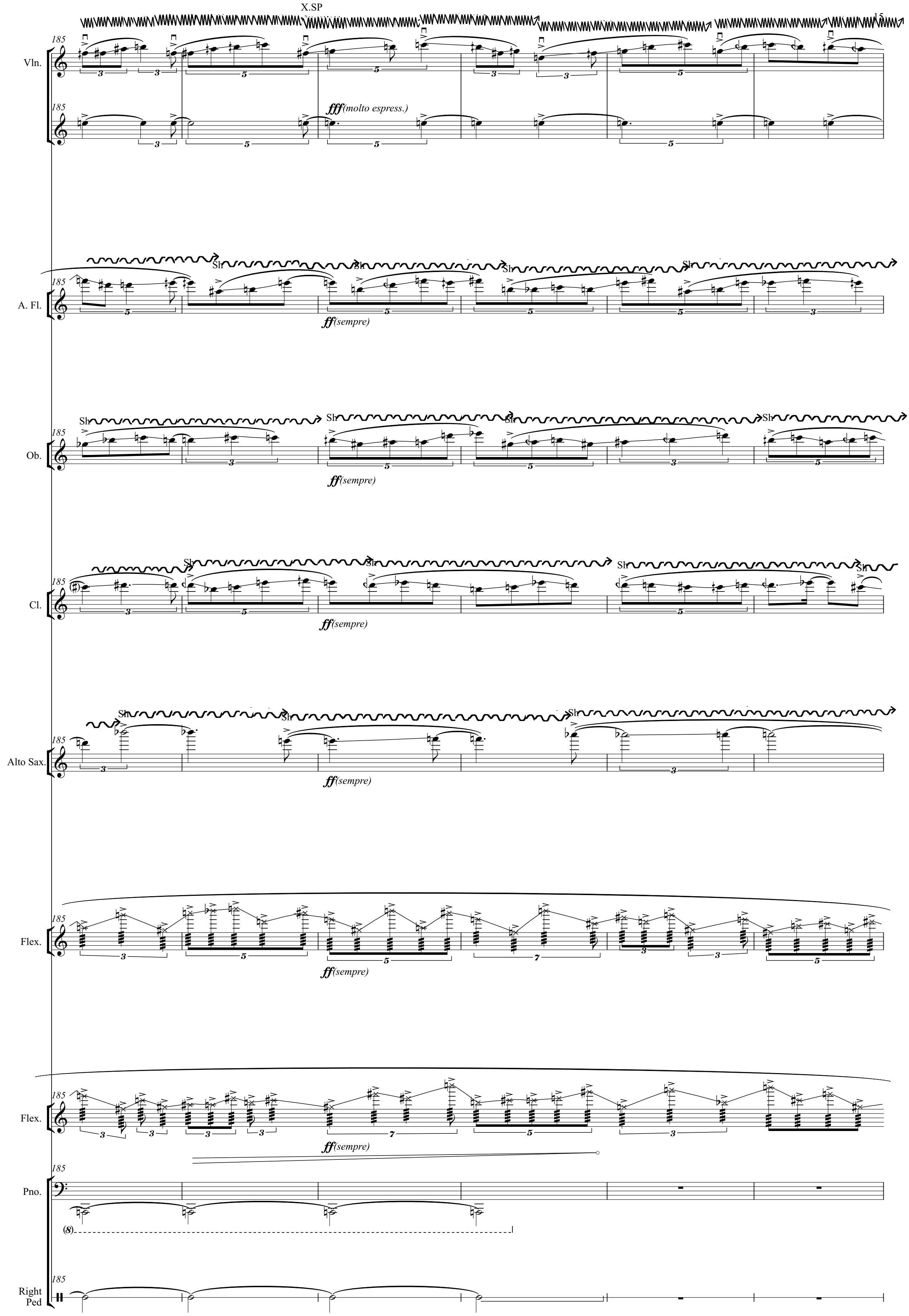

137
Vln.
Picc.
Ob.
Cl.
Alto Sax.
Vib.
Perc. II
Pno.
X.SP
SP/ Alla corda
ffff
(tr)
tr
3
5
5:4♪
7:4♪
(8)
142
SP
X.SP
8va
fff(sempre)
7:3♩
5:4♪
Op. gongs

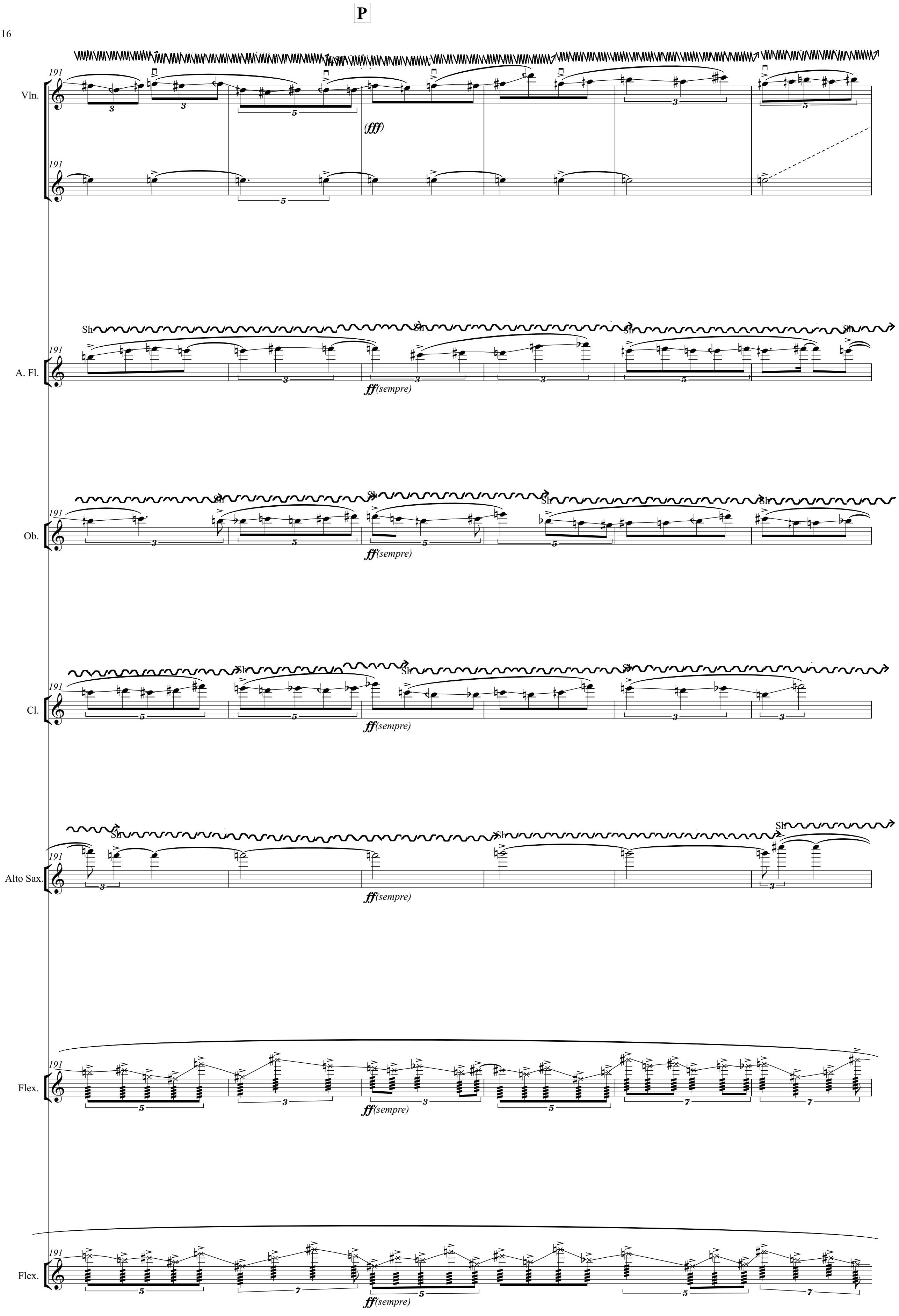

(8)
X.SP/
detaché alla corda
L
M
II
III
145
Vln.
ffffff
5:3.
145
Change to Alto Flute
Picc.
145
Cowbells
Perc. I
145
B.dr
5:6.
7:6.
10
Perc. II
ffffff
pp
Cowbells
fff
Cowbells
145
Right Ped
ffff(brutale)
148
Vln.
pp
cresc.
5:3.
3
7:3.
Perc. I
pp
cresc.
Perc. II
pp
cresc.
Right Ped
151
Vln.
ff
3
7:3.
X.SP
ffffff
Alto Sax.
No.96
No.97
No.96
No.97
No.14
fff
1
3 C#
4
5
1
3
4 Tc
5
7
fff
1
3 C#
4
5
1
3
4 Tc
5
7
1
2
3 Bb
4
5 Ta
7
Flex.
ff(sempre)
Perc. I
To Flexatone
ffff
Flex.
To Flexatone
ff(sempre)
Perc. II
7:3.
3
ffff
On the strings/with a door key
Pno.
ffff(brutale)
3
8vb
Right Ped

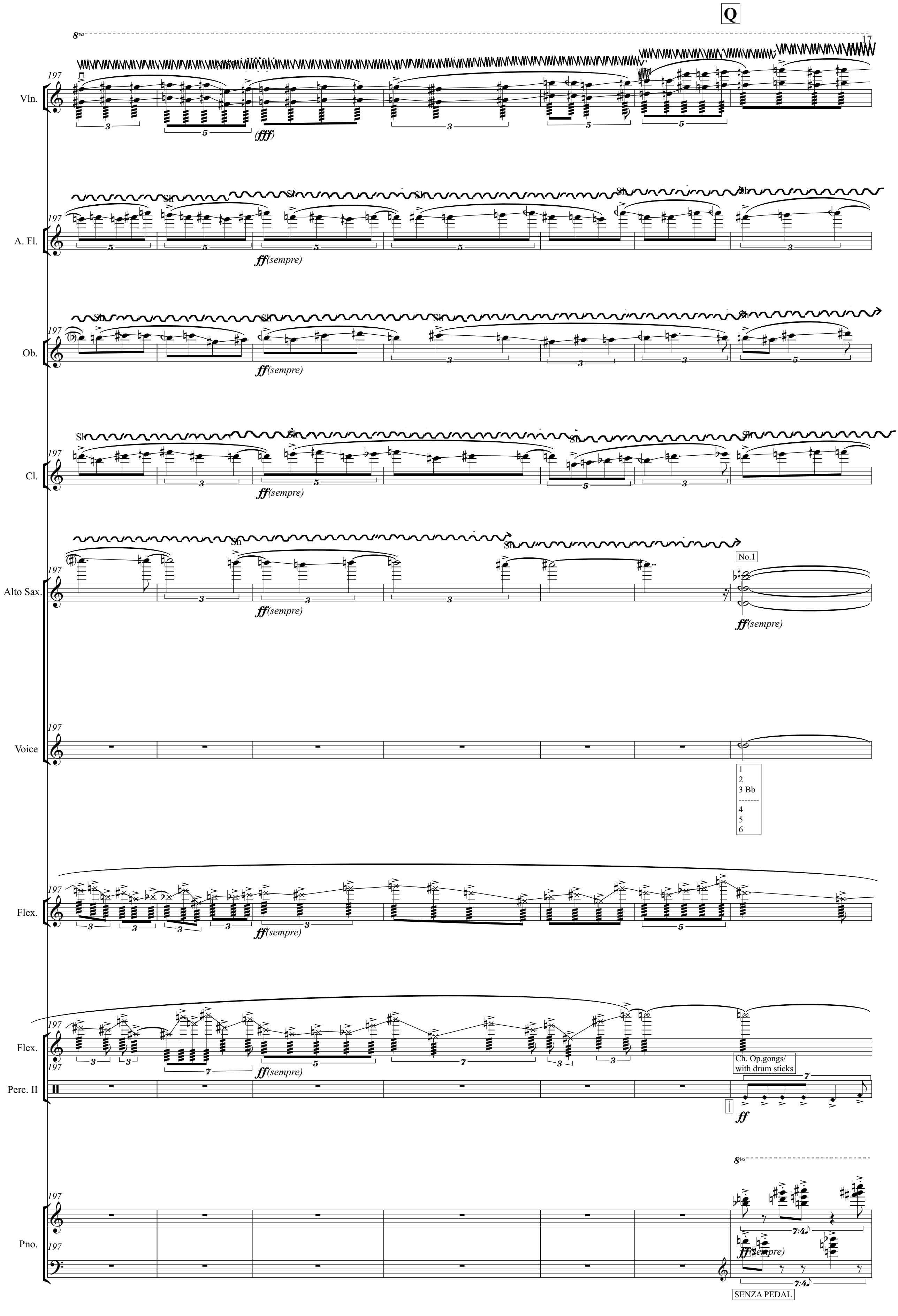

M
X.SP
II
I
159
165
Vln.
fff(molto espress.)
A. Fl.
ff
ffff
ff(espress.)
Sh
Ob.
Cl.
Alto Sax.
ff(molto espress.)
Flex.
Pno.
Right
Ped
ffff(brutale)
(8)
3
3:2
5:4
ff(sempre)

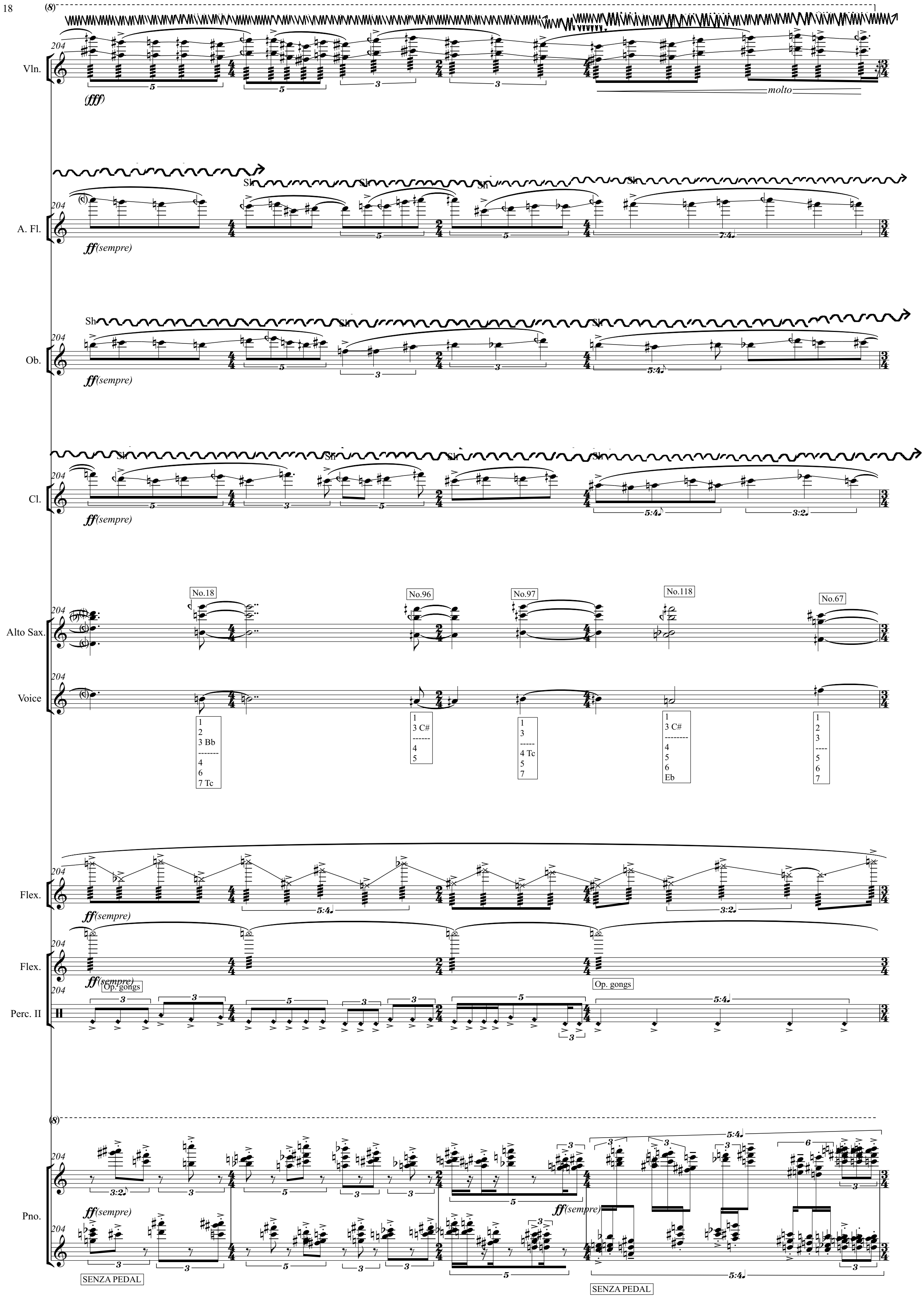

N
X.SP
13
170
Vln.
A. Fl.
Ob.
Cl.
Alto Sax.
Flex.
Flex.
Pno.
Right
Ped
(8)
Sh
5:4
3:2
3
5
fff(molto espress.)
ff(sempre)
ffff(brutale)
O
176
7:4
ffff(brutale)


X.SP
181
Vln.
fff(molto espress.)
5:4♪
5
Sh
A. Fl.
ff(sempre)
Ob.
3:2♩.
Cl.
Alto Sax.
3
Flex.
7:4♪
Pno.
(8)
Right Ped


X.SP
185
Vln.
fff(molto espress.)
A. Fl.
Sl
ff(sempre)
Ob.
Sl
ff(sempre)
Cl.
Sl
ff(sempre)
Alto Sax.
Sl
ff(sempre)
Flex.
ff(sempre)
Flex.
ff(sempre)
Pno.
(8)
Right Ped


P
191
Vln.
(fff)
A. Fl.
Sh
ff(sempre)
Ob.
Cl.
Alto Sax.
Flex.
Flex.


Q
8va
17
197
Vln.
(fff)
A. Fl.
Sh
ff(sempre)
Ob.
Cl.
Alto Sax.
No.1
Voice
1
2
3 Bb
4
5
6
Flex.
Flex.
Perc. II
Ch. Op.gongs/
with drum sticks
ff
Pno.
7:4
SENZA PEDAL

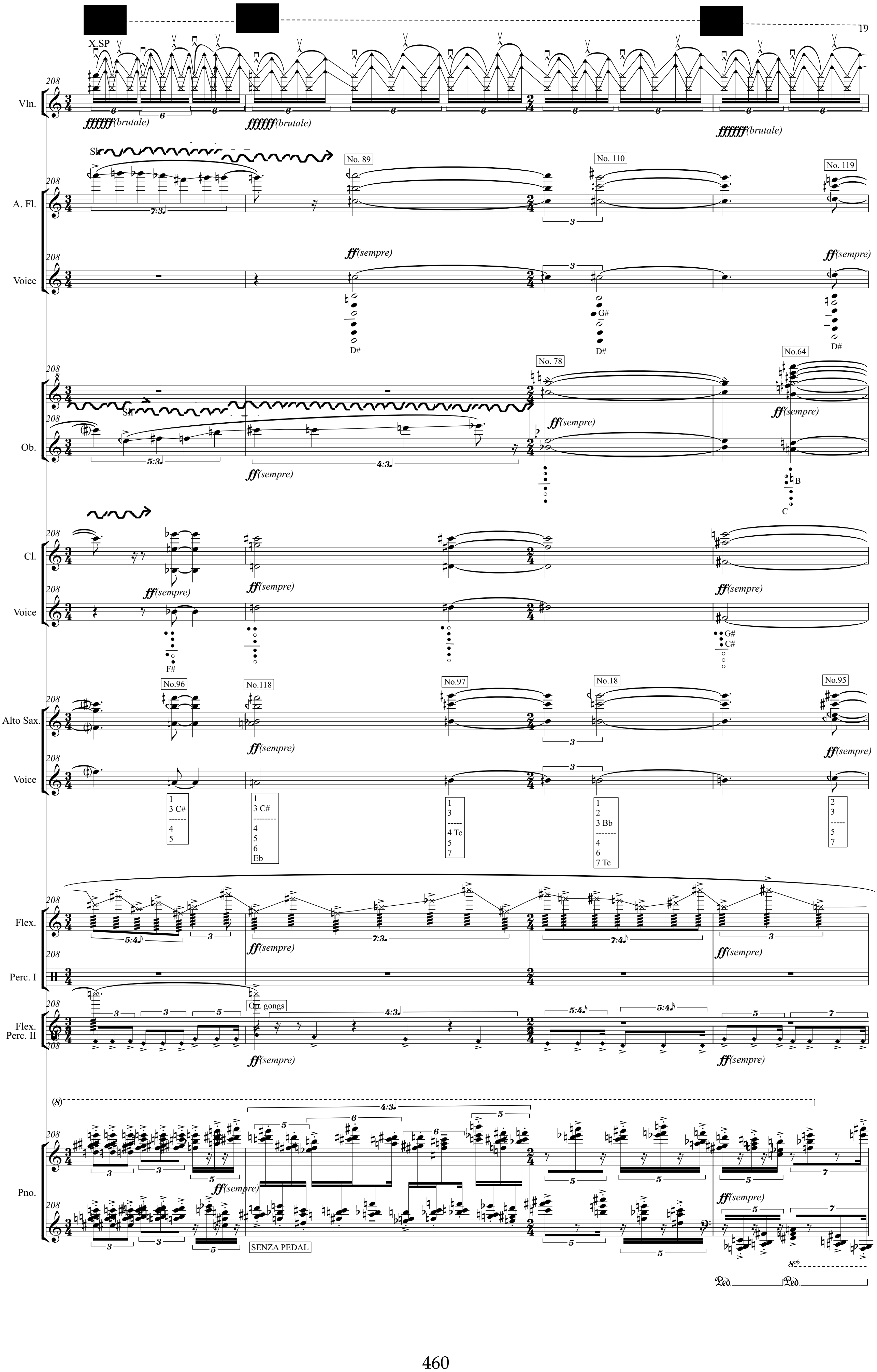

(8)
204
Vln.
(fff)
molto
A. Fl.
ff(sempre)
Sh
Ob.
ff(sempre)
Cl.
ff(sempre)
Alto Sax.
No.18
No.96
No.97
No.118
No.67
Voice
1
2
3 Bb

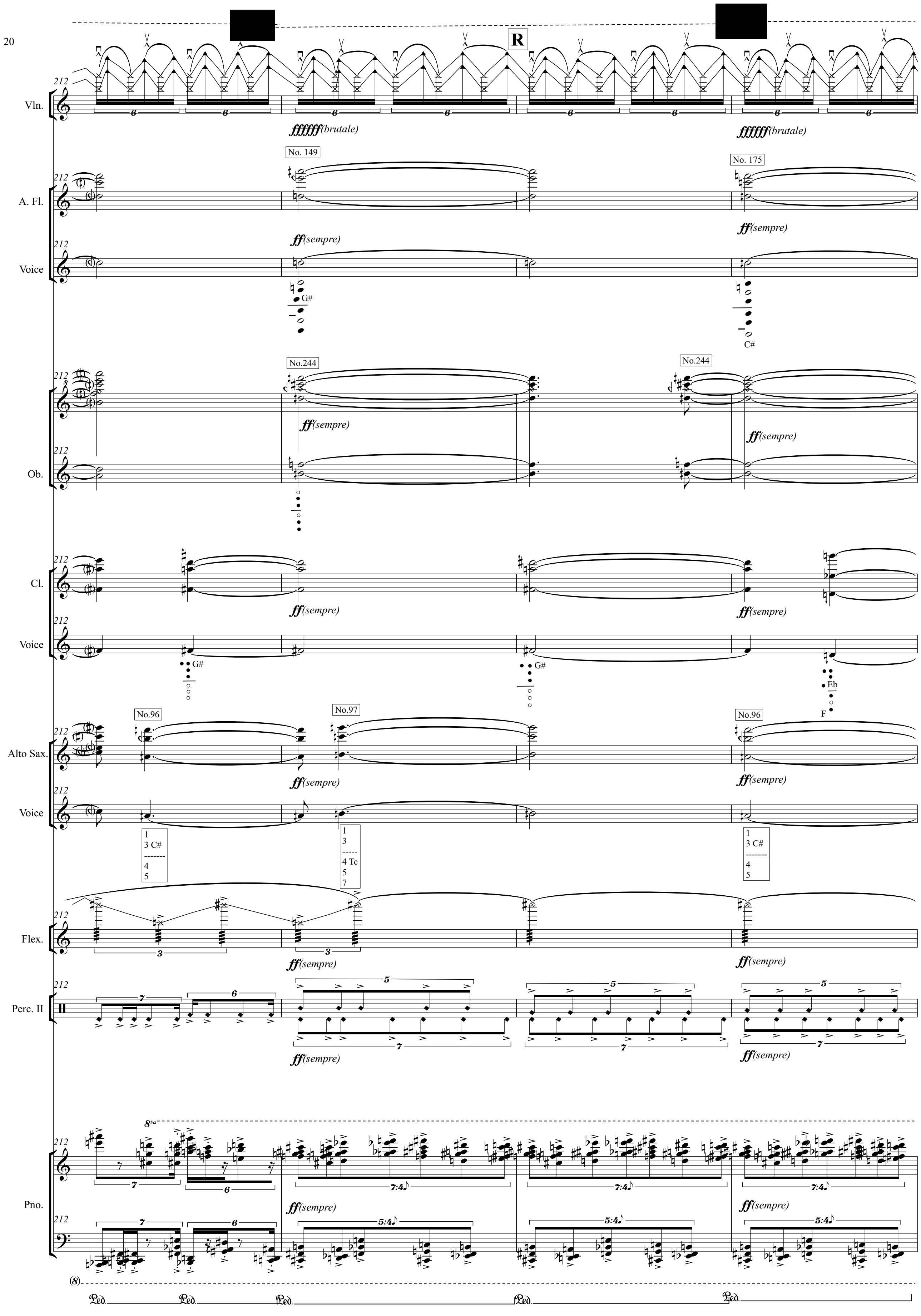
4
6
7 Tc
1
3 C#

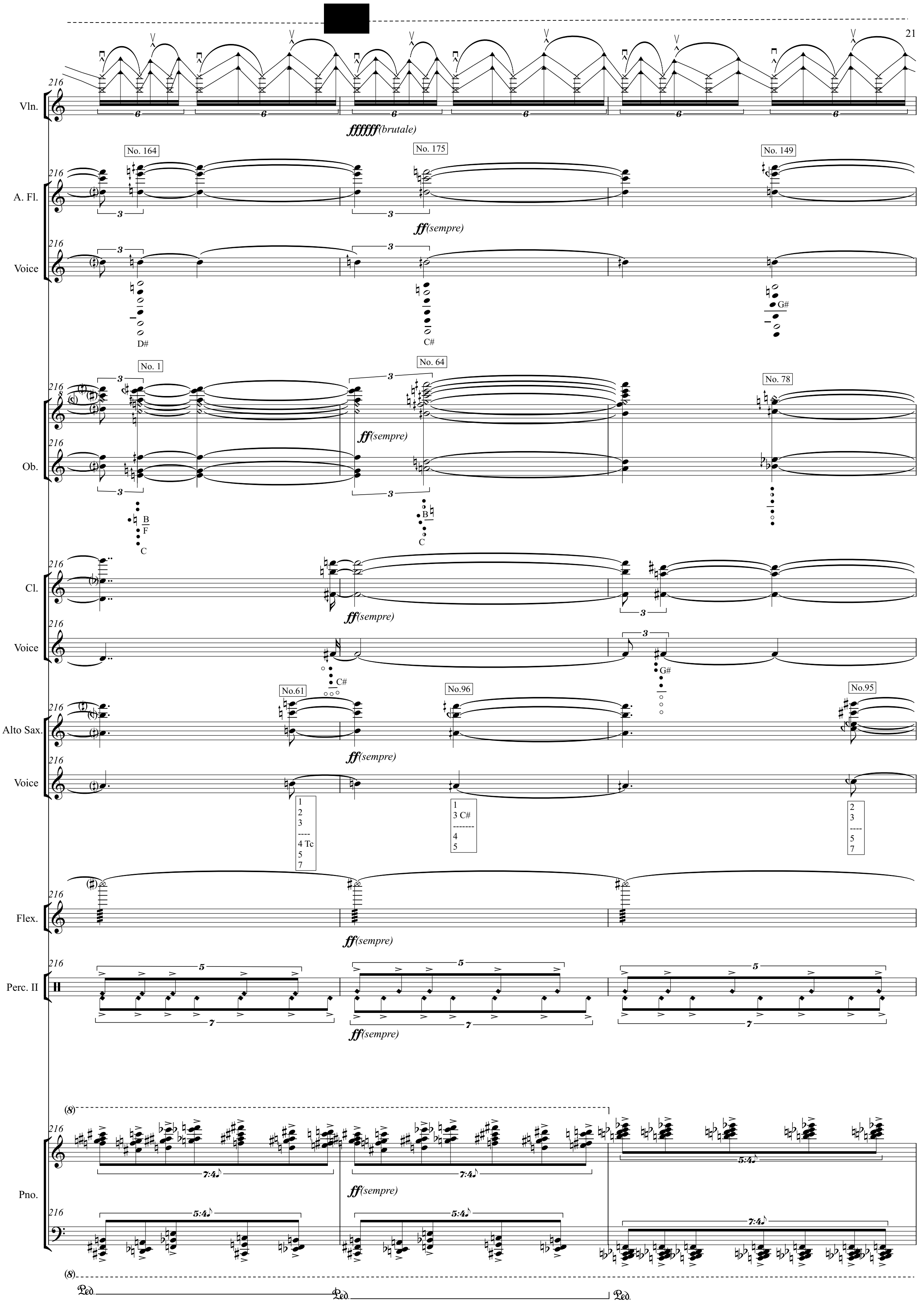
4
5
1
3
-----
4 Tc
5
7
1
3 C#

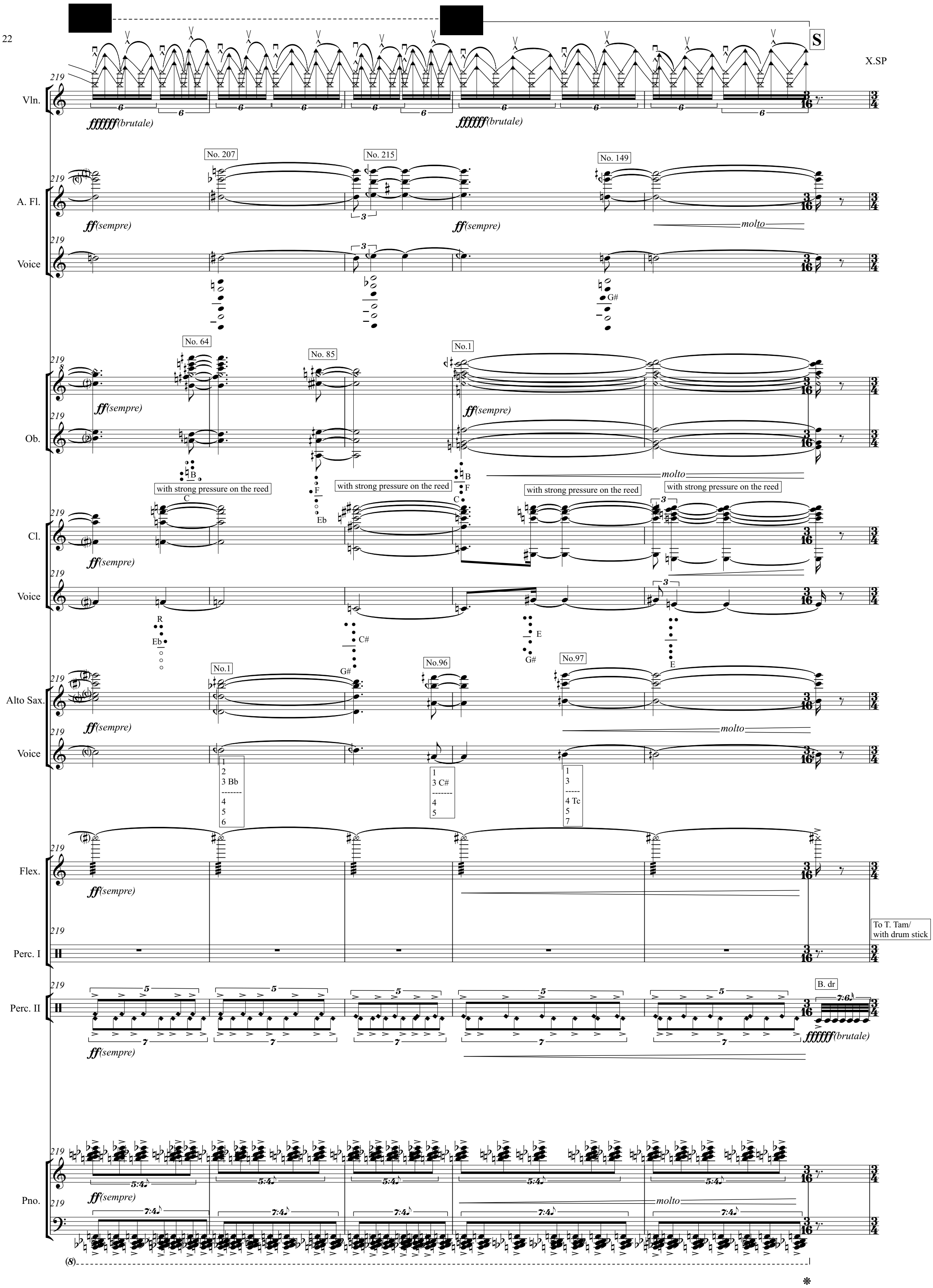
4
5
6
Eb
1
2
3

5
6
7
Flex.
ff(sempre)
Flex.
ff(sempre)
Perc. II
Op. gongs
Op. gongs
Pno.
ff(sempre)
ff(sempre)
SENZA PEDAL
SENZA PEDAL
5
3
5:4
7:4
3:2
6


19
X.SP
Vln.
ffffff(brutale)
Sl.
A. Fl.
No. 89
No. 110
No. 119
Voice
ff(sempre)
D#
G#
No. 78
No.64
Ob.
B
C
Cl.
F#
G#
C#
No.96
No.118
No.97
No.18
No.95
Alto Sax.
1
3 C#
4
5
6
Eb
3
4 Tc
7
2
3 Bb
7 Tc
Flex.
Perc. I
Flex. Perc. II
Op. gongs
Pno.
(8)
SENZA PEDAL
8vb
Ped.
208

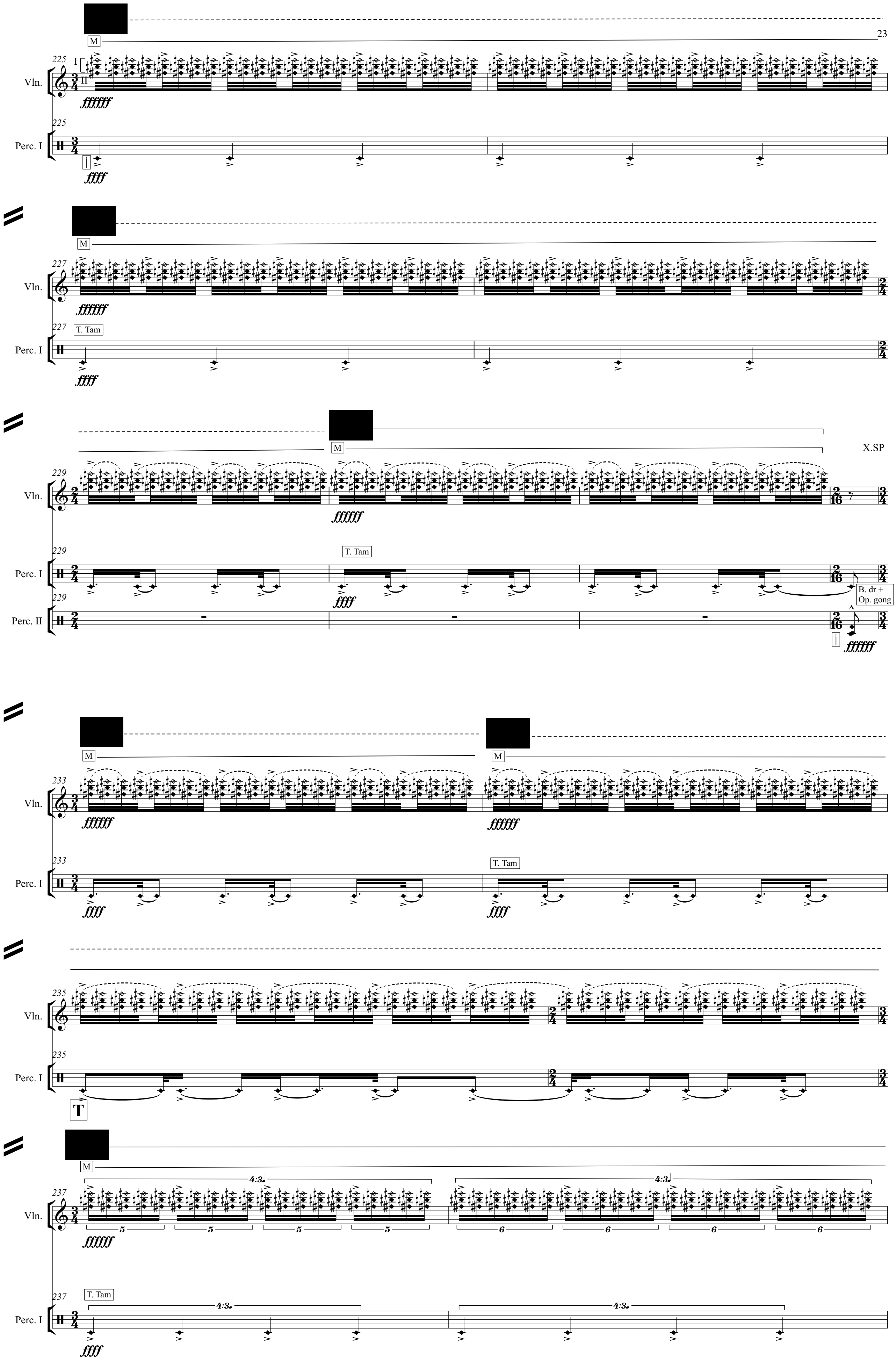

[redacted]
[redacted]
R
212
Vln.
6
ffffff(brutale)
ffffff(brutale)
No. 149
No. 175
A. Fl.
ff(sempre)
ff(sempre)
Voice
G#
C#
No.244
No.244
ff(sempre)
ff(sempre)
Ob.
Cl.
ff(sempre)
ff(sempre)
Voice
G#
G#
Eb
F
No.96
No.97
No.96
Alto Sax.
ff(sempre)
ff(sempre)
Voice
1
3 C#
4
5
1
3
4 Tc
5
7
1
3 C#
4
5
Flex.
3
ff(sempre)
ff(sempre)
Perc. II
7
6
5
7
ff(sempre)
ff(sempre)
8va
Pno.
7
6
7:4
ff(sempre)
ff(sempre)
5:4
(8)
Ped.

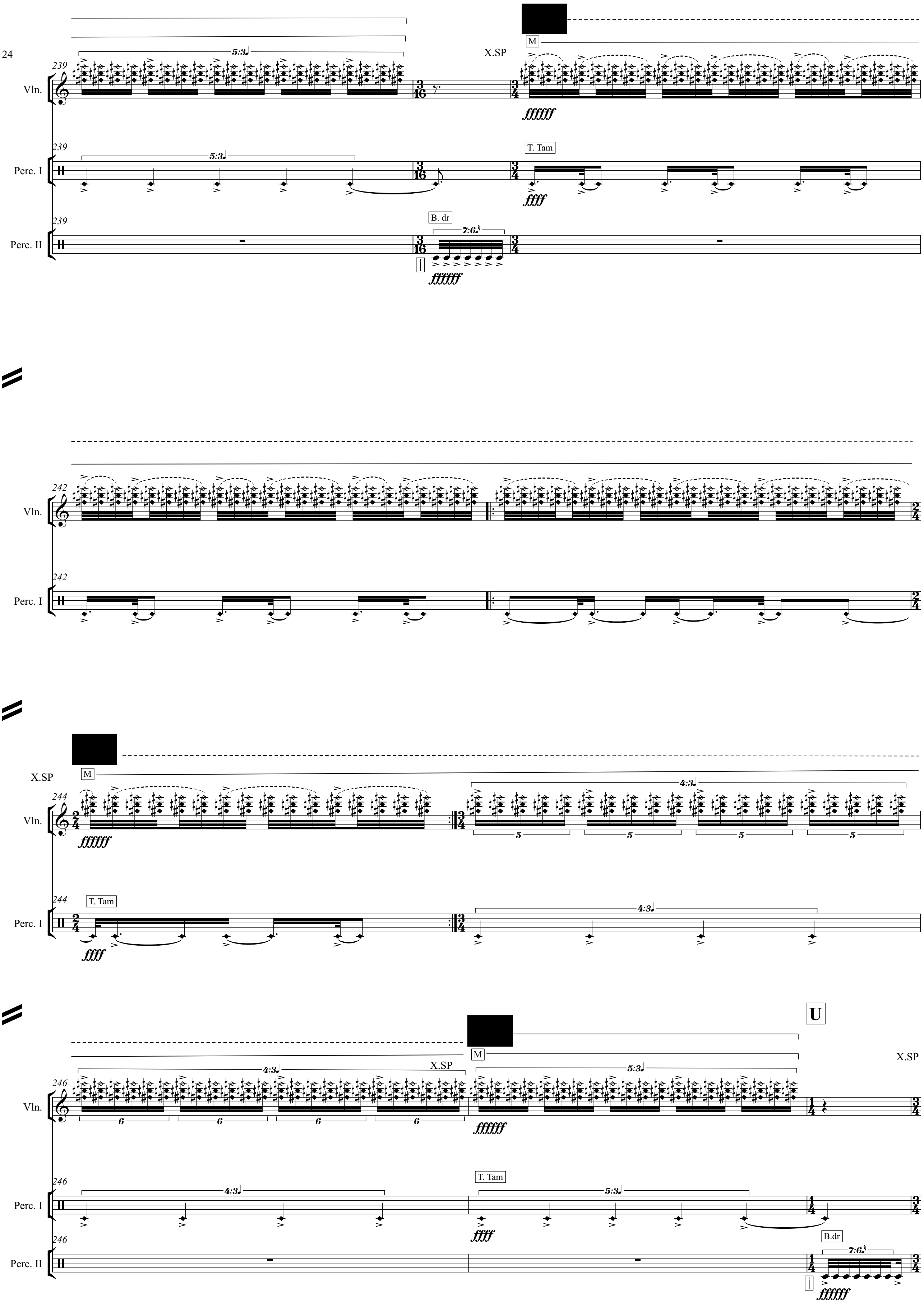

21
216
Vln.
6
ffffff (brutale)
No. 164
No. 175
No. 149
A. Fl.
3
ff (sempre)
Voice
D#
C#
G#
No. 1
No. 64
No. 78
Ob.
ff (sempre)
B
F
C
B♮
C
Cl.
ff (sempre)
Voice
C#
G#
No.61
No.96
No.95
Alto Sax.
ff (sempre)
Voice
1
2
3
4 Tc
5
7
1
3 C#
4
5
2
3
5
7
Flex.
ff (sempre)
Perc. II
5
7
ff (sempre)
(8)
7:4♪
5:4♪
Pno.
ff (sempre)
Ped.
Ped.
Ped.

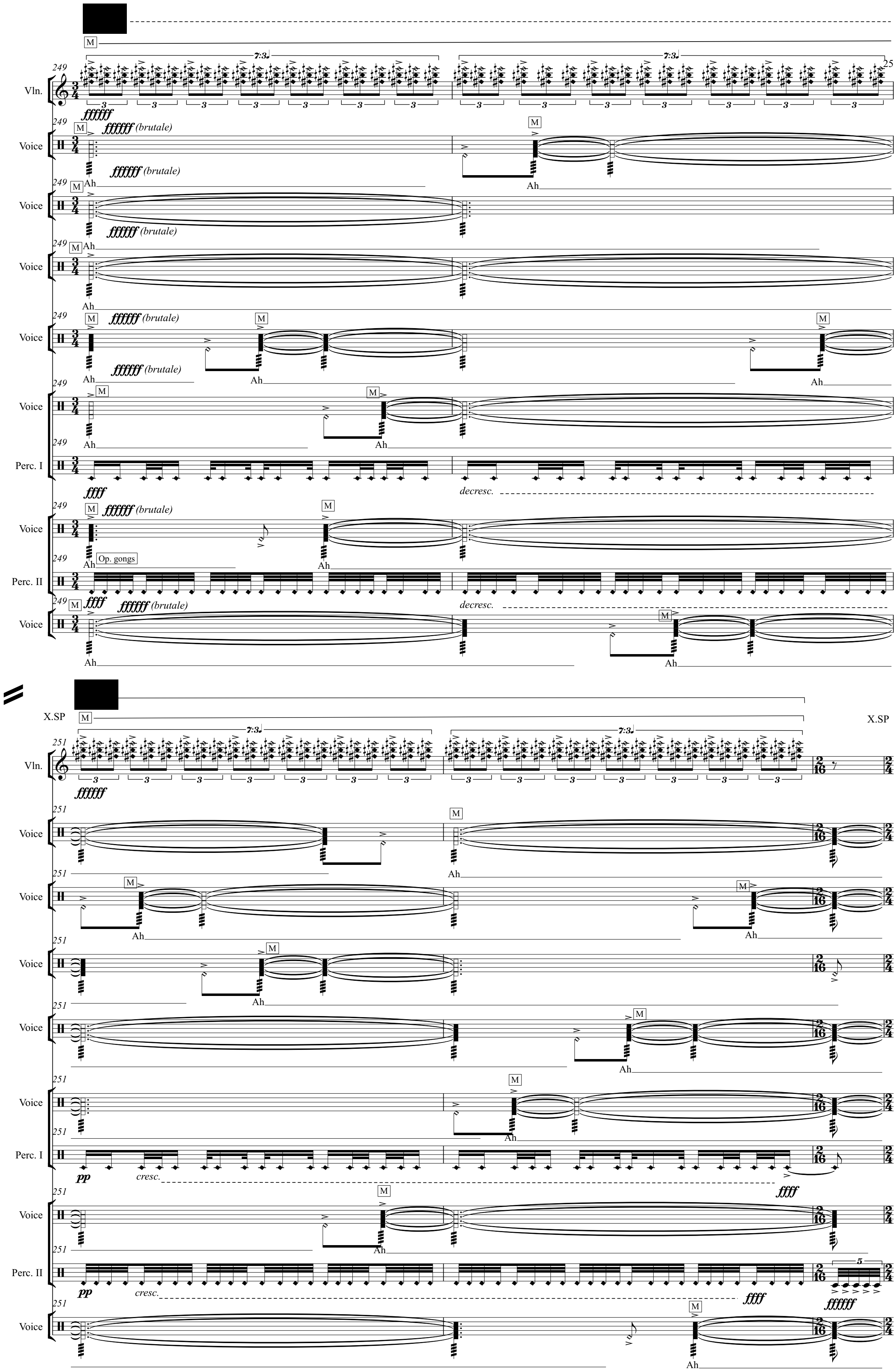

S
X.SP
219
Vln.
ffffff (brutale)
6
A. Fl.
No. 207
No. 215
No. 149
ff (sempre)
molto
3
Voice
G#
Ob.
No. 64
No. 85
No.1
B
F
C
Eb
with strong pressure on the reed
Cl.
R
Eb
C#
G#
E
Alto Sax.
No.1
No.96
No.97
1
2
3 Bb

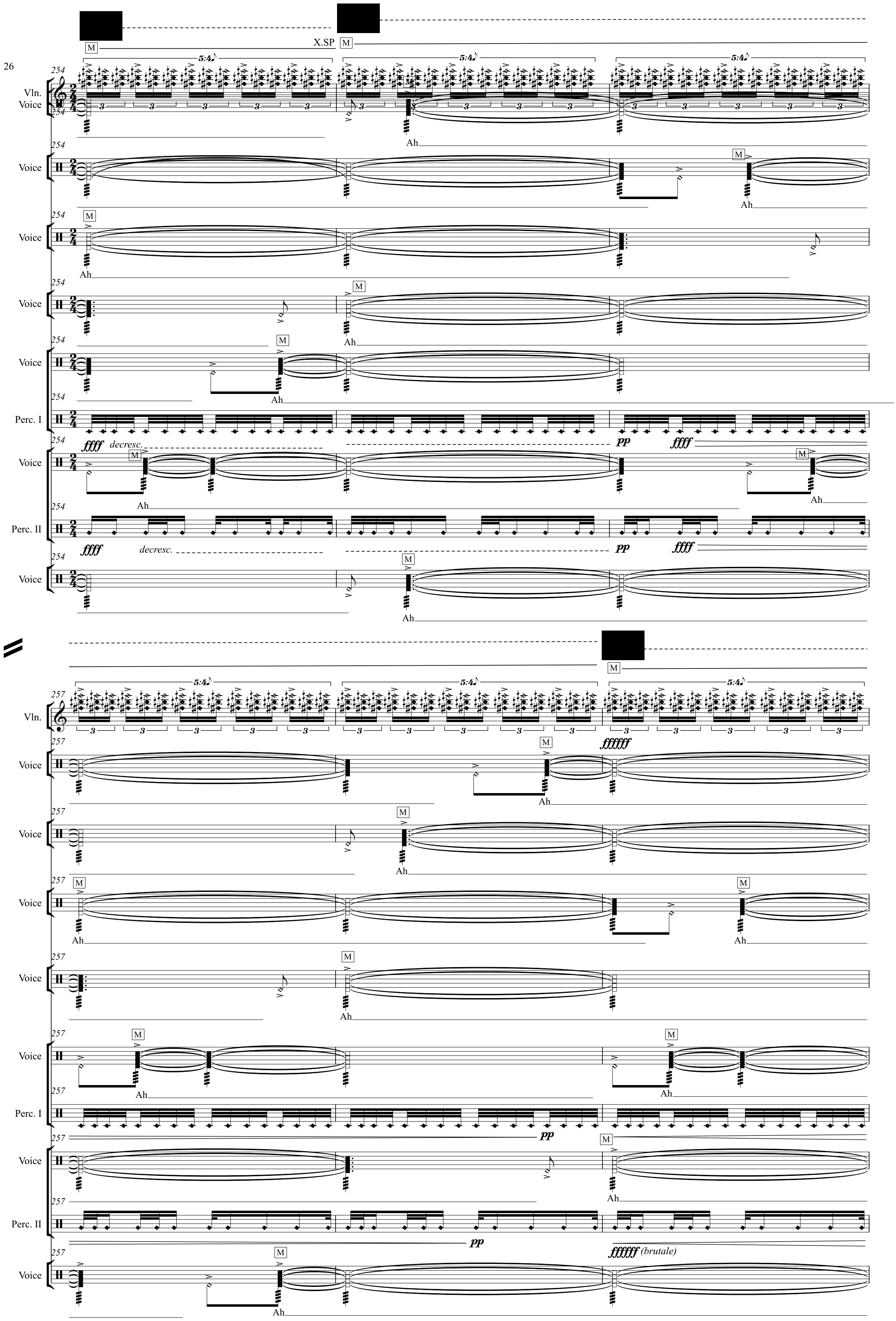
4
5
6
1
3 C#

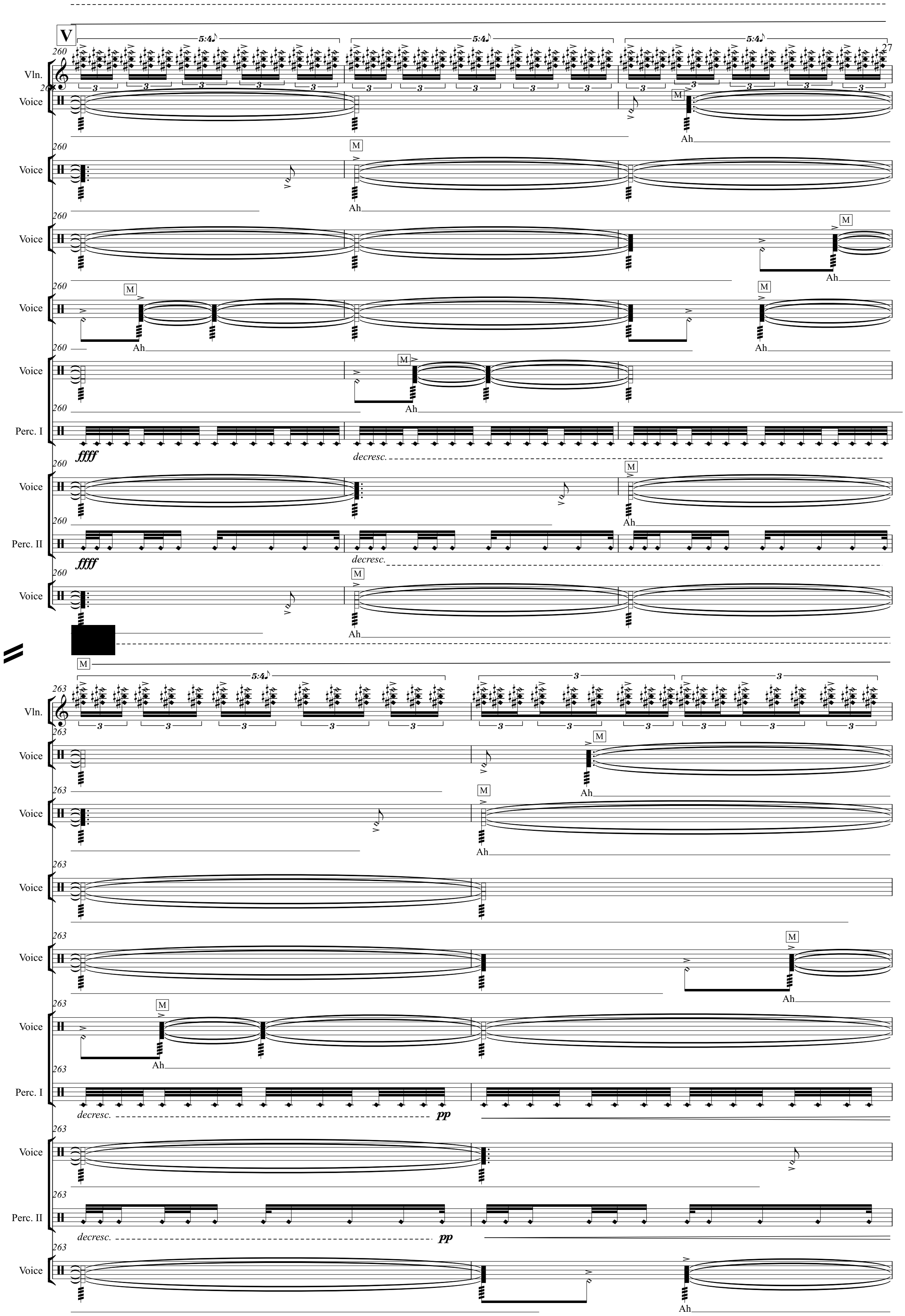
4
5
1
3
-----
4 Tc
5
7
Flex.
Perc. I
To T. Tam/ with drum stick
Perc. II
B. dr
5
7
7:6𝅘𝅥𝅯
Pno.
5:4𝅘𝅥𝅮
7:4𝅘𝅥𝅮
(8)
3
16
3
4
*

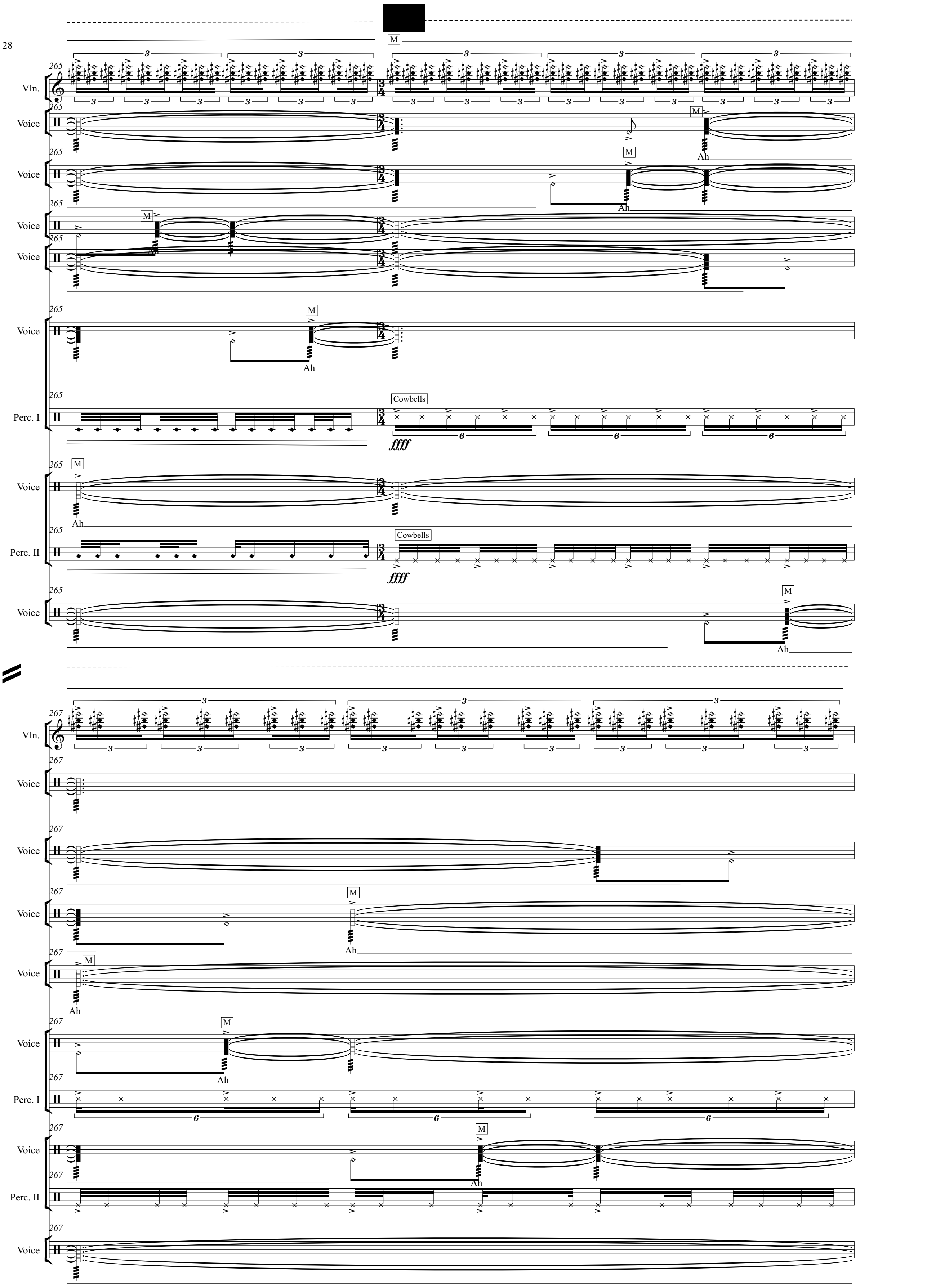

M
23
225
I
II
Vln.
ffffff
Perc. I
ffff
227
T. Tam
229
X.SP
Perc. II
B. dr +
Op. gong
233
235
T
237
4:3
5
6


239
Vln.
Perc. I
Perc. II
5:3♩
3/16
3/4
X.SP
M
ffffff
T. Tam
ffff
B. dr
7:6♪
ffffff
242
2/4
244
X.SP
M
ffffff
T. Tam
ffff
4:3♩
5
246
4:3♩
6
X.SP
M
5:3♩
ffffff
T. Tam
ffff
U
X.SP
1/4
B.dr
7:6♪
ffffff

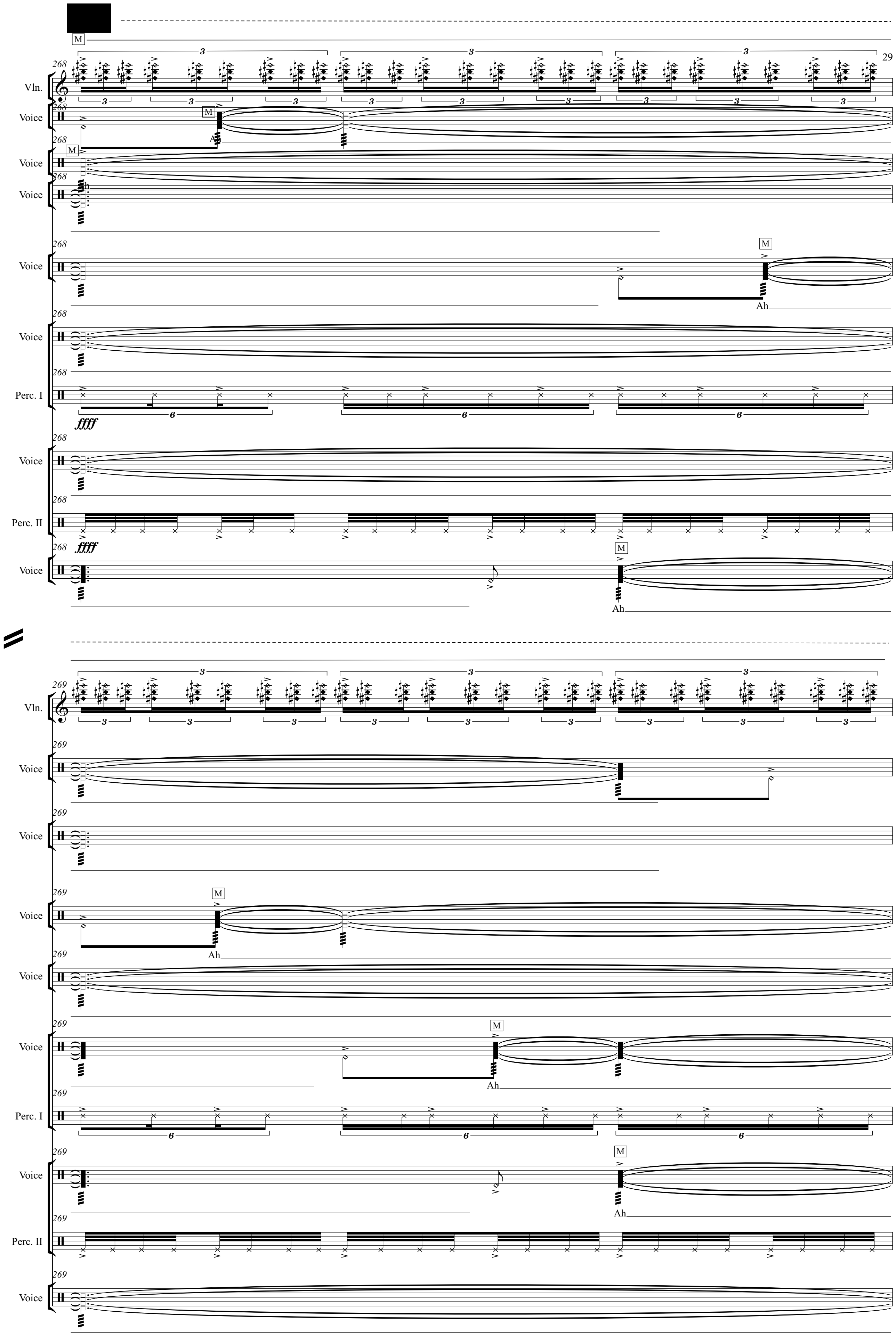

M
7:3♩
249
Vln.
ffffff
Voice
ffffff (brutale)
Ah
Perc. I
ffff
decresc.
Op. gongs
Perc. II
X.SP
251
pp
cresc.
ffff
ffffff
5

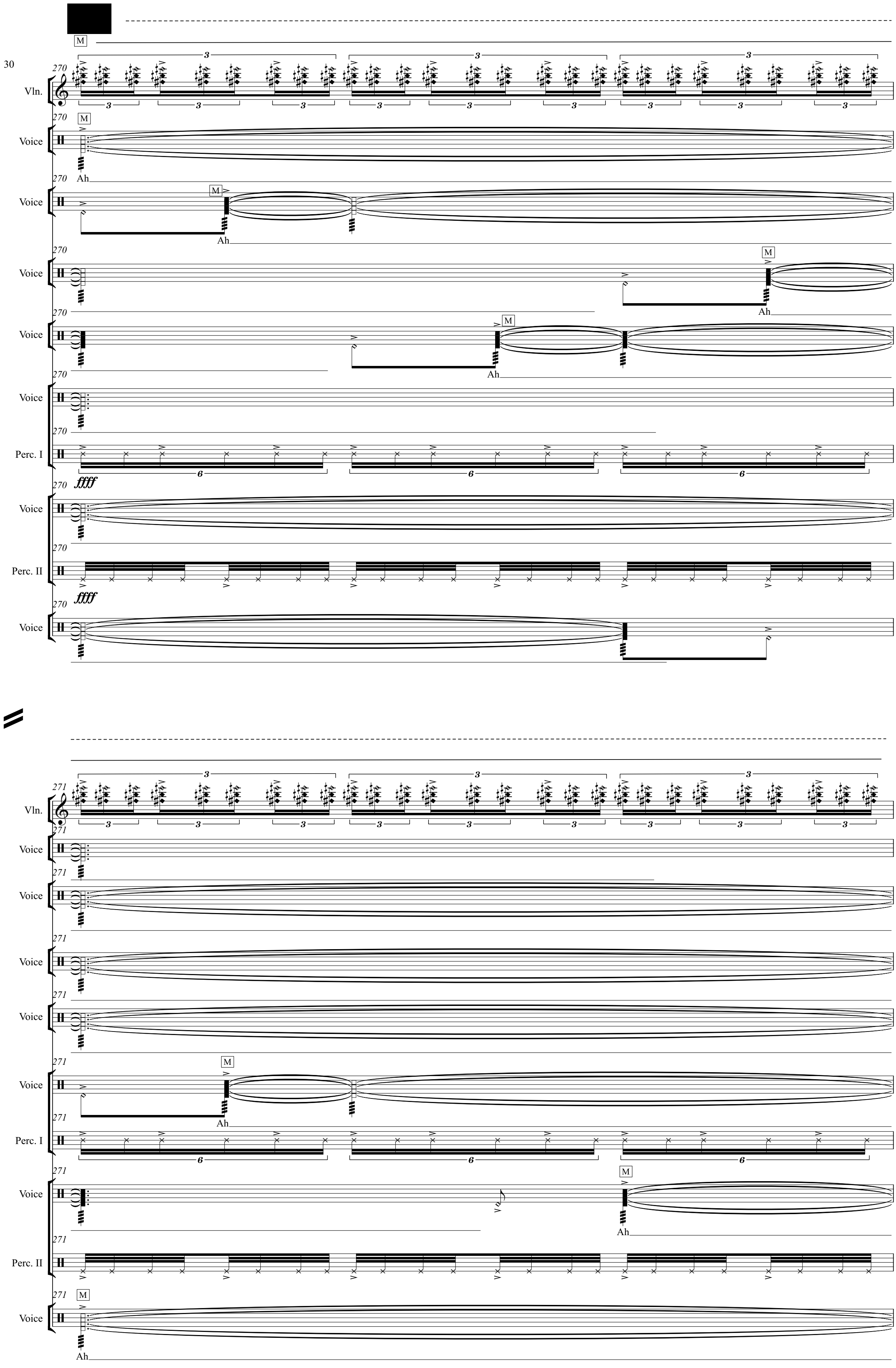

M
X.SP
M
5:4♪
254
Vln.
Voice
3
Ah
Voice
Voice
Voice
Voice
Perc. I
ffff
decresc.
pp
ffff
Voice
Perc. II
ffff
decresc.
pp
ffff
Voice
M
257
Vln.
5:4♪
3
Voice
fffff
Voice
Voice
Voice
Voice
Perc. I
pp
Voice
Perc. II
pp
ffffff (brutale)
Voice
Ah

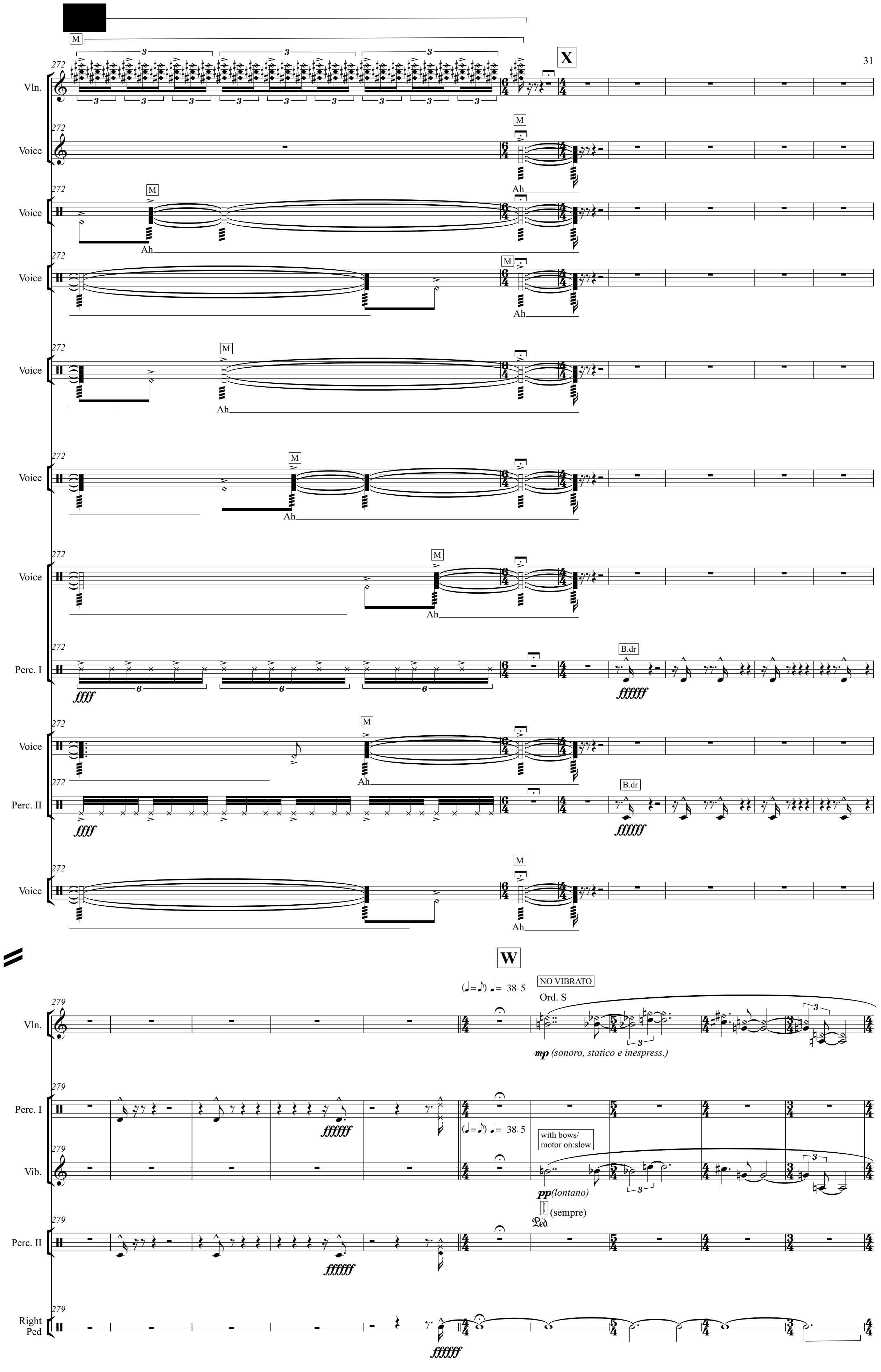

V
260
263
Vln.
Voice
Perc. I
Perc. II
5:4♪
3
M
Ah
ffff
decresc.
pp

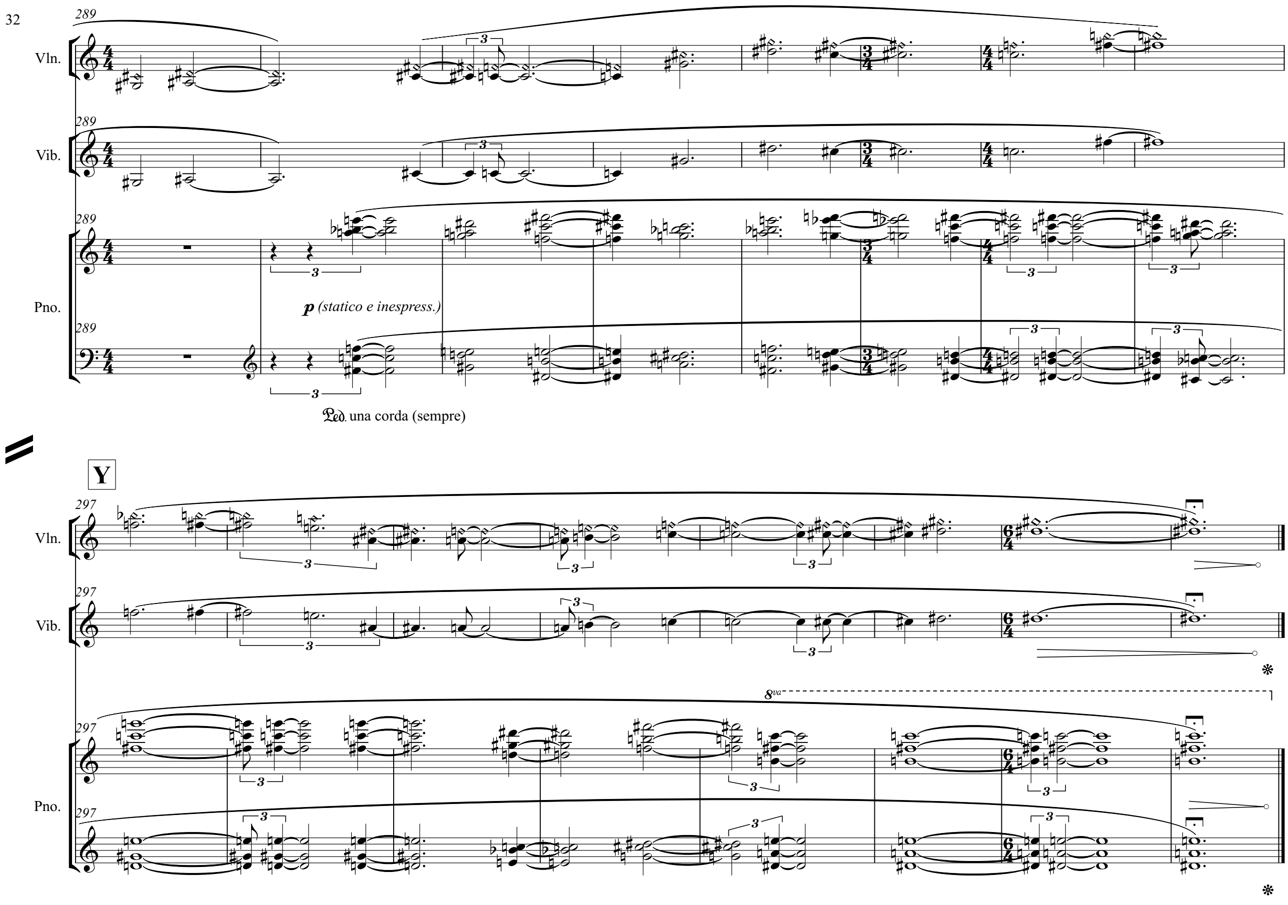

265
Vln.
Voice
Voice
Voice
Voice
Voice
Perc. I
Voice
Perc. II
Voice
M
Ah
Cowbells
ffff
Cowbells
ffff
3
6
267

[redacted]


M
268
29
3
6
Vln.
Voice
Perc. I
Perc. II
Ah
ffff
269


30
M
270
Vln.
3
Voice
M
Ah
Voice
M
Ah
Voice
M
Ah
Voice
M
Ah
Voice
Perc. I
6
ffff
Voice
Perc. II
ffff
Voice
271
Vln.
3
Voice
Voice
Voice
Voice
Voice
M
Ah
Perc. I
6
Voice
M
Ah
Perc. II
Voice
M
Ah


M
3
272
X
Vln.
Voice
Ah
Perc. I
ffff
6
B.dr
ffffff
Perc. II
W
(♩=♪) ♩= 38.5
NO VIBRATO
Ord. S
279
mp (sonoro, statico e inespress.)
with bows/
motor on:slow
Vib.
pp(lontano)
Ped. (sempre)
Right
Ped
ffffff


289
Vln.
Vib.
Pno.
3
p (statico e inespress.)
Ped. una corda (sempre)
Y
297
8va
❋

CONCLUSION

To conclude, I would like to begin with the last paragraph of the interview with Pierre Boulez that was quoted in the introduction:

> "If the rhythms and phrasing that are peculiar to contemporary music would be taught in the best conservatories in an intensive way, the future of contemporary music would certainly change and performers and general public would really start enjoying pieces by Berio, Xenakis or myself. The lack of accuracy in orchestras is the biggest obstacle for communication between composers and public".

The ultimate intention behind my whole research, and the construction of a programme for performers at the Amsterdam Conservatoire, has precisely been to lay a bridge to restore the communication referred to by P. Boulez, in the measure that I can contribute to this end through my knowledge of karnatic rhythm. I would argue that the only way for this to happen, would be to implement the material exposed in the text within a western educational framework. My proposal involves replacing the current rhythmical teaching methodology in our conservatoires and music academies by the methodical, transparent, effective and far-reaching techniques and concepts seen in karnatic music. **The main issue here is to what extent the mentality of learning rhythm and the importance given to this issue in the West (both at an educational stage as well as at a professional level) needs to be deeply reviewed or even changed entirely.**

In addition to this pedagogical and performance-oriented goal, I find it very important to reiterate the great palette of creative possibilities that the karnatic rhythmical system can provide to westerners (furthered by a creative and imaginative use). This is, I believe, illustrated in the students' pieces presented in the last section.

At this point, it should be clear that my research and the teaching of this material has a double aim: a pedagogical one, catering to classical and jazz performers, as well as a creative one for composers and improvisers.

This final section has necessarily to be empirical in nature: all the conclusions I arrive at are the direct result of the research, teaching and development of this material for over seventeen years; twenty years composing and experimenting with karnatic concepts; and the experiences of my students (performers and creators alike) during their studies and when employed in their professional careers.

Performers

From a performance and pedagogical point of view, the entire karnatic material can be divided into two large conceptual corpuses: one dealing with superimpositions (nadai bhedam, anuloma-pratiloma and derived notions) and techniques that work with crossing accents phrasing (gati and jathi bhedam and all their subsequent concepts).

Performers today are confronted with pieces that have not been composed with any knowledge of karnatic rhythmical structures but utilise rhythmical complexities in various ways, and increasingly with works by composers who have studied karnatic music either through the programme at the Amsterdam Conservatoire or with Indian musicians.

I would like to make some reflections on each of the above points.

a) Superimpositions: apart from some preferences for either the notation proposed here or the notation employed by many composers of the XX century, I do not think there should be any doubt regarding the efficiency that the karnatic system can provide in the performance of this sort of material (in general, all 'irregular groupings'). In fact, as stated several times, only the creative approach by karnatic musicians regarding these techniques is what differentiates western and karnatic music as far as this concept is concerned[1].

b) Crossing accents phrasing: in the section on 'Applications to western music', except for Stravinsky's example, I chose fragments of pieces that utilise the same notation as the one proposed in the chapters on gati and jathi bhedam. However, my experience as a teacher working with student ensembles performing 20th century pieces, together with my observation of various experiences of students in a professional setting (where the students applied these karnatic techniques even if the notation did not clearly call for it), led me to reflect upon how much more frequently performers could utilise these techniques than when called for by the notation.

I am well aware of the reluctance that applying these techniques to traditionally notated phrases can arouse in many musicians. I do not advocate for a radical change to phrasing in the performance of 20th century music. However, I would suggest that some composers, at least in some of their pieces, did indeed have in mind, in one way or another, a phrasing closer to an inner amalgamation concept than to the traditional 'imaginary beat-line' interpretation.

Bowing and breathing slurs (as in Ligeti or Messiaen), dotted slurs (as used by Xenakis), or other similar articulation techniques can be clues from which to extract shorter or longer passages that may resemble gati or jathi bhedam (in other words, a simple form of polyrhythm - gati bhedam, or inner amalgamation – jathi bhedam).

My work with students, and the experience of former students performing in professional ensembles, have aroused the interest of other colleagues who perceive this approach to phrasing to be less rigid than the traditional one. I would therefore suggest that some compositions, or fragments of certain pieces by some composers, can be approached with the karnatic technique in mind and the final result may be more in line with what the composer may have intended, even if he did not take the step (or consider it necessary) to use the notation found in, for instance, Ligeti's 'Piano concerto' or Messiaen's 'Quatuor pour la fin de temps'.

c) Compositions with non-karnatic concepts: the manner in which the karnatic concepts are presented in this text (and taught at the Amsterdam Conservatoire), and the way in which contemporary music has developed rhythmical complexities, may not appear to bear any relationship to one another. Nevertheless, any rhythmical device found in western music can be analysed and performed by using one or more karnatic techniques, as I think I have proved in the section on 'Applications to western music'. However, it is absolutely necessary that the student possesses an analytical mind to establish a parallel between a karnatic technique and its use in a concrete passage of contemporary music: studying and mastering all karnatic techniques without having the ability to translate them into an existing piece of music makes the study of karnatic rhythm less valuable for a classical performer.

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[1] *Later on I would like to expand upon the karnatic approach to creation.*

d) Compositions with karnatic concepts: although these pieces should, in principle, be more 'straightforward' for a student of karnatic techniques, and the performer should be able to perceive which techniques have been used or could be applied, the reality is that in general, western creators want to be innovative: the tendency is to twist rules, mix techniques or, as I myself encourage my students to do, find new paths to use karnatic concepts while respecting the bare minimum set of rules for each technique. All this without mentioning the immense possibilities that western concepts (such as 'counterpoint-oriented' notions, orchestration, background versus foreground, fragmentation of techniques among different instruments – to mention just a few) can add to the way karnatic rhythmical structures can be developed and notated in the West.

Subsequently, performers are bound to utilise a similar approach when performing compositions with karnatic concepts as with any other piece of contemporary music, with the sole difference that notation-wise, the concomitances between what they studied and the notation will likely tend to be much closer to one another.

Therefore, my final conclusion as to how performers should approach rhythmically complex pieces is that they need to apply an analytical mind and view karnatic techniques as tools to be adapted to specific circumstances. By analysing contemporary pieces and contemplating ways of implementing these techniques at almost every step of the process, these studies can become a powerful performance tool.

However, many pieces from 1950s onwards and composers born in the third decade of the XX century are bound to become 'classics' in not more than twenty or thirty years from now but, unless the curriculum for classical performers adopts a radical transformation of the current methodology, today's state of affairs will perpetuate itself.

Creators

The combination of karnatic techniques with the arsenal of possibilities provided by our western musical background, can produce completely new paths in western creation (be it improvised or composed).

As a lover of karnatic music (and aesthetics), and simultaneously a teacher of these techniques, I have always walked a fine line between respecting the minimum architecture I consider necessary to make a technique what it is, and respecting the imaginative approach of my students.

Paradoxically, those more prone to break rules and bend the use of techniques are usually in their first year of the programme, while those who 'see beyond' the techniques and respect their rules tend to be in the third or fourth year. The most plausible explanation for this attitude I find lies in the fact that the more karnatic concepts a student learns and the more time he spends working with the material, the more 'meaning' he finds in trying to respect the architecture of the techniques while creating and starting to conceive how to blend both worlds. It is as though, as a student progresses in the understanding and variety of concepts, he begins to gain an 'aerial' view and to see the puzzle in its entirety.

I am not advocating placing fences to innovation and imagination to anyone studying karnatic rhythmical structures (especially if they are the result of combining them with western concepts of orchestration that do not exist in karnatic music). However, there are two quintessential karnatic concepts that I consider important to reflect upon: these are cycle and common denominator.

a) Cycle: most karnatic techniques seem to work exclusively with this concept, however it may be called or conceived: new cyclic structures as seen in chapter 22 (Tala Prastara), or Hans Leeuw's 'repetitive time units' are both paths that significantly expand the possibilities provided by the first tala system explained, the suladi talas.

For many years, quite a number of students (myself included) tried to create music using karnatic elements whilst changing metres without any 'cyclical thinking' behind; the result was that we could seldom use techniques like tirmana, mohara, gati bhedam, nadai bhedam, complex mukthays, rhythmical sangatis or mixed jathi nadai bhedam (just to mention a few options). Only combinations anuloma-pratiloma seemed feasible in any context.

I am well aware that a lot of rhythmical complexities can and have been used in the West with continuous metre changes. However, in my experience, this approach of continuous or random metre changes clashes with quite a large number of karnatic possibilities or, at least makes the use of karnatic devices a highly laborious process requiring very elaborate calculations and making performance extremely difficult.

Essentially, my conclusion is that in order to utilise the aforementioned techniques (and not exclusively anuloma-pratiloma), a creator would most likely have to 'sacrifice' the use of continuous or random metric changes, unless he creates a unit that would closely resemble the concept of cycle. This does not mean that I would advocate discarding the use of continuous or random metric changes in western music; nevertheless, after years attempting to use karnatic techniques with random metre changes, I realised that the 'sacrificed' element has always been the karnatic rhythmical structures. Both rhythmical approaches seem to simply exclude each other. My experience as a composer, and that of many (former) students has been that the more the notion of cycle is used (in one way or another), the easier it becomes to integrate karnatic techniques.

b) Common denominator: this concept impregnates the whole corpus of concepts and techniques of karnatic music from a creative viewpoint. It is the element that has enabled karnatic musicians to elaborate both a highly complex rhythmical system, and a methodology of study of rhythm to a high level of sophistication.

To illustrate the concept of common denominator, I would like to concentrate on the aspects most far-removed from our use of 'irregular groupings', namely nadai bhedam and combinations anuloma-pratiloma.

I would argue that these concepts are two of the greatest achievements of the whole karnatic system. As I mentioned in the section 'Applications to western music', the West has essentially developed a 'numbers against numbers' approach. In contrast, karnatic music has been able to organise these 'numbers' into two completely differentiated and highly elaborated systems: one is exclusively used as a method to establish polypulses (nadai bhedam), whereas the other introduces rather complex irregular groupings and displacements within the beat 'constrained' into six different developmental techniques (combinations anuloma-pratiloma). It is precisely this notion, the fact that two consecutive 'numbers' need to have a common element, that I find fascinating, both as a body of theory in itself and as a method to create with.

For a number of years I have wondered: what can we gain from the karnatic approach materialised in nadai bhedam and anuloma-pratiloma? Why does the gap between composers and performers in the West seem to be much wider than in South India? Could their approach be a solution to bridge the gap between composers and performers, and, ultimately, audiences in the West?

I would argue that a system in which the **practice methodology** and the **developmental possibilities** of the same concept **are inextricably linked**, as is the case in nadai bhedam and anuloma-pratiloma techniques, could very well be a solution to the gap mentioned by P. Boulez.

Once again, I would like to refer to my experience as a teacher to illustrate the latter.

The continuous change of gatis or irregular groupings habitual in western music from the 1950s onwards, is again completely ingrained in our system. On the other hand, it is precisely the fact that two consecutive steps in karnatic music need a common denominator that has enabled karnatic music to construct a highly sophisticated creative and practice methodology.

I have advocated for a change in the current rhythmical solfege imparted in music centres, so musicians begin to better perform existing contemporary music. Most creators who have been exposed to studying karnatic rhythm for at least two years have acknowledged that using the common denominator approach provided by nadai bhedam and combinations anuloma-pratiloma is the best way if they want their music to be performed as intended, and simultaneously to achieve more rhythmical cohesiveness.

The main conclusions that many of my students and I have reached are

a) Unless there is a much closer relationship between what performers study and what creators compose or improvise, the gap between both worlds will most likely be perpetuated.

b) It may not only fall to the performers to close this gap by improving their rhythmical accuracy - it may also fall on creators' shoulders to create complexity that can on one hand be methodically studied by performers, and on the other hand could have a rhythmical coherence departing from the 'numbers against numbers' approach.

Therefore, I do not question the musical value of random metre changes or a lack of the use of common denominator; I have reservations regarding the feasibility of blending karnatic techniques simultaneously with these notions without sacrificing the enrichment possibilities that the karnatic rhythmical system can provide.

As a way of summarising my whole research and its purposes, I would like to conclude with the following:

The study of karnatic rhythm, as presented in this text, does not have as a goal the performance of karnatic music, but rather its **integration within a western framework.** The ultimate aims, after a process of internalising all rhythmical techniques, are:

-A rapid translation and application of these techniques to existing western music (performers).

-A clear understanding of the architecture of the techniques, followed by an imaginative and innovative integration of these techniques into the creator's music vocabulary (composers and improvisers).

To study these techniques as an 'exotic' curiosity of another culture, or as an interesting collection of concepts totally unrelated to us, falls far short of these aims. The complete assimilation of these techniques can only occur when they become part of our culture via an ample revision of how rhythm is taught (and I would daresay conceived) in the West.

APPENDIXES

APPENDIX 1: GLOSSARY OF KARNATIC TERMS

Considering the nature of this text, the use of many karnatic terms has been inevitable: either certain terms do not have a clear translation, or the translation falls short of the many implications or ramifications of the term. I have tried to use an English term wherever feasible to make the text as understandable as possible.

Many terms have been confined to a specific chapter: these do not form part of the glossary since they can be understood by reading that chapter. However, many other terms are repeated quite often and appear in other chapters. In order to enable the reader to swiftly remember the meaning of those terms without having to page back and forth, here I present a concise definition of those terms.

Angas: Construction blocks of different size with which a *tala* is structured.

Anudrutam: One of the *angas* of a *tala.* One beat long. It is shortened to 'A'.

Anuloma: When the number of *matras* in a beat are doubled, tripled or quadrupled.

Balamuralikrishna: Great singer and composer from South India who revolutionised many concepts of karnatic music from the 1960s onwards.

Bhedam: Literally 'change through destruction'; when applied to music, it implies that a concept is modified in some way.

Combinations Anuloma-Pratiloma: Whenever an *anuloma* speed is inserted within any *pratiloma* speed or frame. Also, when a frame is not expressed in quarter notes.

Compound Mukthay: A ready-made *mukthay* that uses two gatis and different types of augmentations on a 'seed' phrase.

Chapu talas: Folkloric type of *tala*; fast tempo and odd number of beats.

Chatusra: One of the *gatis:* same as duplets in western music.

Damaruyati: One of the six types of *yati phrases.*

Drutam: One of the *angas* of a *tala.* Two beats long. It is shortened to 'D'.

Gati: Subdivision of the beat into an equal number of units called *matras.* Four are frequently used, with three being of recent utilisation.

Gati Bhedam: When the phrase is constructed around the *jathi* applied on a *gati.*

Gopuchayati: One of the six types of *yati phrases.*

Jathi: A systematic accent applied to a *gati*. In a wider sense, it is essentially any accent, and in specific contexts can also be understood as a phrase.

Jathi Bhedam: Sequence of irregularly distributed accents whose goal is to provide the illusion of a continuous change of metres within the tala.

Jati Laghu: It refers to the number of beats that this *anga (Laghu)* takes in a tala. It could be 3, 4, 5, 7 or 9.

Kala: Literally means beat; it is also a system of counting *Shadanga talas.*

Khanda: One of the *gatis:* same as quintuplets in western music.

Konnakkol: *see Solkattu.*

Krama: The original exposition of any musical object.

Kriya: Conducting pattern made up of a combination of hand gestures and finger counts.

Laghu: One of the *angas* of a *tala.* It could be 3, 4, 5, 7 or 9. It is shortened to an 'L'.

Laya: It refers to tempo, but it can also be pulse or the underlying *gati* over which different techniques can be used.

Matra: Every unit of a *gati*

Misra: One of the *gatis:* same as septuplets in western music.

Mixed jathi nadai bhedam: It is a technique whereby two different accents alternate systematically whilst a constant *nadai* is superimposed on each frame (this frame is provided by the alternating accents).

Mohara: A creative technique where every conceivable parameter is based on, or has as the most important element, the numbers 4 or 8.

Mohara (Mixed gati): A very intricate variation on a regular *mohara* in which two gatis are alternating throughout the eight cycles that the sequence usually lasts.

Motta Kannakku: It refers to any kind of superimposition or to any 'irregular grouping' that is smaller or bigger than a beat.

Mridangamyati: One of the six types of *yati phrases.*

Mukhy system: System designed by Dr. *Balamuralikrishna* in order to re-introduce the *Shadanga tala*. It also refers to the regroupings of the inner structure of one of these talas.

Mukthay: One of the largest chapters of karnatic music theory; essentially, it is a phrase that is repeated three times, usually separated by a gap, that resolves on *Tala sam*. However, there are quite a few variations on this basic definition.

Mukthay combination: In a very strict sense, is a sequence that takes as its starting point a double or triple mukthay and 'repeats' it three times.

Nadai: The superimposed gati on the frame provided by a *gati/jathi combination.*

Nadai Bhedam: A technique that embodies the concept of polypulse par excellence by means of superimposing a gati on the frame provided by a *gati/jathi combination.* It should always have a preparation, development and resolution.

Pala: Name given to any phrase of a *mukthay* or *yati phrase.*

Poruttam: A simple definition would be a sequence of at least 3 cycles of a *tala*, in which fragments of the theme are interwoven with different rhythmical techniques.

Pratiloma: When the number of *matras* in a *gati* is spread throughout 2, 3, 4, 5, 6 or 7 beats.

Purandaradasa: First known theoretician, who in the XVI century systematised the *Suladi talas* and the *Janaka ragas.*

Purvanga: First part of a *tirmana* sequence.

Rhythmical sangati: Refers to when a phrase that has previously been performed in one *gati* is realised or 'transformed' into a different *gati*.

Sam: The first beat of every *anga.*

Sama mukthay: A phrase (*pala*) that is repeated three times, usually separated by a gap, that starts and finishes on *tala sam.*

Samayati: One of the six types of *yati phrases.*

Sankirna: One of the *gatis:* same as ninetuplets in western music.

Shadanga tala: This *tala* system is the old system that was employed for many centuries before Purandaradasa elaborated and implemented the *Suladi tala* around the 16th century. But since the 1960s, it is the system that has inspired musicians to produce more 'experimental' music.

Solkattu: Solkattu or *Konnakkol* is the name given to the syllables used to 'sing' a rhythmical phrase. In karnatic music, every musician would 'sing' a phrase using a combination of syllables that would feel suitable for the given phrase before setting any melody to it.

Srotovahayati: One of the six types of *yati phrases.*

Sub-mukthay: A sub-mukthay is a phrase that is fragmented into two cells and follows the specific pattern of

AB (gap) **AB** (gap) **B** (gap) **B** | *Tala sam*

Suladi talas: The system of *talas* that Purandaradasa elaborated in the 16th century to end what seems to have been a very chaotic period that threatened to preclude the, until then, unified karnatic system of music.

Tala: The metric container, the framework wherein all the rhythmical concepts and techniques explained in this book are utilised.

Three-fold mukthays: A phrase conceived in two or (mostly) three different gatis, usually separated by a gap.

Tirmana: A phrase of 3, 4, 5, 6 or 7 notes in which each note is separated from another by the same number of matras.

Tisra: One of the *gatis:* same as triplets in western music.

Uttaranga: Second part a *tirmana* sequence.

Vakra: Random permutation of a previous sequence, as long as the derived sequence is comprised of clearly differentiated steps or phrases.

Viloma: Reverse order of any previous phrase or of a sequence with several steps.

Yati phrases: Sequence of phrases in which the first phrase (or, better said, *pala)* forms the nucleus of the sequence. Every subsequent pala takes the previous one as a starting point, applying a systematic increase or decrease to the number of *matras*.

Yati mukthays: In this sort of *mukthays* the number three is intertwined with the *yati* concept of systematic increase or decrease of a musical parameter.

Yatis prastara: A technique whereby two different *yati phrases* intermingle. Each *pala* of one *yati phrase* alternates with another *pala* of a different *yati phrase*.

APPENDIX 2: THE KARNATIC METRONOME

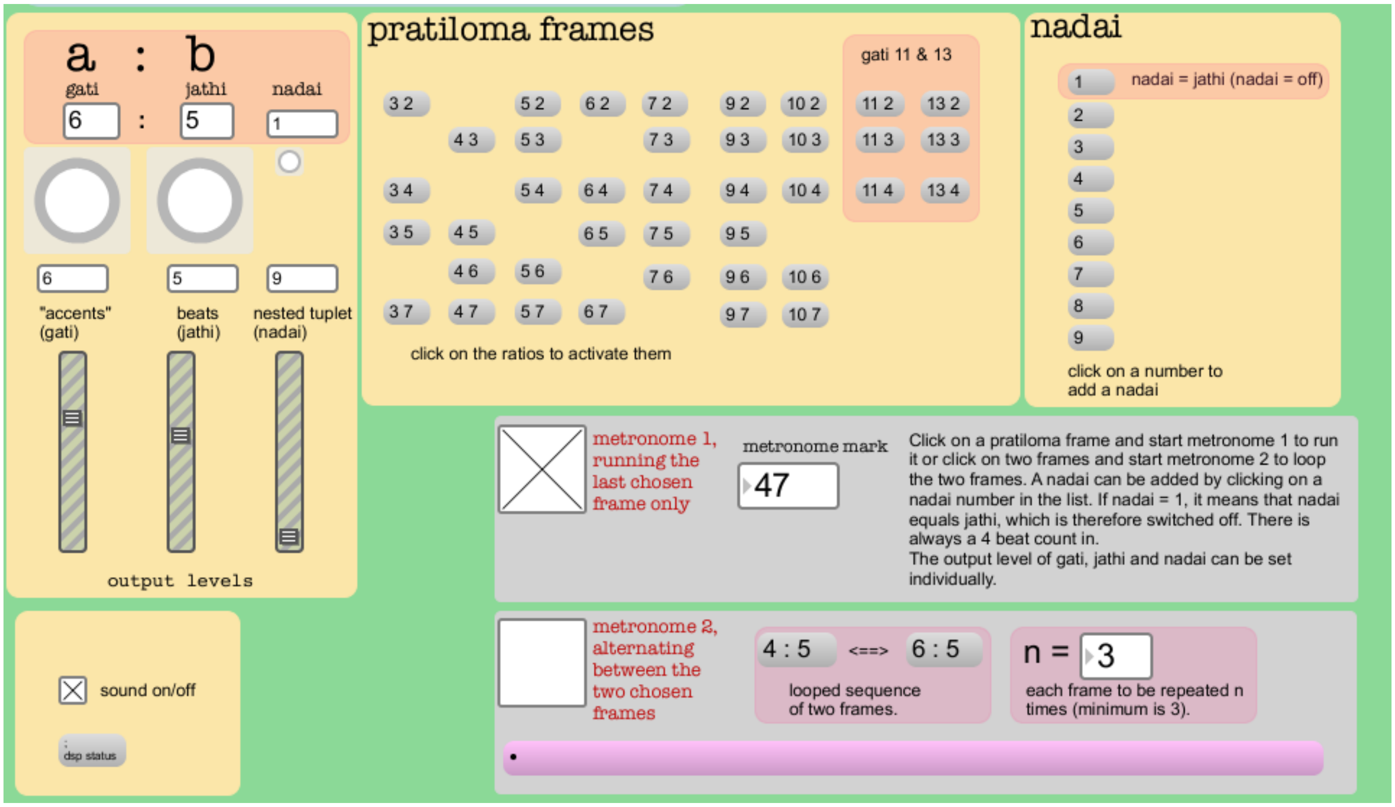
In this appendix I would like to present a device mentioned a few times during the thesis that could greatly help musicians in their practice of regular phrasing, gati bhedam, nadai bhedam and anuloma-pratiloma.

My colleague at the Amsterdam Conservatoire Jos Zwaanenburg has designed this device. It is quite self-explanatory, thus anyone who may acquire this karnatic metronome can quite rapidly work out how it functions.

However, I would like to point out the differences between working with metronomes 1 and 2.

When the first metronome (Fig.1) is utilised, the goal is to practice any of the aforementioned techniques for a long period of time.

Fig.1: Karnatic Metronome 1


a : b
gati
jathi
nadai
"accents" (gati)
beats (jathi)
nested tuplet (nadai)
output levels
pratiloma frames
3 2
5 2
6 2
7 2
9 2
10 2
4 3
5 3
7 3
9 3
10 3
3 4
5 4
6 4
7 4
9 4
10 4
3 5
4 5
6 5
7 5
9 5
4 6
5 6
7 6
9 6
10 6
3 7
4 7
5 7
6 7
9 7
10 7
gati 11 & 13
11 2
13 2
11 3
13 3
11 4
13 4
nadai
1
2
3
4
5
6
7
8
9
metronome 1, running the last chosen frame only
metronome mark
metronome 2, alternating between the two chosen frames
4 : 5
<==>
6 : 5
☒ sound on/off
dsp status

gati 6 : jathi 5 nadai 1

6 5 9

click on the ratios to activate them

1 nadai = jathi (nadai = off)

click on a number to add a nadai

metronome mark 47

Click on a pratiloma frame and start metronome 1 to run it or click on two frames and start metronome 2 to loop the two frames. A nadai can be added by clicking on a nadai number in the list. If nadai = 1, it means that nadai equals jathi, which is therefore switched off. There is always a 4 beat count in.
The output level of gati, jathi and nadai can be set individually.

looped sequence of two frames.

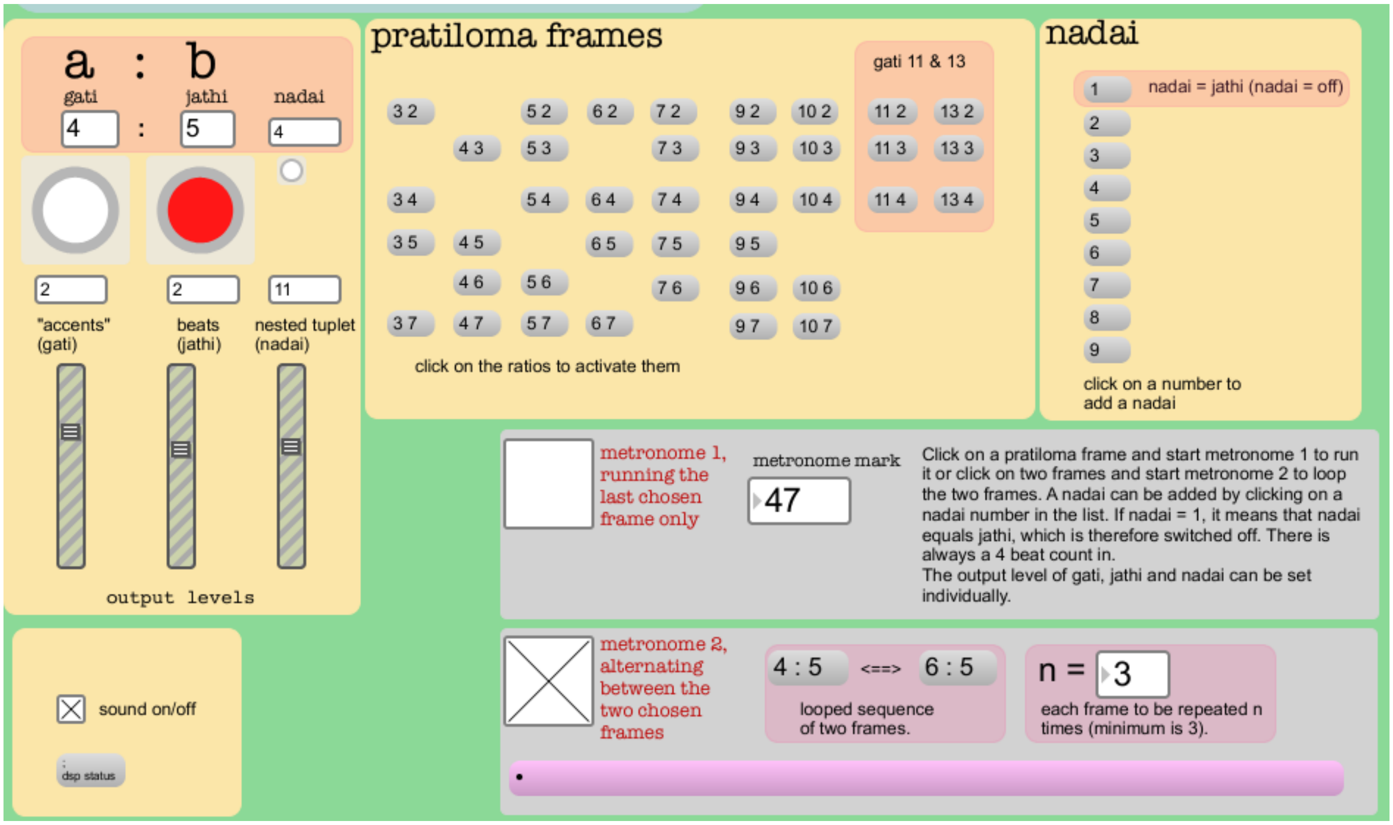
n = 3

each frame to be repeated n times (minimum is 3).

When the second metronome (Fig. 2 below) is chosen, the aim for the musician is to be able to change between any two frames presented under the heading of ‘pratiloma frames’. These pratiloma frames can be used as a nadai bhedam frame or to practice any of the six developmental techniques of combinations anuloma-pratiloma.

Last but not least: the musician can choose the volume of the three parameters, depending on their preference of the moment.

Fig.2: Karnatic Metronome 2


a : b
pratiloma frames
gati 11 & 13
3 2
5 2
6 2
7 2
9 2
10 2
11 2
13 2
4 3
5 3
7 3
9 3
10 3
11 3
13 3
3 4
5 4
6 4
7 4
9 4
10 4
11 4
13 4
3 5
4 5
6 5
7 5
9 5
4 6
5 6
7 6
9 6
10 6
3 7
4 7
5 7
6 7
9 7
10 7
nadai
1
2
3
4
5
6
7
8
9
output levels
dsp status

gati 4 : jathi 5 nadai 4

2 "accents" (gati)

2 beats (jathi)

11 nested tuplet (nadai)

click on the ratios to activate them

nadai = jathi (nadai = off)

click on a number to add a nadai

metronome 1, running the last chosen frame only

metronome mark 47

Click on a pratiloma frame and start metronome 1 to run it or click on two frames and start metronome 2 to loop the two frames. A nadai can be added by clicking on a nadai number in the list. If nadai = 1, it means that nadai equals jathi, which is therefore switched off. There is always a 4 beat count in.
The output level of gati, jathi and nadai can be set individually.

☒ sound on/off

metronome 2, alternating between the two chosen frames

4 : 5 <==> 6 : 5

looped sequence of two frames.

n = 3

each frame to be repeated n times (minimum is 3).

APPENDIX 3: CD TRACKS & CREDITS

Karnatic examples

01	Solkattu syllables	1:07
02	Cells in chatusra	0:19
03	Cells in khanda	0:42
04	Cells in tisra	1:24
05	Cells in misra	2:51
06	3 versions phrase khanda	0:45
07	3 versions phrase misra	0:40
08	Gatis 4 beats	0:38
09	Gatis 1 beat	0:12
10	Random change of gatis	0:26
11	Tisra jathis 4, 5 7	0:47
12	Chatusra jathis 3, 5, 7	0:44
13	Khanda jathis 3, 4, 7	0:45
14	Misra jathis 3, 4, 5	0:41
15	Tisra (sextuplets) jat 4, 5, 7	0:48
16	Chat j 5 against chat j 7	0:44
17	Khanda j 3 against khanda j 4	0:16
18	Chat j 5 against tisra j 5	0:13
19	Khanda j 4 against misra j 4	0:11
20	Tisra j 4 against khanda j 3	0:16
21	Chat j 3 against misra j 5	0:19
22	Same gati, changing jathis	0:21
23	Same jathi, changing gatis	0:23
24	Gati Bhedam khanda jathi 3	0:20
25	Gati Bhedam chat jathi 7	0:35
26	Gati Bhedam Tisra jathi 5	0:20
27	Gathi bhedam misra jathi 4	0:21
28	Gati Bhedam in soram kattu 5/8	5:38
29	Tree of Gati Bhedam only matras	2:22
30	Tree GB with repeated cells	2:31
31	Original phrase chat for Rhythmical Sangati	0:06
32	Rhythmical Sangati khanda jathi 4	0:05
33	Rhythmical Sangati khanda flow	0:05
34	Rhythmical Sangati khanda j 3, 2matras at end	0:05
35	Rhythmical Sangati, khanda j 3, 2 matras begin	0:05
36	Rhythmical Sangati khanda j 3, adding notes	0:07
37	Mixing reg. chatusra & chat jat 5	0:21
38	Tree Gathi bhedam development w/ short motif	0:49
39	Jathi Bhedam chat 9 b.	0:10
40	Jathi Bhedam 1 note per cell	0:17

41	Jathi Bhedam 2 notes per cell	0:17
42	Jathi Bhedam 3 not per cell	0:17
43	Jathi Bhedam free phrasing	0:17
44	Jathi Bhedam tisra 12 b	0:16
45	Jathi Bhedam khanda 9 b	0:11
46	Sama mukthay original phrase	0:15
47	Sama mukthay, diff accents on orig phrase 1	0:15
48	Sama mukthay, diff accents on orig phrase 2	0:15
49	Sama mukthay, diff phrase on accents 1	0:15
50	Sama mukthay, diff phrase on accents 2	0:15
51	Sama mukthay, in khanda	0:15
52	Sama mukthay w/mini-mukthay overlapping	0:15
53	12 matras in tisra & chatusra	0:09
54	Anuloma-Pratiloma chart until 3rd speed	2:05
55	Anu-prat 1st dev tech in 14:3	0:28
56	Anu-prat 2nd dev tech in chatusr	1:13
57	Anu-prati 2nd dev tech in khanda	0:58
58	Anu-prat 2nd dev tech in misra	0:51
59	2nd anu chatusra no 4+4	0:24
60	2nd anu khanda no 5+5	0:24
61	Manju's solo 11 b w/ Anu-Prat	2:15
62	Method 3rd pratiloma	1:16
63	Method 2nd pratiloma	0:53
64	Method 2nd anul in 3rd prat	1:16
65	Same phrase khanda, diff speeds	1:08
66	Same phrase misra, diff speeds	1:03
67	Theme in 10 beats (Simhendra)	0:15
68	Rhyt sangati 5 times, 4 cycles	0:51
69	Rhyt sangati khanda 2nd anu, 5 times, 2 cycles	0:41
70	Pallavi Simhendra w/Rhyt sangatis	4:34
71	Rhyt sangatis 2 speeds	0:51
72	Rhyt sangatis 3 speeds	0:49
73	Theme only subha	0:19
74	Subhapantuvaraly khanda 2+1/2 times	0:31
75	Subha pallavi w/ rhyt sangatis	5:30
76	3 ragas pallavi only theme	0:37
77	3 ragas pallavi Rhyt sangatis on tisra w/ 2 speeds	1:09
78	3ragas theme & rhyth sangatis	6:20
79	Theme only Subha 2	0:19
80	Subha mixing gatis/speeds	1:01
81	3-fold mukthay type A	0:22
82	3-fold mukthay, type B1	0:17
83	3-fold mukthay type B2	0:19
84	3-fold mukthay type C	0:21

85	Strotovahayati adding at the end	0:11
86	Strotovahayati adding beggining	0:11
87	Strotovahayati adding middle	0:11
88	Gopuchayati drop at the end	0:11
89	Mridangamyati w/ viloma structure	0:21
90	Mridangamyati w/ palindromic structure	0:21
91	Damaruyati w/mukthay-like structure	0:21
92	Yati Mukthay type A 1	0:15
93	Yati Mukthay typ A 2	0:15
94	Yati Mukthay type A 3	0:15
95	Jahnavi's yati mukthay (krama-viloma-vakra)	0:27
96	Yati Mukthay type A 4	0:37
97	Yati Mukthay type A 5	0:37
98	Yati Mukthay type B1	0:13
99	Yati Mukthay type B 2	0:13
100	Yati Mukthay type B decreasing	0:13
101	Yati Mukthay type B 4	0:13
102	Yati Mukthay type B 5	0:13
103	Yati Mukthay type B 6	0:13
104	Yati Mukthay type C 1	0:06
105	Yati Mukthay type C 2	0:13
106	Yati Mukthay type C 3	0:09
107	Purvanga tirmana 9 beats	0:15
108	Uttarangas tirmana 9 beats	0:21
109	Tirmana tala 9 krama	0:18
110	Tirmana tala 9 krama-viloma-vakra	0:55
111	Tirmana tala 10 uttaranga tisra	0:21
112	Tirmana-mukthay tala 11 krama-viloma-vakra	0:45
113	Tirmana-mukthay tala 9 krama-viloma-vakra	0:37
114	Compound mukthay tala 6	0:13
115	Compound mukthay tala 5	0:11
116	Compound mukthay tala 7	0:15
117	Compound mukthay type 2 tala 7	0:15
118	Tirmana-Compound mukthay 1, tala 9	0:10
119	Tirmana-Compound mukthay 2, tala 10	0:11
120	Tirmana-Compound mukthay 3, tala 11 khanda	0:12
121	Tirmana-Compound mukthay 4, 25 beats	0:26
122	Sub-mukthay 39 matras	0:11
123	Yati prastara/a	0:25
124	Yati prastara/b	0:24
125	Yati prastara/c	0:25
126	Yati prastara/d	0:25
127	Yati prastara tala 10 krama-viloma-vakra repeat phrase	1:01
128	Yati prastara tala 10 krama-viloma-vakra develop phra	1:01

129	27/8 Yati prastara	1:22
130	Double Mukthay/a	0:25
131	Double Mukthay /b	0:32
132	Double Mukthay /c	0:33
133	Triple mukthay w/yati prastara	0:37
134	Triple mukthay w/ intertwined palas	0:50
135	Mukthay combination rupaka	0:37
136	Mukthay combination Simhendra	0:41
137	Mukthay combination very intertwined	1:37
138	Mukthay combination tala 10	1:51
139	Poruttam A all 3 blocks	2:12
140	Mohara 8 b. chat	0:21
141	Mohara 8 b. khanda	0:21
142	Mohara 11 b. chat	0:29
143	Mohara 14 b. chat	0:37
144	Mixed gati Mohara chat-tisra	0:42
145	MG Mohara chat-khanda	1:21
146	Process construction Nadai Bhedam frame	0:15
147	Nadai Bhedam with matras and phrase	0:20
148	Nadai Bhedam phrases 4:5, tisra nadai	0:11
149	Nadai Bhedam phrase 4:7, tisra nadai	0:15
150	Nadai Bhedam phrase 3:4, misra nadai	0:13
151	Nadai Bhedam phrase 3:5, misra nadai	0:16
152	Nadai Bhedam phrase 5:3, chatusra nadai	0:07
153	Nadai Bhedam phrase 5:7, chatusra nadai	0:15
154	Nadai Bhedam preparation gati becomes nadai	1:04
155	Nadai Bhedam with gati bhedam	0:06
156	Nadai Bhedam with jati bhedam	0:06
157	Nadai Bhedam with three frames of jati bhedam	0:16
158	Nadai Bhedam with yati phrase	0:06
159	Nadai Bhedam with short mukthay	0:06
160	Changing nadai: chat to misra	0:21
161	Changing jathi 4:3 to 4:7	0:21
162	Changing gati 4:5 to 6:5	0:21
163	Nadai Bhedam resolution with Gati Bhedam	0:14
164	Nadai Bhedam resolution Nadai to Gati	0:09
165	Nadai Bhedam sequence in tala 14	2:35
166	Polypulse 4:7 & tisra	0:29
167	Polypulse 4:7 & chatusra	0:29
168	Polypulse 3:5 & misra	0:16
169	Polypulse 3:5 & tisra	0:16
170	Polypulse 5:3 & chatusra	0:10
171	Polypulse 5:3 & khanda	0:10
172	Nadai bhedam in 3-fold mukthay	0:23

173	Mixed jathi Nadai Bhedam 3+4	1:00
174	Mixed jathi Nadai Bhedam 5+7	0:51
175	Mixed jathi Nadai Bhedam 5+6	0:23
176	Mixed jathi Nadai Bhedam 3+5	0:17
177	Mixed jathi Nadai Bhedam 5+7	0:25
178	Mixed jathi Nadai Bhedam 4+5	0:19
179	Combinations Anu-Prat dev tech 2 w/phrases	2:21
180	Combinations Anu-Prat dev tech 2, 4:5 mixed frames	0:31
181	Combinations Anu-Prat dev tech 2, 5:4 mixed frames	0:25
182	Combinations Anu-Prat dev tech 2, 3:7 mixed frames	0:43
183	Combinations Anu-Prat dev tech 2, 7:3 mixed frames	0:19
184	Combinations Anu-Prat dev tech 3 w/phrases	2:39
185	Combinations Anu-Prat dev tech 3, tis mixed frames	0:37
186	Combinations Anu-Prat dev tech 3 chatu mixed frames	0:37
187	Combinations Anu-Prat dev tech 3 kha mixed frames	0:46
188	Combinations Anu-Prat dev tech 3 mis mixed frames	1:13
189	Combinations Anu-Prat dev tech 4 w/phrases	1:36
190	Combinations Anu-Prat dev tech 5 w/phrases	0:54
191	Combinations Anu-Prat dev tech 6A (3 b.) w/phrases	2:05
192	Combinations Anu-Prat dev tech 6B (5 b.) w/phrases	1:34
193	Combinations Anu-Prat on Jati Bhedam tisra	0:15
194	Combinations Anu-Prat on Jati Bhedam chatusra	0:15
195	Combinations Anu-Prat on Jati Bhedam khanda	0:18
196	Combinations Anu-Prat on Jati Bhedam misra	0:18
197	Ravi's solo in Misra chapu	2:29
198	Combinations Anu-Prat 20:7 & 10:7	0:14
199	Combinations Anu-Prat 20:7. 15:7. 10:7, 5:7	0:34
200	Warm-up Combinations Anu-Prat C exercise 3 matr	1:37
201	Warm-up Combinations Anu-Prat C exercise 5 matra	2:20
202	Warm-up Combinations Anu-Prat C exercise 7 matra	2:44
203	Combinations Anu-Prat exersise C w/ 4:5	0:32
204	Systematic gati on tirmana frame 9 b	0:22
205	Systematic gati on tirmana/a	0:22
206	Systematic gati on tirmana /b	0:23
207	Systematic gati on tirmana /c	0:22
208	Systematic gati on tirmana frame 10b	0:24
209	Systematic gati on tirmana /d	0:25
210	Systematic gati on tirmana /e	0:25
211	Systematic gati on tirmana /f	0:25
212	Poruttam B in 27/8	2:02
213	Sankirna inner division 4+5	0:09
214	Sankirna inner division 5+4	0:09
215	Sankirna combining inner division	0:16
216	Sankirna complex phrase in 9:2	0:30

217	Gati 11/a	0:57
218	Gati 11/b	0:57
219	Gati 11/c	0:53
220	Gati 11/d	0:57
221	Complex phrase in 11:2	0:19
222	Gati 13/a	0:57
223	Gati 13/b	0:57
224	Complex phrase in 13:2	0:24
225	Shadanga 19 pattern 1	0:14
226	Shadanga 19 pattern 2	0:13
227	Shadanga 19 pattern 3	0:12
228	Soram kattu in Shadanga 19 b.	5:03
229	L. Shankar theme 4+3/16	0:29
230	L. Shankar 4+3/16 percussion duo	4:56
231	Shadanga 27 pattern	0:18
232	Shadanga 44 pattern	0:30
233	Kalavathi shadanga 44/16 pallavi	8:19
234	37 b. theme (Tala combination)	1:24
235	Shadanga 19 b. mukhy regroupings	1:12
236	19/8 1st regroup w/ khanda	0:29
237	19/8 2nd exercise w/ misra	0:29
238	19/8 3rd exercise w/ tisra	0:29
239	19/8 4th exercise w/ chat	0:29
240	19/8 5th exercise w/ misra	0:29
241	19/8 6th exercise w/ khanda	0:29
242	27/16 1st exercise w/ misra	0:15
243	27/16 2nd exercise w/ khanda	0:15
244	27/16 3rd exercise w/ tisra	0:15
245	27/16 4th exercise w/ chat	0:15
246	27/16 5th exercise w/ tisra	0:15
247	27/8 chat	0:21
248	27/8 khan	0:21
249	27/8 mohara A	1:22
250	27/8 mohara B	1:22
251	Phrasing through gati changes/a	0:17
252	phrasing through gati changes/b	0:25
253	phrasing through gati changes/c	0:39
254	Manju's solo 37 beats	7:08
255	Shivu & Manju duo 44/8	27:33
256	Phrasing through gati changes w/ only matras	0:13
257	Phrasing in gati changes: phrase	0:14

Contemporary and jazz examples

258	F. Zappa example 1	0:07
259	F. Zappa example 2	0:07
260	F. Zappa example 3	0:06
261	Dmaathen example 1	0:12
262	Dmaathen example 2	0:12
263	Castiglione example	0:20
264	Persephassa example 1	0:09
265	Persephassa example 2	0:19
266	Persephassa example 3	0:16
267	Ferneyhough phase 1	0:21
268	Ferneyhough phase 2	0:21
269	Ferneyhough phase 3	0:21
270	Ferneyhough phase 4	0:21
271	Ferneyhough phase 5	0:21
272	Ferneyhough phase 6	0:21
273	Dance of Maya	2:34
274	Boompetit	1:04
275	Sightseeing	1:25
276	Falling in between	1:03
277	Wildlife	1:41
278	Matter of time	1:20
279	Spiral	2:21
280	Three oceans	4:59
281	Accelerando	1:53

Students compositions

282	Andys Skordis	12:03
283	Hans Leeuw	10:09
284	Dolan Jones	15:01
285	Louis Aguirre (quintet)	8:10
286	Louis Aguirre (octet)	12:10

Most audio tracks have been recorded using a metronome as a reference point for the listener, utilising exclusively solkattu, and outside any musical context for better understanding of a concept or specific step of a technique. The majority of these tracks were recorded by percussionist B. C. Manjunath or myself at different points between 2009-2013. The sole exception to these sort of recordings are tracks 267-272 (Ferneyhough's Phases) that were recorded by Jos Zwaanenburg and myself.

There are however several audio tracks that have been recorded live or in studio and form part of a larger piece. I find important to provide information about these recordings.

-Track 28: CD ‘Bharatanatyam’, by Jahnavi Jayaprakash, released by the Italian CD label Stradivarius in 1999.

-Track 61: Percussion solo by B. C. Manjunath, recorded live at the Felix Meritis theater (Amsterdam, Netherlands) in April 2002.

-Track 70: Beginning of the *pallavi* of a ragam-tanam-pallavi piece in raga Simhendra Madhyama. Studio recording in Bangalore (India) in September 1995. Main artist is Jahnavi Jayaprakash

-Track 75: Beginning of the *pallavi* of a ragam-tanam-pallavi piece in raga Subhapantuvaraly. Live recording at the Reformist Church of Haarlem (Netherlands) in May 1997. Main artist is Jahnavi Jayaprakash. Released by VPRO classics.

-Track 80: Beginning of the *pallavi* of a ragam-tanam-pallavi piece constructed on a 3-raga theme using Todhi, Kalyani and Varaly ragas. Recorded live at the Felix Meritis theater (Amsterdam, Netherlands) in April 2002. Main artist is Jahnavi Jayaprakash.

-Track 95: Studio recording of a motif to be used in a project between karnatic musicians and the Amsterdam Percussion Group in April 2001 in Bangalore (India).

-Track 135: Studio recording of a piece for dance by Jahnavi Jayaprakash. January 2002, Bangalore (India).

-Track 136: Mukthay combination of the same recording as track 70.

-Track 197: Improvised solo by N. G. Ravi, recorded in his house during a lesson in March 1994.

-Track 228: Recording of a rehearsal for a piece for dance by Jahnavi Jayaprakash and B. C. Manjunath in December 2001.

-Tracks 229-230: Composition and percussion duo taken from the CD ‘Raga Aberi’ (1995) performed by L. Shankar (violin), Zakir Hussain (tablas) and Vikku Vinayakram (gatham).

-Track 233: Beginning of the *pallavi* of a ragam-tanam-pallavi piece in a tala of 44 beats by A. R. A. K. Sharma, sung by Kalavathy. Live recording at the Tropen Institute (Amsterdam, Netherlands) in May 2005

-Track 234: Theme of a *Mallari* in a tala of 37 beats by Jahnavi Jayaprakash. Recorded live in the Bimhuis (Amsterdam, Netherlands) in May 2001. Released by Karnatic Lab records in 2007 in the CD ‘Legacy’.

-Track 254: Percussion solo by B. C. Manjunath on the same piece as track 234.

-Track 255: Percussion duo between A. R. A. K. Sharma and B. C. Manjunath on the same piece as track 233.

-Track 273: ‘Dance of Maya’ by John McLaughlin. Released by Columbia Records in 1998.

-Track 274: 'Boompetit', by Anton Goudsmid. Released by Challenge Jazz/Challenge Records in 2004.

-Track 275: 'Sightseeing' by R. Ferrante and J. Haslip. Released by MCA Records in 1987.

-Track 276: 'Falling in between' by the group Toto. Released by Frontiers Records in 2006.

-Track 277: 'Wildlife' by the group Yellow Jackets. Released by HeadsUp International in 2008.

-Track 278: 'Matter of time' by Stormvogel. Released by Stab Records/Owme in 2011.

-Track 279: 'Spiral' by Miles Okazaki. Own release in 2006.

-Track 280: 'Three oceans' by Fabrizio Cassol (Aka Moon). Released by De Werf in 2002.

-Track 281: 'Accelerando' by Vijay Iyer. Released by ACT Music in 2012.

-Track 282: 'Sorry to interfere... anyone cares?' by Andys Skordis, recorded live at the Conservatorium van Amsterdam in June 2011.

-Track 283: 'Shape Shifting', by Hans Leeuw, recorded live at the Conservatorium van Amsterdam in June 2007.

-Track 284: 'It was stark... ... this just makes it starker' by Dolan Jones. Studio recording at the Conservatorium van Amsterdam in November 2012.

Track 285: 'Oshún Olodí' by Louis Aguirre. Studio recording at the Conservatorium van Amsterdam in April 2013.

-Track 286: 'Oru a Yemayá y Obba' by Louis Aguirre. Studio recording at the Conservatorium van Amsterdam in April 2013.

-Track 287: 'Toque a Oshún y Olokun' by Louis Aguirre. Studio recording at the Conservatorium van Amsterdam in April 2013.

APPENDIX 4: SOURCES OF INFORMATION

Classes

My main sources of information have been the classes that I took daily with Jahnavi Jayaprakash during the period 1993-1997 at her home in Bangalore, or when she came to Amsterdam to give seminars at the Conservatorium van Amsterdam (1998-2002). Besides these lessons, I also took many classes from the percussionists N.G. Ravi (1993-1997) and B. C. Manjunath (2002-2012). A few but very valuable sessions were held with percussionists A.R.A.K Sharma, Rajakeishari, Karaikkuddi Mani and Chander Shaker.

I also had the fortune of meeting Dr. Balamuralikrishna twice, which helped me to better understand his innovative ideas in the fields of tala prastara and how he conceived his mukhy system that has come to be the trigger for many new developments in karnatic music, as explained in chapter 27.

While staying in India I attended innumerable rehearsals and concerts, where I was always asked to analyse the content of the rhythmical as well as the melodic structures. Attending rehearsals, be it for concerts, dance programmes or operas, or to make recordings (in Bangalore or the Netherlands), was very inspiring: I was able to observe how the musicians were creating on the spot, and discussing developmental possibilities and a wide array of creative issues.

Literature references

Although my research has been essentially field research, I consider it important in the context of a PhD thesis to provide a sample of the literature available and which books have helped me to obtain a better understanding of the world of karnatic rhythm. However, it ultimately remains necessary to also explain why the majority of books that one can find in India, the West or via internet have been of no relevance to my research. I will start with the books that have certainly helped me to advance in my understanding of lessons, rehearsals and concerts, as well as in my contact with my teachers and other musicians:

-*Sangeetha Akshara Hridaya* (a new approach to tala calculations) by Vidwan S.R. Iyer (1988), revised version by R. Krishna Murty (2000). Published by Gaana Rasika Mandali Publications.

This book opened a big window to understanding the world of *Motta Kannaku*, as explained in chapters 21 to 25. The world of superimpositions and the importance of the common denominator as a guiding tool for performance and practice is exposed in this book with a certain amount of clarity, enough to made me wonder about the ideas exposed in it and enquire more of my main teachers. For reasons I will never understand, karnatic musicians are quite reluctant to provide information about this huge body of concepts to westerners (as students of mine, who obtained the information through my lessons, found out when they went to India). Fortunately, this book provides sufficient information on this issue, once one has been able to assimilate the 'jungle' of terms and the non-Cartesian mode of explanation that characterises karnatic musicians and academics.

-*Permutative Genius in Tala (-Prastara) in South Indian music* by Akella Mallikarjuna. Published by Telugu University Press, Hyderabad 1992.

This highly complex book (I needed to read it three times before I begun to really understand the implications and theories exposed in it), opened the path to comprehend the full potential of what Dr. Balamuralikrishna initiated in the 1960s: the construction of new talas with logic and a system, and how techniques that have been born and developed within the *tala* system explained in chapter 1 (*Suladi talas)* have been adapted to the new possibilities presented by the ideas conceived and developed by Dr. Balamuralikrishna (as explained in chapter 27).

-*The theory and practice of Mridangam* by Dharmala Ramamurty. Published by the author in 1973, revised in 1987, and with a final revision by his son Ramamurty Rao in 2001.

This book is the most 'practical' one that can be found in English. Although with many explanations addressed to *mridangists (mridangam* is the most important percussion instrument in South India) regarding fingering and other technical issues of the instrument, this book is a wealth of phrases in a variety of techniques described in the first twenty chapters. Notwithstanding the lack of theoretical explanation of any technique and that all phrases are written using karnatic notation at a very sophisticated level, once I managed to overcome these difficulties I found a fountain of phrases and an underlying logic, exposition of exceptions and combinations between techniques (as explained in chapters 16-19) that was certainly of great help. However, I should mention that unless one has the knowledge of how these techniques are constructed, the book would only provide the westerner with hundreds of phrases, without any background that can clarify the reasons behind the existence of any phrase or structure (besides the already mentioned difficulty of having to learn the karnatic notational system to a very high level).

-*Tala Sangraha* by B.M. Sundaram. Published by Percussive Arts Centre in 1987.

This book in a clever compilation of theoretical possibilities of *tala prastara* based on the premises invented and developed by Dr. Balamuralikrishna, as explained in chapter 27. It provides thousands of talas by working out combinations and permutations derived of the *mukhy* system (also explained in chapter 27). I doubt that many karnatic musicians would use this book for any practical purposes and for westerners it would be of no use unless one is familiarised with the whole system Dr. Balamuralikrishna produced between the 1960s and the 1990s. This information I only learnt in a more or less clear form in 2010, after more than 17 years of research and 14 of teaching.

These are the only four books I could find of real help, and only after struggling with many handicaps such as terminology, roundabout ways of explaining concepts and a lack of background information.

The following books provide some rather superficial comment on some of the techniques exposed in this text.

-*South Indian Music* (a six volume work) by Professor P. Sambamurty, published by The Indian Music Publishing House. The first edition (1947), has gone through multiple revisions and is considered the most important book on karnatic music covering the basics.

With chapters such as 'Music and Health' and similar matters not directly concerning the pure theory and practice of karnatic theory, this book is compulsory reading in all Music Universities in South India, possibly more because it was the first attempt to establish some written material on karnatic music than for its actual musical value. Dedicated mostly to ragas and a superficial explanation of forms, the author only very superficially mentions the topics covered in chapters 1-3 and chapter 11 of this text. For example, he refers several times to *mukthays* without offering any explanation regarding the many different types or providing any instructions as to how to construct one.

-*A rational approach to Manodharma Sangitam* by Dr. Radha Venkatachalam, published by Music Education Trust in 2001.

Manodharma means improvisation. Due to the importance of improvisation in karnatic music and the vast amount of rules of construction, proportionalities, and techniques that can and cannot be used in an improvised section, I found this book interesting in order to see how the rhythmical concepts are interwoven with other rules pertaining to a particular section of improvisation. Possibly is a great help for Indian (or western) students who start working on improvisation; however I think is merely anecdotal for the purposes of this text as it relates exclusively to the performance of karnatic music.

-*Euphony* by L. and Viji Subramanian. Published by Affiliated East-West Press Pvt Ltd in 1995.

A book in principle intended for westerners, it is slightly more clear in its explanation and use of language than any of the books mentioned so far. However, it fails to provide information beyond what the reader will find in chapters 1-3, 7 and 11 of this text and in a rather superficial way. The same holds true for the following selection of books and percussionists who have given master classes on karnatic rhythm:

-*Wheels within Wheels*, by Jacob Adler. Published by the author in 2011. The abstract to the book reads: 'Wheels within Wheels *is a method book that demonstrates tools for performing complex time proportions and ratio relationships in a clear and progressive format. Concepts from Carnatic rhythm theory are generalized and expressed in western notation to illustrate techniques for musicians exploring complex rhythms'.*

Jacob Adler is a former student of the programme at the Amsterdam Conservatoire, where he studied the introductory course called 'Advanced Rhythm' and one year of the main programme. This book is possibly the only one that provides information about chapters 7-9 and a glimpse of chapter 26, probably because of his contact with the course in Amsterdam (as he recognises on his web site). It constitutes a great handbook being full of all possible exercises for each specific technique, but provides only very basic theoretical information about the concepts, and nothing regarding their developmental possibilities or how to apply these practically or creatively to western pieces

-*The art of Solkattu: The spoken rhythmic language of Indian Carnatic music*, by Suresh Vaidyanathan and Darren Moore. This comprises a series of master classes (some fragments can be found on Youtube) that the authors decided to turn into a book. They cover the same material as 'Euphony' or Professor Sambamurty's six volume treatise, but with a great profusion of examples. However, the book does not go beyond information dealt with in chapters 1-3 of this text.

-*Carnatic Thalum Lessons* by Pete Lockett. This is a series of videos with practical information that does go beyond chapters 1-3 of this text.

Finally I would like to mention a few books that, as is the case in around 80% of books dedicated to Indian music, explain only the melodic aspect of this music system: a high percentage of these are dedicated solely to North Indian music, which as mentioned previously in the introduction, is a very different music system to karnatic music.

-*Ragapravahan*, by Dr. M.N. Dhandapam and D. Pattamal, published by Karnatic Music Book Centre (1991).

-*Ragam-Tanam-Pallavi (evolution, structure, exposition)*, by Dr. M.B. Vedavalli, published by MJR Publications in 1995.

-*Ragas of Tanjore*, by M. Hariharam and Gowry Kuppuswamy. Published by Caxton Publication Delhi in 1920, revised in 1988.

-*Intonation in North and South Indian music*, by Mark Levy. Published by Biblic Impex Printed Ltd in 1982, revised in 2005.

Recorded material

I would like to distinguish between two different sources. Firstly recordings of concerts and rehearsals not commercially available, that I made myself (live or in studio), as well as many selected recordings of live performances provided by Bhanu Prakash (son of my main teacher) and B.C. Manjunath; secondly commercial CDs and tapes (some of them without any credits except for the name of the main artist) acquired while in India.

Recordings not commercially available

-Studio recordings with Jahnavi Jayaprakash, Hemanth Kumar and Shri Hari, Bangalore, August 1995.

-Studio recordings with Jahnavi Jayaprakash, Rajakeishari, Shir Hari and Shridart, Bangalore, August 1997.

-Live recordings with Jahnavi Jayaprakash, Rajakeishari, Shir Hari and Hemanth Kumar at the Conservatorium van Amsterdam, April 1998.

-Live recordings with Jahnavi Jayaprakash, Rajakeishari, Gauri Chandar and Shridart at the Conservatorium van Amsterdam, January 2000.

-Studio recordings with Jahnavi Jayaprakash and B.C. Manjunath. Preparation of material for my piece 'Sranang Tongo', for the Amsterdam Percussion Group and these two karnatic musicians. Bangalore, December 2000.

-Live recordings with Jahnavi Jayaprakash and B.C. Manjunath, at the Bimhuis (Amsterdam, Netherlands, May 2001).

-Studio recording for the soundtrack of a Madras film (type of film completely unrelated to the 'Bollywood' trend), composed by Jahnavi Jayaprakash, for 8 singers, 4 violinists, 4 flutists, 4 nagaswaram players and 8 percussionists (possibly one of the most complex pieces of music I ever heard in my entire life). Madras, December 2001

-Live recording with Jahnavi Jayaprakash, B.C. Manjunath and Shridart with Turkish musicians at the Felix Meritis Theater (Amsterdam, Netherlands) in April 2002.

-Mp3 collection provided by Bhanu Prakash with a selection of what he would describe as 'the best of' with live performances of Dr. Balamuralikrishna, Mysore Brothers, T. S, Seshagopalan, B.N.S. Praveen, Hyederabad Brothers, Eandukkepeddala, Lalgudi Jayaram and D.K. Pattamal. This selection contains more than 100 examples.

-Mp3 compilation provided by B.C. Manjunath with a selection of pieces in the form called *ragam-tanam-pallavi* (considered the pinnacle of complexity in karnatic music; each piece lasts between 45-90 minutes). This compilation contains more than 40 examples.

-Compilation of mridagam, kanjeera and tavil solos and duos made by Bhanu Prakash, featuring solos between 1997-2005 by Palghat T.S. Mani Iyer, Sivaraman, Palghat R. Raghu, Karaikkuddi Mani, N.G. Ravi, Pravesh Tani and Trichy Sankaran.

-Video recording of a live concert by Karaikkuddi Mani (mridangam) and Harakrishna (kanjeera) in a temple in Madras (2001).

-Recording of a live concert by Kalavathy group with compositions by A.R.AK. Sharma and B.C. Manjunath at the Tropen Museum (Amsterdam, Netherlands, 2005).

Commercially available recordings

Here I would again like to distinguish on the one hand between recordings that have been a source of information as well as source of inspiration, and on the other hand a selection of CDs intended for a wider audience that have proved of no relevance to my research and teaching, but that should nonetheless be mentioned as they tend to represent around 80% of the available recordings in India and 95% in the West.

To the group of source of information belong the following recordings:

-'Bharatanatyam', by Jahnavi Jayaprakash, released by the Italian CD label Stradivarius in 1999.

-Live recording at the Reformist Church of Haarlem (Netherlands) in May 1997. Jahnavi Jayaprakash is the main artist. Released by VPRO classics.

- CD 'Legacy', released by Karnatic Lab records in 2007 on the 5th anniversary of Jahnavi Jayaprakash's death.

To the group of source of inspiration belong the following recordings:

-Latangi, by N. Ravikiran (Digital Work Station, 2000).

-Tape of a live recording by Mallikarjun Mansur. Label and year unknown.

-CD ‘Live Music Academy’ with T. S. Seshagopalan and Karaikkuddi Mani. (Madras 2003, Sony Music).

-Series of tapes by Trichy Sankaran featuring various percussion instruments recorded to a metronome. Recorded in Toronto (Canada) between 1993-95. Label unknown.

-CD by L. Shankar ‘Raga Aberi’ (ECM Records 1995).

-Tape of an LP by L. Subramanian. Label and year unknown.

-CD ‘Bhairavi’ by Nithyashree Mahadevan (Digital Work Station, 1999).

-CD ‘Ragam-tanam-pallavi in Saaveri’ by Alathur Brothers (Sony Music 2001).

-CD ‘Live at the Music Academy’ by Hyderabad Brothers (Madras, 1994, Sony Music).

-Tape of ‘Varnam Bhairavi’ by L. Subramanian, L. Shankar and Vidjanathavi (violin). Year and label unknown.

-CD ‘Live at the Music Academy’ by T.S. Seshagopalan (Madras, 1992, Sony Nad)

-CD ‘Live at the Music Academy’, by D. K. Pattamal (Madras, 1989, Sony Nad)

-CD ‘Kiravani’, by P. Unnikrishnanan (Digital Work Station, 1999)

-CD ‘Live at the Music Academy’ by Alathur Srinivasa Iyer, L.Subramanian and T.S. Mani Iyer (Madras, 2001, Sony Nad).

WIDER AUDIENCE RECORDINGS

In many cases, great musicians record CDs using what many reputed karnatic artists would call ‘light classical music’. They are either made up of short pieces in forms considered ‘popular’ (*tillanas, mallaris, gazelles, kirtanas*) or the material utilised is extremely simple and repetitious. For this category I selected a few CDs that I purchased because I had either attended concerts or heard recordings of great quality by these artists (to be rather disappointed after listening to them).

-CD ‘Layatharanga-Ananda’ (Polish label CM Records 2010), featuring great percussionists like A.R.A.K. Sharma, Ravichandra Kulur, Giridhar Udupa and Jaychandra Rao. Although this particular recording was personally a great disappointment to me, these musicians belong to the group of percussionists that are continuously exploring and expanding new talas and concepts (and I have heard live performances and other recordings by these musicians that have been truly inspiring).

-CD ‘Gana Madhurya’, featuring a great singer and composer named M.S. Sheela (Hamsadhwany Creations, 2002).

-CD ‘Classical vocal’, featuring another amazing singer called Sownya (Sony Nad, 2005).

-CD ‘On the banks of’, by Sangheet Sivakumar (Digital Work Station, 2001). He was a direct student of Dr. Balamuralikrishna and has released many live recordings with very innovative talas and rhythmical concepts.

-CD ‘Live at the Music Academy’, by Priya sisters (Madras 2007. Sony Nad). A rarity since this CD series of ‘Live at the Music Academy’ tends to be very selective and presents complex forms, talas and concepts.