Playing with Mysterious Time
Rhythm Exercises for Mastering Laya

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This book covers the first part of Laya Mastery for Indian vocal music students. The second part is covered in the companion book: *Interplay of Musical Notes and Time: Musical Pattern Exercises for Mastering Laya*.

Dedication

To *gaNESa,* the master of time and space

Sanskrit language transliteration guide

Italicized words in this book represent Sanskrit words. Given below is the list of commonly used vowels (10) and consonants (31).

a like "a" in "Roman" ***A*** like "a" in "far" ***i*** like "i" in "pin" ***I*** like "ea" in "peak" ***u*** like "u" in "pull"	***U*** like "u" in "rule" ***E*** like "ey" in "they" (without the off-glide) ***ai*** like "ai" in "aisle" ***O*** like "o" in "note" ***ou*** like "ow" in "now"
k like "k" in "sky" ***kh*** k with strong expulsion of breath ***g*** like "g" in "go" ***gh*** g with strong expulsion of breath ***ch*** like the second "ch" in "church" ***cch*** c with strong expulsion of breath ***j*** like "j" in "jam" ***jh*** j with a strong expulsion of breath ***T*** like "t" in "stop" with tongue curled further backward ***Th*** T with strong expulsion of breath ***D*** like "dd" in "odd" with tongue curled further backward ***Dh*** D with strong expulsion of breath ***N*** like "n" in "land" with tongue curled further backward ***t*** T with tongue starting just behind and touching upper teeth ***th*** t with strong expulsion of breath ***d*** D with tongue starting just behind and touching upper teeth ***dh*** d with a strong expulsion of breath ***n*** like "n" in "no" with tongue starting just behind and touching upper teeth	***p*** like "p" in "spin" ***ph*** p with strong expulsion of breath ***b*** like "b" in "ban" ***bh*** b with strong expulsion of breath ***m*** like "m" in "man" ***y*** like "y" in "yes" ***r*** like "r" in "drama" ***l*** like "l" in "lion" ***v*** or ***w*** like "w" in "we" ***S*** like "sh" in "shall" ***sh*** approach the roof of the palatal dome with tip of the tongue and expel breath ***s*** like "ss" "lesson" ***h*** like "h" in "hope"

Foreword

"Sruti mAtA laya pitA."
"*Sruti* is the mother and *laya* is the father (of music)."

Sruti and *laya* represent the fundamental aspects of music. These two beautiful Sanskrit words are rich in meaning and describe various aspects of music and musical experience.

Meanings of the word *Sruti*:

- The organ (ear); the power of hearing and deep listening
- That which is heard (through the ear)
- That which is perceived (through inner hearing - revelation)
- A division of the octave, a quarter tone or interval (in music)
- The sound produced by the drone instrument (tambura)
- The position of the fundamental musical note *sA* (e.g. western pitch G, A, B)
- Alignment of musical notes with the fundamental note
- Perfect alignment of musical notes (*Sruti-Suddham*)

Meanings of the word *laya*:

- Movement of time (in music)
- Graceful flow (of sound)
- Embrace - union of sound and time
- Pause; rest; tranquility
- Absorption of mind; deep concentration; devotion; dissolution (of self identity)

As you can see, mastery of both *Sruti* and *laya* are necessary to produce soothing soulful music. This book focuses on the pure rhythm exercises, the first step in mastering laya. No prior musical training is required for learning and mastering these exercises.

Enjoy the graceful dance of rhythmic sounds!

Blissfully yours,
Immaneni Ashok

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1 Introduction

1.1 Rhythmic cycle, beat, unit and gait

Rhythmic cycle (*tALa* as called in the South Indian classical tradition) is a repeating time structure whose duration is typically fixed during the execution of the composition. For example, a composition could be organized into 60 rhythmic cycles. If each cycle is 8 seconds, the total time is 480 seconds (8 minutes).

Each rhythmic cycle is divided into a set of **beats** with equal duration (typically). For example, consider a cycle of 8 beats, each beat taking 1 second. The duration of each cycle would be 8 seconds.

Each beat is further divided into **units** of equal duration. Each unit is associated with a specific sound and a musical note. For example, look at the notation for the popular rhyme:

S S	P P	D D	P -	M M	G G	R R	S -
twin kle	twin kle	li ttle	st ar	how I	won der	what you	a re
ta ri	ki Ta	ta ka	dhim -	ta ri	ki Ta	ta ka	dhim -

The cycle has 8 beats (marked with '|'). Each beat has two units. The first line specifies the musical notes and the second line specifies the corresponding sounds of the rhyme. The third line uses a different set of sounds made up of rhythmic syllables (with no meaning), which uses the same tune.

The number of units per beat defines the **gait**. If the beat duration is 1 second, then the unit duration for a gait of four is ¼; the unit duration for a gait of three is 1/3. If the cycle has 8 beats, then the total number of units per cycle is 32 for a gait of four and 24 for a gait of three. In this book we focus on the default gait of four.

1.2 Rhythmic cycle of eight (*Adi tALa*)

In this book we use the most common cycle, a cycle of eight beats of equal duration. This cycle is called *Adi tALa* in the South Indian classical tradition and is kept track with the hand as follows:

1. **Clap**
2. Little finger
3. Ring finger
4. Middle finger
5. **Clap**
6. Wave
7. **Clap**
8. Wave

1.3 Rhythmic patterns

A set of units is organized into patterns. For example, look at how a set of 8 units can be organized in four different ways:

1.	ta ka dhi mi	ta ka dhi mi	(4+4)
2.	ta dhin - ta	ta ka dhi -	(4+4)
3.	ta ki Ta	ta ka ta ki Ta	(3+5)
4.	ta - -	ta - dhin - ta	(3+5)

The first set is composed of two patterns of four units each [ta ka dhi mi]. The second set is also composed of two patterns of four units, but these are different from the one used in the first example. These patterns have gaps. In the pattern [ta dhin - ta] the third unit is a gap (represented by a '-'), whereas, in the pattern [ta ka dhi -] the fourth unit is a gap.

The third set is composed of a pattern of three units followed by a pattern of five units. The fourth example is also composed of three and five, however, these patterns have gaps. The pattern [ta - -] has gaps in the second and third positions. The pattern [ta - dhin - ta] has gaps in the second and fourth positions.

A **rhythmic pattern** is a set of units, each unit being either a syllable or a gap, with the exception of the first unit, which is always a syllable (that is emphasized).

1.3.1 Patterns of three

The first unit is always a syllable. The second unit has two options (syllable and gap) and the third unit also has two options. Mathematically, the total number of variations is 2 x 2 = 4. Here is the list of all the four variations:

1. ta ki Ta
2. ta dhi -
3. ta - ng
4. jham - -

1.3.2 Patterns of four

Mathematically, the total number of variations is 2 x 2 x 2 = 8. Here is the list of all the eight variations:

1. ta ka dhi mi
2. ta ka dhi -
3. ta lA - ng
4. ta dhi - -
5. tA - ki Ta
6. dhi - ta -
7. ta - - ng
8. jham - - -

1.3.3 Patterns of five

Mathematically, the total number of variations is 16. Here is the list of four variations:

1. ta dhin gi Na tom
2. ta ka dhin - ta
3. ta - dhin - ta
4. ta dhi - ta -

1.3.4 Patterns of six

Mathematically, the total number of variations is 32. Here is the list of four variations:

1. ta dhin - gi Na tom
2. ta dhin - dhin - ta
3. dhi - ta ri ki Ta
4. ta ri ki Ta ta ka

1.3.5 Patterns of seven

Mathematically, the total number of variations is 64. Here is the list of four variations:

1. ta - dhin - gi Na tom
2. ta - dhin - dhin - ta
3. ta ka dhin - dhin - ta
4. ta ri ki Ta ta ki Ta

1.3.6 Patterns of eight

Mathematically, the total number of variations is 128. Here is the list of eight variations:

1. ta ri ki Ta ta ka dhi mi
2. ta - ki Ta ta ka dhi mi
3. ta - dhi - ta dhin - ta
4. ta dhi - ta dhin gi Na tom
5. ta dhin - gi - Na - tom
6. ta - dhin - dhin - ta ka
7. ta - dhin - ta dhin - ta
8. ta ka dhin - ta dhin - ta

1.4 Practice Guidelines

1.4.1 Silver Level

Applies to students enrolled in the Flowering Intelligence Intermediate program.

- Chapters 2-3: Two speeds - 2/4 per beat with *tALa*.

1.4.2 Gold Level

Applies to students enrolled in the Flowering Intelligence Advanced, Musical Intelligence and all Carnatic Vocal programs.

- Chapters 2-3: Three speeds - 2/4/8 per beat with *tALa*.
- Chapters 2-3: Three speeds - 2/4/8 per beat with metronome @ **40** BPM.
- Chapters 4-5: One speed - four per beat with *tALa*.
- Chapters 4-5: One speed - four per beat with metronome @ **60** BPM.

2 Flow of Eights

2.1 Set A [4+4]

A1. [ta ri ki Ta] [ta ka dhi mi]

A2. [ta - ki Ta] [ta ka dhi mi]

A3. [ta la - ng] [ta ka dhi mi]

A4. [ta ka dhi -] [ta ka dhi mi]

A5. [ta dhi - -] [ta ka dhi mi]

A6. [ta - dhi -] [ta ka dhi mi]

A7. [ta - - ng] [ta ka dhi mi]

A8. [jham - - -] [ta ka dhi mi]

2.2 Set B [3+3+2]

B1. [ta ki Ta] [ta ki Ta] [ta -]

B2. [ta ki Ta] [ta ki Ta] [ta ka]

B3. [ta - ng] [ta - ng] [ta ka]

B4. [dhi nna -] [dhi nna -] [ta ka]

B5. [jham - -] [jham - -] [ta ka]

B6. [ta ki Ta] [ta - ng] [ta ka]

B7. [ta ki Ta] [dhi nna -] [ta ka]

B8. [ta ki Ta] [jham - -] [ta ka]

B9. [ta - ng] [ta ki Ta] [ta -]

B10. [dhi nna -] [ta ki Ta] [ta -]

B11. [jham - -] [ta ki Ta] [ta -]

B12. [jham - -] [ta ki Ta] [ta ka]

2.3 Set C [3+2+3]

C1. [ta ki Ta] [dhi -] [ta ki Ta]

C2. [ta - ng] [dhi -] [ta ki Ta]

C3. [ta ki Ta] [ta ka] [ta ki Ta]

C4. [ta - ng] [ta ka] [ta ki Ta]

C5. [dhi nna -] [ta ka] [ta ki Ta]

C6. [jham - -] [ta ka] [ta ki Ta]

2.4 Set D [2+3+3]

D1. [ta -] [dhin - ta] [dhin - ta]

D2. [ta ka] [dhin - ta] [dhin - ta]

D3. [dhi -] [ta ki Ta] [ta ki Ta]

D4. [ta ka] [ta ki Ta] [ta ki Ta]

D5. [dhi -] [ta ki Ta] [jham - -]

D6. [ta ka] [jham - -] [ta ki Ta]

2.5 Set E [3+5]

E1. [ta ki Ta] [ta dhin gi Na tom]

E2. [ta - ng] [ta dhin gi Na tom]

E3. [dhi nna -] [ta dhin gi Na tom]

E4. [jham - -] [ta dhin gi Na tom]

E5. [ta ki Ta] [dhin - dhin - ta]

E6. [ta ki Ta] [ta ka dhin - ta]

E7. [ta ki Ta] [ta dhi - ta -]

E8. [ta ki Ta] [ta dhin - gi Na]

2.6 Set F [2+6]

F1. [ta -] [ta ri ki Ta ta ka]

F2. [ta -] [ta dhin - gi Na tom]

F3. [ta ka] [ta dhin - gi Na tom]

F4. [ta ka] [dhin - dhin - ta ka]

2.7 Set G [8]

G1. [ta dhin - gi - Na - tom]

G2. [ta - dhin - dhin - dhin -]

G3. [ta ka dhin - dhin - dhin -]

3 Flow of Sixteens

3.1 Set H [4+4+4+4]

H1. [ta - ki Ta] [dhi - ki Ta] [ta ri ki Ta] [ta ka dhi mi]

H2. [ta - ki Ta] [dhi - ki Ta] [dhom - ki Ta] [nam - ki Ta]

H3. [ta - tta ri] [ki Ta ta ka] [dhi ra dhi ra] [ki Ta ta ka]

H4. [ta - tta ri] [ki Ta ta ka] [dhi - tta ri] [ki Ta ta ka]

H5. [dhi ra ki Ta] [dhi ra ki Ta] [jham - jham -] [ki Ta ta ka]

H6. [dhi ra ki Ta] [ki Ta ki Ta] [ta ri ki Ta] [ta ri ki Ta]

H7. [ta - tta -] [ki Ta ta ka] [dhi ra ki Ta] [dhi ra ki Ta]

H8. [ta la - ng] [ta ka dhi mi] [ta ka dhi mi] [ta ka dhi mi]

3.2 Set J [3+3+3+3+4]

J1. [ta ki Ta] [ta ki Ta] [ta ki Ta] [ta ki Ta] [ta ka dhi mi]

J2. [dhin - ta] [dhin - ta] [dhin - ta] [dhin - ta] [dhi ra ki Ta]

J3. [dhrn - ta] [dhrn - ta] [dhrn - ta] [dhrn - ta] [ta ka dhi mi]

J4. [ta Na ta] [dhi mi ta] [jha Nu ta] [dhi mi ta] [jham - - -]

J5. [ta - ng] [ta ki Ta] [ta - ng] [ta ki Ta] [jham - jham -]

J6. [dhi nna -] [ta ki Ta] [dhi nna -] [ta ki Ta] [jham - ta ri]

J7. [ta ri ta] [nam - -] [ta ri ta] [nam - -] [ta ka dhi mi]

J8. [ta - -] [dhi - -] [dhom - -] [nam - -] [ta ka dhi mi]

3.3 Set K [3+3+3+7]

K1. [ta ki Ta] [ta ki Ta] [ta ki Ta] [ta - dhin - gi Na tom]

K2. [ta ki Ta] [ta - ng] [ta ki Ta] [ta ka dhin - gi Na tom]

K3. [dhin - ta] [dhin - ta] [dhin - ta] [dhin - dhin - dhin - ta]

K4. [dhin - ta] [dhin - ta] [dhin - ta] [ta ka dhin - dhin - ta]

K5. [ta Na ta] [dhi mi ta] [jha Nu ta] [ta ka dhin - dhi mi ta]

K6. [ta - -] [dhi - -] [dhom - -] [nam - ta ri ta ki Ta]

3.4 Set L [3+3+4+6]

L1. [ta ki Ta] [ta ki Ta] [ta ri ki Ta] [ta ri ki Ta ta ka]

L2. [ta ki Ta] [ta ki Ta] [ta ri ki Ta] [ta dhin - gi Na tom]

L3. [ta ki Ta] [ta ki Ta] [ta - - -] [ta dhin - gi Na tom]

L4. [ta - -] [dhi - -] [ta - - -] [ta ri ki Ta ta ka]

L5. [dhin - ta] [dhin - ta] [dhi ra ki Ta] [ta - jham - jham -]

L6. [dhi mi ta] [dhi mi ta] [dhi ra ki Ta] [ta ka jham - jham -]

3.5 Set M [3+3+5+5]

M1. [ta ki Ta] [ta ki Ta] [ta ka dhi mi ta] [ta dhi gi Na tom]

M2. [ta ki Ta] [ta - -] [ta ka dhi mi ta] [ta dhi gi Na tom]

M3. [ta ki Ta] [ta ki Ta] [ta ka dhin - ta] [ta dhi gi Na tom]

M4. [ta ki Ta] [ta ki Ta] [ta - dhin - ta] [ta dhi gi Na tom]

M5. [ta ki Ta] [ta ki Ta] [ta - dhin - -] [ta dhi gi Na tom]

M6. [ta ki Ta] [ta ki Ta] [ta - - ta ka] [ta dhi gi Na tom]

M7. [ta ki Ta] [ta ki Ta] [dhi - - - -] [ta dhi gi Na tom]

M8. [ta - -] [ta ki Ta] [dhi - - - -] [ta dhi gi Na tom]

M9. [ta - -] [dhi - -] [dhom - - - -] [ta dhi gi Na tom]

3.6 Set N [3+5+4+4]

N1. [ta ki Ta] [ta - dhin - ta] [ta ri ki Ta] [jham - - -]

N2. [ta - -] [ta dhi gi Na tom] [dhi - ta ri] [jham - ta ri]

N3. [ta ki Ta] [dhi - - ta ri] [dhi ra ki Ta] [ta - - m]

N4. [ta ki Ta] [ta - - - -] [dhi ra ki Ta] [dhom - dhom -]

3.7 Set P [3+4+5+4]

P1. [ta ki Ta] [ta ka dhi mi] [ta dhi gi Na tom] [ta - - -]

P2. [ta ki Ta] [ta - dhi -] [ta dhi gi Na tom] [ta - - -]

P3. [ta ki Ta] [ta - - -] [ta dhi gi Na tom] [ta - - -]

P4. [ta - -] [ta ka dhi mi] [jham - - - -] [ta ka dhi mi]

3.8 Set Q [3+4+4+5]

Q1. [ta ki Ta] [ta ka dhi mi] [ta ka dhi mi] [ta dhi gi Na tom]

Q2. [ta ki Ta] [ta - - -] [ta ka dhi mi] [ta dhi gi Na tom]

Q3. [ta ki Ta] [ta ka dhi mi] [ta - - -] [ta dhi gi Na tom]

Q4. [ta - -] [ta ka dhi mi] [jham - - -] [ta dhi gi Na tom]

3.9 Set R [5+4+4+3]

R1. [ta dhi gi Na tom] [ta ka dhi mi] [ta ka dhi mi] [ta ki Ta]

R2. [ta dhi gi Na tom] [ta - - -] [ta ka dhi mi] [ta ki Ta]

R3. [ta dhi gi Na tom] [ta ka dhi mi] [ta - - -] [ta ki Ta]

R4. [ta - - - -] [ta ka dhi mi] [ta ka dhi mi] [ta ki Ta]

3.10 Set S [3+6+7]

S1. [ta ki Ta] [ta dhin - gi Na tom] [ta - dhin - gi Na tom]

S2. [ta ri Ta] [jham - - jham - -] [ta - dhin - gi Na tom]

S3. [ta ri Ta] [jham - - - - -] [ta - dhin - gi Na tom]

S4. [ta - -] [jham - - - - -] [ta ri ki Ta ta ki Ta]

3.11 Set T [3+4+9]

T1. [ta ki Ta] [ta ka dhi mi] [ta - dhi - ta dhi gi Na tom]

T2. [ta ki Ta] [ta ka dhi mi] [ta - dhin - gi - Na - tom]

T3. [ta - -] [ta ka dhi mi] [ta - dhin - gi - Na - tom]

T4. [ta ki Ta] [ta - - -] [ta - dhin - gi - Na - tom]

3.12 Set U [5+5+6]

U1. [ta - dhin - ta] [ta - dhin - ta] [ta dhin - gi Na tom]

U2. [ta dhi gi Na tom] [ta dhi gi Na tom] [ta dhin - gi Na tom]

U3. [ta - - - -] [ta dhi gi Na tom] [ta dhin - gi Na tom]

U4. [ta - - - -] [dhi - - - -] [ta dhin - gi Na tom]

3.13 Set V [7+9]

V1. [ta - dhin - gi Na tom] [ta - dhin - gi - Na - tom]

V2. [jham - - ta ka dhi mi] [ta - dhin - gi - Na - tom]

V3. [jham - - ta jham - -] [ta - dhin - gi - Na - tom]

V4. [ta - - - - - -] [ta - dhin - gi - Na - tom]

4 Rhythmic Designs (*kOrvais*) in *Adi tALa*

Note: Unless otherwise specified, practice in one speed - four units per beat.

4.1 Design #1

Design of 64 units (two cycles of *Adi tALa*: 2x32 = 64):

A:	8 + 8 + 8	(24)
B:	3 + 3 + 3 + 3 + 3	(15)
C:	2 + 2 + 2 + 2 + 2	(10)
D:	5 + 5 + 5	(15)

A: [ta ki Ta ta dhi gi Na tom] [ta ki Ta ta dhi gi Na tom]
[ta ki Ta ta dhi gi Na tom]

B: [ta - -] [dhi - -] [gi - -] [Na - -] [tom - -]

C: [ta -] [dhi -] [gi -] [Na -] [tom -]

D: [ta dhi gi Na tom] [ta dhi gi Na tom] [ta dhi gi Na tom]

4.2 Design #2

Design of 64 units (two cycles of *Adi tALa*: 2x32 = 64):

A:	6 + 8 + 10	(24)
B:	3 + 3 + 3 + 3 + 3	(15)
C:	2 + 2 + 2 + 2 + 2	(10)
D:	5 + 5 + 5	(15)

A: [ta ki Ta jham - -] [ta ka ta ki Ta jham - -]
[ta ga di ku ta ki Ta jham - -]

B: [ta - -] [dhi - -] [gi - -] [Na - -] [tom - -]

C: [ta -] [dhi -] [gi -] [Na -] [tom -]

D: [ta dhi gi Na tom] [ta dhi gi Na tom] [ta dhi gi Na tom]

4.3 Design #3

Design of 64 units (two cycles of *Adi tALa*: 2x32 = 64):

A:	4 + 4 + 4 + 4 + 4	(20)
B:	3 + 3 + 3 + 3 + 3	(15)
C:	2 + 2 + 2 + 2 + 2	(10)
D:	5 + 2 + 5 + 2 + 5	(19)

A: [ta - - -] [dhi - - -] [gi - - -] [Na - - -] [tom - - -]

B: [ta - -] [dhi - -] [gi - -] [Na - -] [tom - -]

C: [ta -] [dhi -] [gi -] [Na -] [tom -]

D: [ta dhi gi Na tom] [ta -] [ta dhi gi Na tom] [ta -] [ta dhi gi Na tom]

4.4 Design #4

Design of 64 units (two cycles of *Adi tALa*: 2x32 = 64):

A:	5 + 5 + 5 + 5 + 5	(25)
B:	4 + 4 + 4 + 4 + 4	(20)
C:	5 + 2 + 5 + 2 + 5	(19)

A: [ta - - - -] [dhi - - - -] [gi - - - -] [Na - - - -] [tom - - - -]

B: [ta - - -] [dhi - - -] [gi - - -] [Na - - -] [tom - - -]

C: [ta dhi gi Na tom] [ta -] [ta dhi gi Na tom] [ta -] [ta dhi gi Na tom]

4.5 Design #5

Design of 64 units (two cycles of *Adi tALa*: 2x32 = 64):

A:	5 + 5 + 5 + 5 + 5	(25)
B:	3 + 3 + 3 + 3 + 3	(15)
C:	8 + 8 + 8	(24)

A: [ta - - - -] [dhi - - - -] [gi - - - -] [Na - - - -] [tom - - - -]

B: [ta - -] [dhi - -] [gi - -] [Na - -] [tom - -]

C: [ta dhi - ta dhi gi Na tom] [ta dhi - ta dhi gi Na tom]
[ta dhi - ta dhi gi Na tom]

4.6 Design #6

Design of 96 units (three cycles of *Adi tALa*: 3x32 = 96):

A:	6 + 8 + 10	(24)
B:	4 + 4 + 4 + 4 + 4	(20)
C:	3 + 3 + 3 + 3 + 3	(15)
D:	2 + 2 + 2 + 2 + 2	(10)
E:	9 + 9 + 9	(27)

A: [ta ki Ta jham - -] [ta ka ta ki Ta jham - -]
[ta ga di ku ta ki Ta jham - -]

B: [ta - - -] [dhi - - -] [gi - - -] [Na - - -] [tom - - -]

C: [ta - -] [dhi - -] [gi - -] [Na - -] [tom - -]

D: [ta -] [dhi -] [gi -] [Na -] [tom -]

E: [ta - dhi - ta dhi gi Na tom] [ta - dhi - ta dhi gi Na tom]
[ta - dhi - ta dhi gi Na tom]

4.7 Design #7

Design of 96 units (three cycles of *Adi tALa*: 3x32 = 96):

A:	5 + 5 + 5 + 5 + 5	(25)
B:	4 + 4 + 4 + 4 + 4	(20)
C:	3 + 3 + 3 + 3 + 3	(15)
D:	2 + 2 + 2 + 2 + 2	(10)
E:	6 + 4 + 6 + 4 + 6	(26)

A: [ta - - - - -] [dhi - - - - -] [gi - - - - -] [Na - - - - -] [tom - - - - -]

B: [ta - - - -] [dhi - - - -] [gi - - - -] [Na - - - -] [tom - - - -]

C: [ta - - -] [dhi - - -] [gi - - -] [Na - - -] [tom - - -]

D: [ta - -] [dhi - -] [gi - -] [Na - -] [tom - -]

E: [ta dhin - gi Na tom] [ta - - - -]
[ta dhin - gi Na tom] [ta - - - -]
[ta dhin - gi Na tom]

4.8 Design #8

Design of 96 units (three cycles of *Adi tALa*: 3x32 = 96):

A:	6 + 6 + 6 + 4 + 4	(26)
B:	6 + 6 + 6 + 4 + 4	(26)
C:	6 + 6 + 6 + 4 + 4	(26)
D:	6 + 6 + 6	(18)

A/B/C: [ta dhin - gi Na tom] [ta dhin - gi Na tom]
[ta dhin - gi Na tom] [ta ta ta - -] [ta ta ta - -]

D: [ta dhin - gi Na tom] [ta dhin - gi Na tom] [ta dhin - gi Na tom]

4.9 Design #9

Design of 96 units (three cycles of *Adi tALa*: 3x32 = 96):

A:	6 + 6 + 6 + 4	(22)
B:	6 + 6 + 6 + 4	(22)
C:	6 + 6 + 6 + 4	(22)
D:	10 + 10 + 10	(30)

A/B/C: [ta dhin - gi Na tom] [ta dhin - gi Na tom]
[ta dhin - gi Na tom] [ta ta ta -]

D: [ta - dhin - ta ta dhi gi Na tom]
[ta - dhin - ta ta dhi gi Na tom]
[ta - dhin - ta ta dhi gi Na tom]

4.10 Design #10

Design of 96 units (three cycles of *Adi tALa*: 3x32 = 96):

A:	5 + 5 + 5 + 4	(19)
B:	6 + 6 + 6 + 4	(22)
C:	7 + 7 + 7 + 4	(25)
D:	10 + 10 + 10	(30)

A: [ta dhi gi Na tom] [ta dhi gi Na tom]
[ta dhi gi Na tom] [ta ta ta -]

B: [ta dhin - gi Na tom] [ta dhin - gi Na tom]
[ta dhin - gi Na tom] [ta ta ta -]

C: [ta - dhin - gi Na tom] [ta - dhin - gi Na tom]
[ta - dhin - gi Na tom] [ta ta ta -]

D: [ta - - dhi - ta dhi gi Na tom]
[ta - - dhi - ta dhi gi Na tom]
[ta - - dhi - ta dhi gi Na tom]

4.11 Design #11

Design of 96 units (three cycles of *Adi tALa*: 3x32 = 96):

A:	7 + 7 + 7 + 4	(25)
B:	6 + 6 + 6 + 4	(22)
C:	5 + 5 + 5 + 4	(19)
D:	10 + 10 + 10	(30)

A: [ta - dhin - gi Na tom] [ta - dhin - gi Na tom]
[ta - dhin - gi Na tom] [ta ta ta -]

B: [ta dhin - gi Na tom] [ta dhin - gi Na tom]
[ta dhin - gi Na tom] [ta ta ta -]

D: [ta dhi gi Na tom] [ta dhi gi Na tom]
[ta dhi gi Na tom] [ta ta ta -]

D: [ta - dhin - ta ta dhi gi Na tom]
[ta - dhin - ta ta dhi gi Na tom]
[ta - dhin - ta ta dhi gi Na tom]

4.12 Design #12

Design of 128 units (four cycles of *Adi tALa*: 4x32 = 128):

A:	8 + 8 + 8 + 8	(32)
B:	8 + 8 + 8 + 8	(32)
C:	8 + 8	(16)
D:	8 + 8	(16)
E:	8 + 4 + 8 + 4 + 8	(32)

A/B: [dhrn - ta dhin - ta ki Ta] [dhrn - ta dhin - ta ki Ta]
[dhrn - ta dhin - ta ki Ta] [dhi ra ki Ta jham - - -]

C/D: [dhrn - ta dhin - ta ki Ta] [dhi ra ki Ta jham - - -]

E: [dhrn - ta dhin - ta ki Ta] [jham - - -]
[dhrn - ta dhin - ta ki Ta] [jham - - -]
[dhrn - ta dhin - ta ki Ta]

4.13 Design #13

Design of 192 units (six cycles of *Adi tALa*: 6x32 = 192):

A:	16 + 16 + 16 + 8 + 8	(64)
B:	16 + 16 + 16 + 8	(56)
C:	16 + 8	(24)
D:	16	(16)
E:	8 + 4 + 8 + 4 + 8	(32)

A: [Ta - dhom - ki Ta ta ka] [ta ka ta ri ki Ta ta ka]
[ta lang - dhom ki Ta ta ka] [ta ka ta ri ki Ta ta ka]
[Ta - dhom - ki Ta ta ka] [ta ka ta ri ki Ta ta ka]
[ta lang - ka dhom - ka -] [ta lang - ka dhom - - -]

B: [Ta - dhom - ki Ta ta ka] [ta ka ta ri ki Ta ta ka]
[ta lang - dhom ki Ta ta ka] [ta ka ta ri ki Ta ta ka]
[Ta - dhom - ki Ta ta ka] [ta ka ta ri ki Ta ta ka]
[ta lang - ka dhom - - -]

C: [Ta - dhom - ki Ta ta ka] [ta ka ta ri ki Ta ta ka]
[ta lang - ka dhom - - -]

D: [Ta - dhom - ki Ta ta ka] [ta ka ta ri ki Ta ta ka]

E: [ta lang - ka dhom - ka -] [ta - - m]
[ta lang - ka dhom - ka -] [ta - - m]
[ta lang - ka dhom - ka -]

4.14 Design #14

Design of 128 units (four cycles of *Adi tALa*: 4x32 = 128):

A:	8 + 8 + 8 + 8	(32)
B:	8 + 8 + 8 + 8	(32)
C:	8 + 8	(16)
D:	8 + 8	(16)
E:	8 + 4 + 8 + 4 + 8	(32)

Note: The boxed numbers (8) are rendered in double the default speed (eight per beat), hence use double the number of rhythmic syllables.

A/B: [ta - tta - ki Ta ta ka] [ta - tta - ki Ta ta ka]
[ta - tta - ki Ta ta ka]
[ki Ta tom - - - ki Ta tom - - - ta ri ki Ta]

C/D: [ta - tta - ki Ta ta ka]
[ki Ta tom - - - ki Ta tom - - - ta ri ki Ta]

E: [ta - tta - ki Ta ta ka] [ta - - m]
[ta - tta - ki Ta ta ka] [ta - - m]
[ta - tta - ki Ta ta ka]

4.15 Design #15

Design of 128 units (four cycles of *Adi tALa*: 4x32 = 128):

A:	8 + 8 + 8 + 8	(32)
B:	8 + 8 + 8 + 8	(32)
C:	8 + 8	(16)
D:	8 + 8	(16)
E:	8 + 4 + 8 + 4 + 8	(32)

Note: The boxed numbers (8) are rendered in double the default speed (eight per beat), hence use double the number of rhythmic syllables.

A/B: [ta la - ng ta ka dhi mi] [ta la - ng ta ka dhi mi]
[ta la - ng ta ka dhi mi]
[dhi ra ki Ta dhom - - - dhi ra ki Ta dhom - - -]

C/D: [ta la - ng ta ka dhi mi]
[dhi ra ki Ta dhom - - - dhi ra ki Ta dhom - - -]

E: [ta la - ng ta ka dhi mi] [ta - - m]
[ta la - ng ta ka dhi mi] [ta - - m]
[ta la - ng ta ka dhi mi]

4.16 Design #16

Design of 128 units (four cycles of *Adi tALa*: 4x32 = 128):

A:	3+3+[2] 3+3+[2] 3+3+[2] [4]+4	(32)
B:	3+3+[2] 3+3+[2] 3+3+[2] [4]+4	(32)
C:	3+3+[2] [4]+4	(16)
D:	3+3+[2] [4]+4	(16)
E:	3+3+[2] + 4 + 3+3+[2] + 4 + 3+3+[2]	(32)

Note: The boxed numbers ([4]) are rendered in double the default speed (eight per beat), hence use double the number of rhythmic syllables.

A/B: [dhi nna -] [dhi nna -] [ta ri ki Ta]
[dhi nna -] [dhi nna -] [ta ri ki Ta]
[dhi nna -] [dhi nna -] [ta ri ki Ta]
[dhi - tta ri ki Ta ta ka] [ta - - m]

C/D: [dhi nna -] [dhi nna -] [ta ri ki Ta]
[dhi - tta ri ki Ta ta ka] [ta - - m]

E: [dhi nna -] [dhi nna -] [ta ri ki Ta] [ta - - m]
[dhi nna -] [dhi nna -] [ta ri ki Ta] [ta - - m]
[dhi nna -] [dhi nna -] [ta ri ki Ta]

5 Sigma-Pi Designs

5.1 Sigma-Pi Notation

If A represents an active pattern that starts and ends with a syllable, and B represents a gap (all silent except for the first syllable), then

- Sigma (A.B) = [A] [B] [A] [B] [A] [B] Total #units = 3A + 3B
- Pi (A.B) = [A] [B] [A] [B] [A] Total #units = 3A + 2B

Notes:
- A must be at least of length two.
- If B is of length one, then B represents a gap of one unit (no syllable).
- If B is of length zero, then Sigma (A.0) is same as Pi (A.0).

Sigma-Pi Design #1 = Sigma (A.B) + Pi (C.D)

Sigma-Pi Design #2 = Sigma (A.B) + Sigma (C.D) + Pi (E.F)

5.2 Sigma-Pi Designs for 32 units (*Adi tALa* - one cycle)

5.2.1 Pi (8.4)

[ta dhi - ta dhi gi Na tom] [ta - - -]
[ta dhi - ta dhi gi Na tom] [ta - - -]
[ta dhi - ta dhi gi Na tom]

5.2.2 Pi (6.7)

[ta dhin - gi Na tom] [ta - - - - - -]
[ta dhin - gi Na tom] [ta - - - - - -]
[ta dhin - gi Na tom]

5.2.3 Sigma (5.0) + Pi (5.1)

[ta - dhin - ta] [ta - dhin - ta] [ta - dhin - ta]
[ta dhi gi Na tom] [-] [ta dhi gi Na tom] [-] [ta dhi gi Na tom]

5.2.4 Sigma (3.2) + Pi (5.1)

[ta ki Ta] [ta -] [ta ki Ta] [ta -] [ta ki Ta] [ta -]
[ta dhi gi Na tom] [-] [ta dhi gi Na tom] [-] [ta dhi gi Na tom]

5.2.5 Sigma (4.0) + Pi (6.1)

[ta dhin - ta] [ta dhin - ta] [ta dhin - ta]
[ta dhin - gi Na tom] [-] [ta dhin - gi Na tom] [-]
[ta dhin - gi Na tom]

5.2.6 Sigma (3.0) + Pi (7.1)

[ta ki Ta] [ta ki Ta] [ta ki Ta]
[ta - dhin - gi Na tom] [-] [ta - dhin - gi Na tom] [-]
[ta - dhin - gi Na tom]

5.3 Sigma-Pi Designs for 48 units (*Adi tALa* - one-and-half cycles)

Note: These designs fit into four cycles of *rUpaka tALa* (three beats - clap, clap and wave).

5.3.1 Sigma (5.3) + Pi (6.3)

[ta dhi gi Na tom] [ta - -] [ta dhi gi Na tom] [ta - -]
[ta dhi gi Na tom] [ta - -]
[ta dhin - gi Na tom] [ta - -] [ta dhin - gi Na tom] [ta - -]
[ta dhin - gi Na tom]

5.3.2 Sigma (6.2) + Pi (8.0)

[ta dhin - gi Na tom] [ta -] [ta dhin - gi Na tom] [ta -]
[ta dhin - gi Na tom] [ta -]
[ta dhin - gi - Na - tom] [ta dhin - gi - Na - tom]
[ta dhin - gi - Na - tom]

5.3.3 Sigma (5.2) + Pi (7.3)

[ta dhi gi Na tom] [ta -] [ta dhi gi Na tom] [ta -]
[ta dhi gi Na tom] [ta -]
[ta - dhin - gi Na tom] [ta - -] [ta - dhin - gi Na tom] [ta - -]
[ta - dhin - gi Na tom]

5.3.4 Sigma (4.3) + Pi (9.0)

[ta ri ki Ta] [ta - -] [ta ri ki Ta] [ta - -] [ta ri ki Ta] [ta - -]
[ta - dhi - ta dhi gi Na tom] [ta - dhi - ta dhi gi Na tom]
[ta - dhi - ta dhi gi Na tom]

5.3.5 Sigma (3.4) + Pi (5.6)

[ta ki Ta] [ta - - -] [ta ki Ta] [ta - - -] [ta ki Ta] [ta - - -]
[ta dhi gi Na tom] [ta - - - - -] [ta dhi gi Na tom] [ta - - - - -]
[ta dhi gi Na tom]

5.3.6 Sigma (6.3) + Pi (7.0)

[ta dhin - gi Na tom] [ta - -] [ta dhin - gi Na tom] [ta - -]
[ta dhin - gi Na tom] [ta - -]
[ta - dhin - gi Na tom] [ta - dhin - gi Na tom]
[ta - dhin - gi Na tom]

5.3.7 Sigma (5.4) + Pi (5.3)

[ta dhi gi Na tom] [ta - - -] [ta dhi gi Na tom] [ta - - -]
[ta dhi gi Na tom] [ta - - -]
[ta dhi gi Na tom] [ta - -] [ta dhi gi Na tom] [ta - -]
[ta dhi gi Na tom]

5.3.8 Sigma (4.5) + Pi (3.6)

[ta ri ki Ta] [ta - - - -] [ta ri ki Ta] [ta - - - -]
[ta ri ki Ta] [ta - - - -]
[ta ki Ta] [ta - - - - -] [ta ki Ta] [ta - - - - -] [ta ki Ta]

5.3.9 Sigma (5.5) + Pi (6.0)

[ta dhi gi Na tom] [ta - - - -] [ta dhi gi Na tom] [ta - - - -]
[ta dhi gi Na tom] [ta - - - -]
[ta dhin - gi Na tom] [ta dhin - gi Na tom] [ta dhin - gi Na tom]

5.3.10 Sigma (6.5) + Pi (5.0)

[ta dhin - gi Na tom] [ta - - - -] [ta dhin - gi Na tom] [ta - - - -]
[ta dhin - gi Na tom] [ta - - - -]
[ta dhi gi Na tom] [ta dhi gi Na tom] [ta dhi gi Na tom]

5.3.11 Sigma (7.4) + Pi (5.0)

[ta - dhin - gi Na tom] [ta - - -] [ta - dhin - gi Na tom] [ta - - -]
[ta - dhin - gi Na tom] [ta - - -]
[ta dhi gi Na tom] [ta dhi gi Na tom] [ta dhi gi Na tom]

5.3.12 Sigma (8.3) + Pi (5.0)

[ta dhi - ta dhi gi Na tom] [ta - -]
[ta dhi - ta dhi gi Na tom] [ta - -]
[ta dhi - ta dhi gi Na tom] [ta - -]
[ta dhi gi Na tom] [ta dhi gi Na tom] [ta dhi gi Na tom]

5.4 Sigma-Pi Designs for 64 units (*Adi tALa* - two cycles)

5.4.1 Sigma (7.4) + Pi (5.8)

[ta - dhin - gi Na tom] [ta - - -] [ta - dhin - gi Na tom] [ta - - -]
[ta - dhin - gi Na tom] [ta - - -]
[ta dhi gi Na tom] [ta - - - dhi - - -]
[ta dhi gi Na tom] [ta - - - dhi - - -]
[ta dhi gi Na tom]

5.4.2 Sigma (6.5) + Pi (9.2)

[ta dhin - gi Na tom] [ta - - - -] [ta dhin - gi Na tom] [ta - - - -]
[ta dhin - gi Na tom] [ta - - - -]
[ta - dhi - ta dhi gi Na tom] [ta -]
[ta - dhi - ta dhi gi Na tom] [ta -]
[ta - dhi - ta dhi gi Na tom]

5.4.3 Sigma (8.3) + Pi (7.5)

[ta dhi - ta dhi gi Na tom] [ta - -]
[ta dhi - ta dhi gi Na tom] [ta - -]
[ta dhi - ta dhi gi Na tom] [ta - -]
[ta - dhin - gi Na tom] [ta - - - -]
[ta - dhin - gi Na tom] [ta - - - -]
[ta - dhin - gi Na tom]

5.4.4 Sigma (7.6) + Pi (5.5)

[ta - dhin - gi Na tom] [ta - - - - - -]
[ta - dhin - gi Na tom] [ta - - - - - -]
[ta - dhin - gi Na tom] [ta - - - - - -]
[ta dhi gi Na tom] [ta - - - - -]
[ta dhi gi Na tom] [ta - - - - -]
[ta dhi gi Na tom]

5.4.5 Sigma (3.3) + Sigma (4.3) + Pi (7.2)

[ta ki Ta] [ta - - -] [ta ki Ta] [ta - - -] [ta ki Ta] [ta - - -]
[ta ri ki Ta] [ta - - -] [ta ri ki Ta] [ta - - -] [ta ri ki Ta] [ta - - -]
[ta - dhin - gi Na tom] [ta - -]
[ta - dhin - gi Na tom] [ta - -]
[ta - dhin - gi Na tom]

5.4.6 Sigma (3.4) + Sigma (4.4) + Pi (5.2)

[ta ki Ta] [ta - - - -] [ta ki Ta] [ta - - - -] [ta ki Ta] [ta - - - -]
[ta ri ki Ta] [ta - - - -] [ta ri ki Ta] [ta - - - -] [ta ri ki Ta] [ta - - - -]
[ta dhi gi Na tom] [ta - -] [ta dhi gi Na tom] [ta - -]
[ta dhi gi Na tom]