

Rhy

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# Contents

<b>Introduction</b>	<b>vii</b>
<b>1</b>	<b>1</b>
1.1 . . . . .	1
1.2 . . . . .	2
1.3 . . . . .	9
1.4 . . . . .	18
<b>2</b>	<b>25</b>
2.1 . . . . .	25
2.2 . . . . .	27
2.3 . . . . .	32
2.4 . . . . .	40
<b>3</b>	<b>47</b>
3.1 . . . . .	47
3.2 . . . . .	48
3.3 . . . . .	51
3.4 . . . . .	59

<b>4</b>	<b>63</b>
4.1 . . . . .	63
4.2 . . . . .	65
4.3 . . . . .	69
4.4 . . . . .	83
<b>5</b>	<b>85</b>
5.1 . . . . .	85
5.2 . . . . .	87
5.3 . . . . .	95
5.4 . . . . .	103
<b>6</b>	<b>107</b>
6.1 . . . . .	107
6.2 . . . . .	110
6.3 . . . . .	112
6.4 . . . . .	122
<b>7</b>	<b>125</b>
7.1 . . . . .	125
7.2 . . . . .	128
7.3 . . . . .	134
7.4 . . . . .	141
<b>8</b>	<b>147</b>
8.1 . . . . .	147



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8.2 . . . . . 151

8.3 . . . . . 157

8.4 . . . . . 166



# Introduction

For about 40 years Ed Harkins taught a graduate-level seminar at the University of California, San Diego, that he called “advanced rhythm reading.” This book is a collection of exercises Ed wrote and used in these classes. The classes would consist of Ed writing an exercise on a whiteboard (sometimes stopping to enjoy the fumes from his dry-erase markers) and/or, later, projecting one from his computer. The class would then try to clap, tap, or vocalize the rhythm, almost always with uneven results. As time permitted we would copy some of them down in our notebooks and practice them between classes.

Although on the surface these exercises would seem to be primarily useful to performers who might be called on to perform rhythmically complex music, they also show many inventive ways notation can be bent to communicate rhythmic ideas that will be of use to composers. Many of the rhythmic ideas themselves might inspire ideas in composers (Ed himself studied composition). They often carry fascinating implications about rhythmic perception. Ed’s classes were followed by musicians and music scholars of all kinds.

The 500-ish students who have taken Ed’s seminar over the years (and, probably, some of the thousands of undergraduate students in his musicianship classes) will know what to do with these exercises, but other readers might need some explanations. To somewhat oversimplify, the exercises both demonstrate and encourage musicians to develop many different ideas and strategies for analyzing and performing difficult rhythms. These ideas and strategies come with shorthand names such as **Nudged Rats** and **BAMO**. These are used as tags in this collection and are collected as an index in the back matter. (You might picture a seedy-looking man in an ice cream truck saying, “You want the regular **Noodgie** or the **Noodgie w/ Rats**?)

Where possible and appropriate, each tag can be traced back to a defining exercise with a description of the tag’s meaning. Some of the tags apply to many of the exercises, and in these cases the index can be used to find all the others. (If you are reading this on a screen this is supported with links.)

This book’s title, “Rhy” is another shorthand, which Ed pronounces as “rye” or “wry”. It appears in the captions for two exercises in chapter 3 as “Easy Rhy, Hard Pi”.

There are sound recordings of many of the exercises, which you can download separately, or, if you have downloaded them together with a PDF, or if you are reading this on a web browser, should be playable as additional links marked “play audio”.

## Example: seven against five in gory detail

To illustrate Ed’s teaching approach, suppose we want to perform seven events in the time of five beats. (If this would be too easy for you, imagine doing this on an *accelerando*, or against dotted quarters, or further subdividing the middle three events, or whatnot. It is hard to imagine being so good at 7:5 that this is never worth revisiting.)

To start with, we pull out what is probably the most frequently used concept in the book: the **HAMn** (pronounced “ham”), an acronym for Harkins’ Alignment MNemonic. This is a sequence of numbers that count how many (equally-spaced) events should fall on or after each of the five beats. If there are, for instance, 60 beats per minute (at 1, 2,  $\dots$ , 5 seconds), the events should approximately fall at times 1, 1.71, 2.42, 3.14, 3.86, 4.57, and 5.28. The **pnob**, or Presumed Next On-Beat (the acronym is pronounced with the “P” silent) arrives at 6 seconds. The **HAMn** is 21211, that is, there are 2 events on or after the first beat (1 and 1.71), one after the second, two after the third, and one each after the last two.

To perform this we can start by performing 3:2 (Hamn 21) followed immediately by 4:3 (Hamn 211). This isn’t exact but is close enough that many listeners won’t hear the difference (one year when Ed demonstrated this, only one student out of about 12 heard the truth). Specifically, the fourth event of the seven falls at time 3 instead of 3.17, 1/7 beat early. The first four are spaced too closely together and the last five (from 3 to the **pnob** at 6) are too far apart. We fix this with a **noodgie** (nudge): simply perform the 3:2 a bit slower and catch up during the 4:3. Once you get the eight time points (the seven onsets plus the **pnob**) evenly spaced, you have mastered 7 against five.

This is not quite as easy as it sounds since it involves carrying out two tasks (performing 3:2 and 4:3 inexactly, while simultaneously listening for the even spacing of the eight attacks). Developing this ability to listen simultaneously to two or more aspects of a rhythm, in real time, is a central aspect of the technique that Ed’s book seeks to impart. For example, in the the book’s first exercise (106, Pat 1st), although the left hand plays a steady beat, that beat is

unfortunately a dotted eighth note so that everything in the right hand sounds as triplets—including two written triplets which are four and two ninths of a beat. If there were three of you, one could be listening to the dotted eighths and the bar lines, another in duple time (4.5 beats per measure except for one 6-beat one), and a third could verify the uniformity of, first, the repeating 5-quarter-note figure that hockets against the bar lines in measures 5-8, and later the 2:1 division of the first triplet compared to the second one.

Ed himself can pick up any of these exercises and perform it on call, as a student can learn by referring to any one of them out of context. Before the conversation proceeds Ed will helpfully freshen our memory of it.

## What this book contains

Over the decades Ed has made some six hundred exercises, most without names, but each with a serial number. The numbering is loosely chronological but Ed has continually made revisions and offshoots. Different ones were used during different years of the seminar, in different orders. To compose this book Ed chose his favorite ones (a mere 347 of them) and organized them into eight chapters. The chapters are not in any clear progression; the student can start as well at chapter 8 as 1.

Each chapter is divided into four sections, originally called “fun”, “blow your mind”, “long”, and “neat,” but now appearing simply as “1.1” and so on. The various tags, and the ideas or strategies behind them, recur at odd intervals through the various chapters and sections, except that each last (“neat”) section focuses down on one concept area. For example, section 1.4 is an extended study on the rhythmic ratio 17:11, and section 3.4 examines two measures of a piece by Brian Ferneyhough from many possible points of view, and section 8.4 offers a deep dive into HAMns.

## What to do with it

Ed’s primary pedagogical aim is to show you how you can perform difficult rhythms, either by tapping or vocalizing them, or on a musical instrument. In order for the time onsets to be correct, you have to be able to hear whether they are right or not. When you are performing the rhythm correctly, you also must *know* that you are performing it correctly. In one of Ed’s classes I learned that, when you are rehearsing in a group with a conductor and the conductor asks you whether you played a rhythm correctly or not, your correct answer is, tautologically, “yes”.

Some of the examples ask you to listen for *ESPIT*: equally spaced onsets in time. Others ask you to notice that complicated-looking rhythms are often well approximated by much simpler ones. Yet others require a sort of figure/ground reversal in which one rhythm (regular or not) becomes the beat against which another rhythm is played. There is sometimes a *puline* (punch line) - a complicated-looking rhythm is in fact *ESPIT*, or two very different-looking examples are identical as sounded.

There is usually more than one possible strategy for performing a rhythm, and as mentioned above, it often pays to learn to employ more than one strategy simultaneously. In some complicated situations it pays to re-notate a rhythm in a variety of ways, both approximate and exact, in order to find a way of understanding the rhythm that allows you to verify the correctness of your performance. On many occasions the same rhythmic fragment is examined from several different points of view. Not all of them will be useful to any one practitioner, but an open-minded performer will find many possible paths to explore on their way to mastering a difficult rhythm.

## Editorial notes

Rather than attempt to mold the contents of this book into any fixed editorial style, I've preferred to treat the examples, along with their titles and tags, as primary material. Some of the examples come with text descriptions, which are mostly my own recollections of Ed's observations. Otherwise I've hewed closely to Ed's original text, all the way down to the inconsistent spellings, capitalizations, and punctuation.

A few of the examples are adapted from elsewhere: one each by Jörgen Jersild, Peter Magadini, and Arthur Weisberg (the latter for an analytical re-telling of a measure by Ralph Shapey). There are also three excerpts from Ferneyhough, including very dirty reproductions from manuscript scores. We don't yet have formal permission to reproduce these. Although they certainly fall under fair-use rules we plan to be polite and ask permission before publishing this manuscript in final form.

Many of the examples have one or more keywords, such as "Odd Evening" or simply "fun". These are collected in an index of tags so that the reader can use them to find other examples that share the same tag. In some cases the tags deserve a bit of explanation, and for these, one of the examples was selected to introduce the tag with a bit of explanatory text; these tag-explainer examples are listed first in the tag's index entry. Readers of the electronic version can click on the tags to navigate between the examples and the tag index.

In addition, many examples come with soundfiles. In the printed version there

is a comment below the printed example giving the soundfile’s index number; to hear it the reader will have to chase it down on a computer. If reading a digital version, it should be possible to hear the example just by clicking on the “AUDIO” link below the displayed score.

Special thanks are due to Andrew (“Drew”) Allen, who developed a Pure Data patch to generate one of the examples, out of which Ed derived several related ones. Drew’s patch still mostly works and once I’ve got it back in shape I’ll distribute it.

Thanks also to Trevor Henthorn, who data-mined a massive collection of digital slide shows to extract the hundreds of images and soundfiles that made it possible to assemble this book.

—Miller Puckette





# Chapter 1

## 1.1

### 106. Pat 1st

Musical score for exercise 106, Pat 1st. The score is written in 9/16 time and consists of three staves. The first staff contains a sequence of eighth notes. The second staff contains a sequence of eighth notes with a 12/16 time signature change. The third staff contains a sequence of eighth notes with a 9/16 time signature change and triplet markings.

### 108b. With beat, Patt 1st

Musical score for exercise 108b, With beat, Patt 1st. The score is written in 3/4 time and consists of two staves. The first staff contains a sequence of eighth notes with a 12/16 time signature change. The second staff contains a sequence of eighth notes with a 9/16 time signature change and a triplet marking.

Tag: *Fun.* Audio example number 15014.

## 107a. ReGroup



Tag: *ReGroup*. Refers to exercises in which a fixed time duration (in this case sixteenth notes) are grouped differently from measure to measure, sometimes purely notationally (which could imply phrasing but could also just be psychological), and sometimes in order to apply transformations such as tuplets or dotting. In this exercise, over the space of nine measures the top line is grouped 4+4+1, then 4+3+2, then 1+4+4, then 3+4+2. See also: 105b; 62; 508; 112; 455; 442; 524; 104. Audio example number 23010.

## 89b. Tibet



Tag: *Tibet*. Short for *Tie Betweens*. Other tag: *Duplex*. Audio example number 19014.

## 1.2

## 43a. Different Rat/same speed



Tag: *Different Rat/same speed*.

The same 6-attack sequence is played more and more slowly against the steady quarter notes. You can also play this example with an increasing tempo so that the sequence repeats at the same speed (and the quarter notes accelerate). See also: 182. Audio example number 20002.

### 44b. Patt 1st Rit Oblique

Beats Constant - Pattern Slows



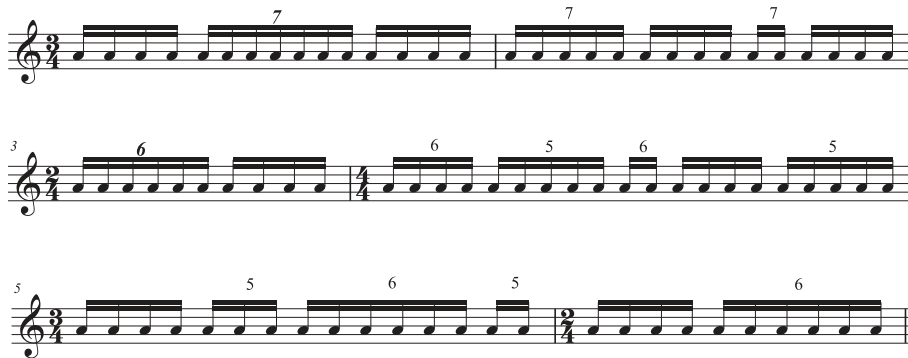
This is what 43a becomes when accelerated to even out the top line. The bottom-line quarter notes are placed as they sound against the the top. tag: *Short-Hand/Patt 1st*

### 604. 10:9



Audio example number 20002.

### 80e. Part rat



Audio example number 20002.

80b. Odd dupl

The musical score consists of two staves. The top staff is in 3/4 time and features a sequence of eighth-note patterns. It begins with a continuous eighth-note run, followed by a measure with a slur over seven eighth notes, and then another measure with a slur over seven eighth notes. The bottom staff is in 4/4 time and features a sequence of eighth-note patterns. It begins with a measure containing a slur over six eighth notes, followed by a measure with a slur over six eighth notes, then a measure with a slur over five eighth notes, and continues with similar patterns. The piece concludes with a final eighth-note run in the bottom staff.

tag: *Duplex*.

### 105b. Indian ReGroup

The musical score consists of seven staves of rhythmic notation. Each staff begins with a treble clef and a 4/4 time signature. The notation is as follows:

- Staff 1: Treble clef, 4/4 time. Four groups of eighth notes, each with a '5' above it and an accent (>) below it.
- Staff 2: Treble clef, 2/4 time. Two groups of eighth notes, each with a '6' above it and an accent (>) below it.
- Staff 3: Treble clef, 4/4 time. Four groups of eighth notes, each with a '7' above it and an accent (>) below it.
- Staff 4: Treble clef, 2/4 time. Two groups of eighth notes, each with a '6' above it and an accent (>) below it.
- Staff 5: Treble clef, 4/4 time. Four groups of eighth notes, each with an accent (>) below it.
- Staff 6: Treble clef, 4/4 time. Four groups of eighth notes, each with a '5' above it and an accent (>) below it.
- Staff 7: Treble clef, 4/4 time. Four groups of eighth notes, each with a '7' above it and an accent (>) below it.

(Continued on next page.) tag: **ReGroup**. Audio example number 21012.

## 105b. Indian ReGroup (Continued from previous page)

Measures 8-12 of the piece "Indian ReGroup". The notation is in treble clef with a 7/4 time signature. Measure 8 starts with a fermata over the first note. Measures 9-12 feature complex rhythmic patterns with slurs and accents. Measure 9 has a '7' above the first note. Measure 10 has a '5' above the first note. Measure 11 has a '7' above the first note. Measure 12 has a '6' above the first note. The piece ends with a double bar line.

## 114. Extreme partial AproPo

Measures 1-4 of the piece "Extreme partial AproPo". The notation is in treble clef with a 7/4 time signature. Each measure contains a complex rhythmic pattern with slurs and accents. Measure 1 has a '6' below the first note. Measure 2 has a '5' below the first note. Measure 3 has an '8' below the first note. Measure 4 has an '8' below the first note. The piece ends with a double bar line.

tags: *AproPo*; *Partial Rats*.  
 Audio example number 26002.

### 114. Extreme partial AproPo, as numbers

665544	54345	8765456	87868584	45678888	888877766	7654567	88776655
.166	.200	.125	.125	.250	.125	.143	.125
.166	.250	.143	.143	.200	.125	.166	.125
.200	.333	.167	.125	.167	.125	.200	.143
.200	.250	.200	.167	.143	.125	.250	.143
.250	.200	.250	.200	.125	.143	.200	.166
	.167	.200	.125	.125	.143	.143	.200
		.250	.125	.125	.166	.143	.200
					.166		
1.233	1.233	1.251	1.260	1.260	1.262	1.269	1.269
Speed Shape 1	Speed Shape 2	Speed Shape 3	Speed Shape 4	Speed Shape 5	Speed Shape 6	Speed Shape 7	Speed Shape 8

## 114. Extreme partial AproPo, as it sounds

Musical score for 'Extreme partial AproPo, as it sounds'. The score is written in treble clef and consists of five staves of music. The tempo markings above the notes are: 180, 150, 120, 300, 240, 180, 240, 300, 480, 420, 360, 300, 240, 300, 360, 480, 420, 480, 360, 480, 300, 480, 120, 300, 360, 420, 120, 140, 180, 420, 360, 300, 240, 300, 360, 420, 240, 210, 180, 150.



### 1.3

#### 76c. ReTempo/reRatio

The musical score consists of four staves of music in treble clef. The first two staves are in 4/4 time. The first staff has a tempo marking of ♩ = 57 and contains two measures of music with 7-measure rests. The second staff has a 3-measure rest, followed by two measures with 7-measure rests, and then two measures with 7-measure rests and a 4-measure rest. The third staff is in 7/4 time, with a tempo marking of ♩ = 100. It contains two measures of music with a 7-measure rest. The fourth staff is in 18/8 time, with a tempo marking of ♩ = 133. It contains two measures of music with a 7-measure rest.

Audio example number 18017.

## 90b. Duplex

The musical score for 'Duplex' is written in 3/4 time and consists of three systems, each with three staves. The first system shows a melody in the upper staff with eighth and sixteenth notes, a bass line in the middle staff with eighth notes, and a bass line in the lower staff with quarter notes. The second system continues the melody with a second ending bracket and repeat sign. The third system concludes the piece with a final double bar line and repeat sign.

Tag: *Duplex*. See also: 89b; 80b; 78; 95; 112; 583. Audio example number 14010.

**33.** same patt/dif rat

Tag: *Same Patt/Differ Rat*. See also: 471; 538a; 560. Audio example number 18015.

**2.** typical mist

Tag: *Typical Myst*. See also: 444; 505; 513. Audio example number 18015.

**444.** 7s typ mist

tag: *Typical Myst*.

## 22-26. accels

The musical score consists of eight staves of music, numbered 2 through 9. Each staff contains a sequence of rhythmic exercises with specific fingerings indicated by numbers 3, 5, 6, and 7. The exercises involve eighth and sixteenth notes, often grouped together. The time signatures vary, including 4/4, 2/4, and 3/4. The exercises are designed to build speed and accuracy through acceleration.

Audio example number 3014.

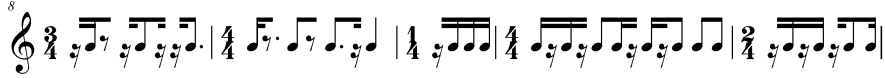
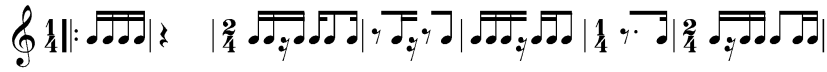
## 46. 4:1 APs-Hocket, each/once

The musical score for exercise 46 consists of two staves. The top staff begins with a sequence of eighth notes, followed by a rest, and then continues with a hocket pattern of eighth notes. The bottom staff provides a complementary hocket pattern, creating a 4:1 APs-Hocket effect. The exercise is marked with a '5' above the first measure, indicating a five-measure phrase.

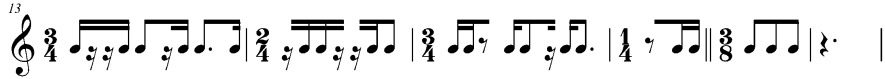
tags: *Class Representatives; Each/Once/(Spread)*

**388.** 4 & 3:1 AP/dur-All

$\text{♩} = 60$



$\text{♩} = \text{♩} \text{♩} = 80$



tags: *Class Representatives; Each/Once/(Spread); Fun; door mat (d'Order matters)*

## 260. Haydn - 331, 583G

The musical score for Haydn's Minuet in G major, Op. 331, No. 583, is presented in ten staves. The piece starts in 2/4 time and includes several time signature changes: 6/8, 3/4, 5/8, 3/4, and 3/4. The notation includes various rhythmic patterns, such as eighth and sixteenth notes, and rests. The piece concludes with a fermata and a final note marked with a '5' above it.

The musical score consists of ten staves of music in treble clef. The first staff is in 3/4 time and features a sequence of eighth-note chords with a '5' fret number below each. The second staff continues this pattern with some chords beamed together. The third staff begins with a whole rest, followed by a 3/4 time signature and eighth-note chords. The fourth staff continues the eighth-note chord sequence. The fifth staff shows a change to 6/16 time and continues with eighth-note chords. The sixth staff continues the 6/16 time signature. The seventh staff changes to 6/8 time and continues with eighth-note chords. The eighth staff changes to 2/4 time and continues with eighth-note chords. The ninth staff changes to 3/4 time and continues with eighth-note chords. The tenth staff changes to 2/4 time and concludes with a double bar line.

tags: *Known Tune/Wrong Rhy; Fun*. Audio example number 5008.

### 331. Haydn rat

Audio example number 5009.

### 187. Magic 14 chart

			♩			
		↙		↘		
↙	♪	↘		↙	♪	↘
♪		♪	♪	♪	♪	♪

			♩			
		↙		↘		
↙	♪	↘		↙	♪	↘
♪		♪	♪	♪	♪	♪



187b. 187 score

Musical score for exercise 187b, measures 1-10. The score is written in a single staff with a treble clef. It consists of four lines of music. The first line (measures 1-3) starts with a 4/4 time signature, changes to 3/8, and then to 3/4. The second line (measures 4-6) starts with a 3/8 time signature, changes to 3/4, and then to 3/8. The third line (measures 7-9) starts with a 3/8 time signature, changes to 3/4, and then to 3/8. The fourth line (measures 10) is in 4/4 time. The music features various rhythmic patterns, including eighth and sixteenth notes, and rests. There are several triplets and a 7-measure rest indicated by a bracket and the number 7.

188

Musical score for exercise 188, measures 1-5. The score is written in a single staff with a treble clef. It consists of three lines of music. The first line (measures 1-3) is in 3/8 time. The second line (measures 4-5) is in 3/4 time. The music features eighth and sixteenth notes, and rests. There are several triplets and a 6-measure rest indicated by a bracket and the number 6.

189

Musical score for exercise 189, measures 1-5. The score is written in a single staff with a treble clef. It consists of one line of music. The music features eighth and sixteenth notes, and rests. There are several triplets and a 6-measure rest indicated by a bracket and the number 6.

## 68. look simp/not

tags: *Long-Hand, Look Diffic/Are Easy* Audio example number 28008.

## 68b. look simp/not

tags: *Long-Hand, Look Diffic/Are Easy* Audio example number 28009.

## 1.4

## 570. tun 1a

$\text{♩} = 131$

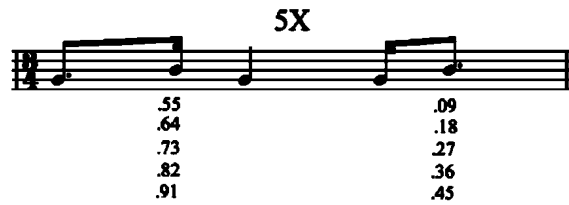
## 570. tun 1b

570. hocket 1



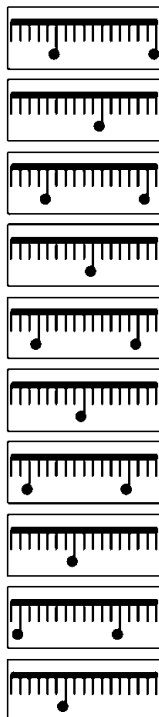
Audio example number 13015.

570. compos (Patt w dec-composite patt)



Audio example number 13007.

### 570. 17:11 Lolli-HAM



### 570. conventch



570. conventch not ful-dur

Musical notation for '570. conventch not ful-dur'. It consists of three staves of music in 3/2 time. The first staff contains measures 1-4, the second staff contains measures 5-8, and the third staff contains measures 9-11. The music features a complex rhythmic pattern with many sixteenth notes and rests, and includes several 17-measure phrases indicated by a '17' above the notes.

570. propor

RATIO = 17/11  
 HAMS = 2 2 1 2 1 2 1 2 1 2 1

Musical notation for '570. propor'. It shows a single staff with 11 measures. Above the staff, the HAMS sequence is given as 2 2 1 2 1 2 1 2 1 2 1. The notes are quarter notes, and the rhythm follows the HAMS sequence.

570. vert (17:11 decimals vert)

1	1.65	2.29	2.94	3.59
		4.24	4.88	5.53
		6.18	6.82	7.47
		8.12	8.76	9.41
		10.06	10.71	11.35

## 570. invert

$\text{♩} = 131$

The musical notation for '570. invert' consists of two staves in 17/4 time. The first staff contains a melodic line with eighth notes, featuring triplets and sixteenth-note groups. The second staff contains a bass line with eighth notes, marked with a double bar line (11) above the staff.

## 570. seq/simul

$\text{♩} = 131$

The musical notation for '570. seq/simul' consists of four staves in 17/4 time. The first staff is a melodic line with eighth notes, triplets, and sixteenth-note groups. The second staff is a bass line with eighth notes, marked with a double bar line (11) above the staff. The third and fourth staves are a pair of staves with eighth notes and numerical values below them. The third staff has values: .50, .13, .67, .17, .75, .25, .83, .33, .88, .50. The fourth staff has values: .55, .09, .64, .18, .73, .27, .82, .36, .91, .45.

## 570. noodle w/rats

Equal

$\text{♩} = 72$

The musical notation for '570. noodle w/rats' consists of a single staff in 7/2 time. The tempo is marked as  $\text{♩} = 72$ . The notation shows a sequence of notes with ratios above them: 5:3, 3:2, 3:2, 3:2, 3:2. The notes are quarter notes.

Audio example number 13008.

570. 14:9

The image shows a musical score for a piece titled "570. 14:9". It consists of two systems of music, each with a treble and bass staff. The top system features a treble staff with eighth and sixteenth notes, including two triplet markings (indicated by a '3' and a slur) and a bass staff with a steady eighth-note accompaniment. The bottom system continues the melody in the treble staff, featuring a sextuplet (indicated by a '6' and a slur) and another triplet, with the bass staff continuing the eighth-note accompaniment. The piece concludes with a double bar line.





# Chapter 2

## 2.1

### 125. rotate 2

The musical score for '125. rotate 2' is written on a single treble clef staff. It consists of four measures, each with a different time signature: 4/4, 3/4, 2/4, and 6/8. The notes are quarter notes and eighth notes, with some beamed eighth notes. The piece ends with a double bar line.

tags: *Rotation*; *Fun*. Audio example number 19008.

## 131. Odd Evening

$\text{♩} = 80$

The musical notation for 'Odd Evening' consists of two staves. The first staff contains a sequence of eighth notes with a steady eighth-note accompaniment. The second staff begins with a triplet of eighth notes, followed by a quarter note, and ends with a double bar line and repeat dots.

tags: *Odd Evening*; *Fun*. Audio example number 29008.

## 131. 1 NV

$\text{♩} = 80$

The musical notation for '1 NV' consists of two staves. The first staff contains a sequence of eighth notes with a steady eighth-note accompaniment. The second staff begins with a triplet of eighth notes, followed by a quarter note, and ends with a double bar line and repeat dots.

tags: *Odd Evening*; *Fun*. Audio example number 29009.

## 141. 2/3-All Contexts (369)

The musical notation for '2/3-All Contexts (369)' consists of two staves. The first staff shows a sequence of eighth notes in 2/3 time, with a double bar line and repeat dots. The second staff shows a sequence of eighth notes in 16/16 time, with a double bar line and repeat dots.

tags: *Fun*. Audio example number 24015.

### 142. 2/3-All Contexts (369)

tags: **Rotation**. Audio example number 24016.

## 2.2

### 473. rats-met mod

tags: **Met Mod**. Audio example number 5015.

## 508. Grouping

The image shows a musical score for '508. Grouping'. It consists of eight staves of music, each starting with a measure number (1 through 8) in the upper left corner. The notation is in treble clef and features a complex, rhythmic pattern of eighth and sixteenth notes. The first seven staves show a consistent rhythmic structure. The eighth staff includes several measures with time signature changes indicated by small numbers above the notes: 4:3, 4:5, 3:4, 7:4, 3:2, and 5:4. The score ends with a double bar line.

tags: *ReGroup*. Audio example number 20010.

## 127. Two-hands

♩ = 72

tags: **THE**. Audio example number 15004.

## 415B. in 4/4

tags: **THE**.

## 415g3. in 7

tags: **THE; Invert; Look Differ/Are Same**. Audio example number 15008.

128. THE held

tags: *THE; All are ties; All are silent.*

127. All 6

tags: *THE; Invert; Look Differ/Are Same.*

### 145. THE Rhythm

$\text{♩} = 70$

The musical score consists of 25 numbered measures across six staves. The time signatures are 11/16, 6/16, 16/16, 8/16, 4/16, 9/16, and 3/8. The score includes various rhythmic patterns such as eighth notes, sixteenth notes, and triplets. Measure numbers 1 through 25 are indicated above the notes.

tags: **THE**. Audio example number 15002.

## 146. w heard beat

tags: ***THE***. Audio example number 15006.

## 2.3

## 133. Music 2

tags: ***Yeasty***. Audio example number 10003.



**133b. 2-Hands**

Tag: *2-Hands*. Other tag: *Yeasty*.

**294. Invert**

Tag: *Invert*.

**371. 2x speed w bashnaggles**

tags: *Divide into two*.

## 371. One NV

Two staves of musical notation. The first staff contains a sequence of eighth notes with stems pointing up, followed by a bar line. The second staff continues the sequence, ending with a double bar line and repeat dots.

## 166. Eq Rats

Three staves of musical notation. The first staff is in 3/4 time, marked with a tempo of 192, and ends with a double bar line and a tempo of 128. The second staff starts with a 6-measure rest, then continues in 3/4 time with triplets, marked with a tempo of 96, and ends with a double bar line and a tempo of 768. The third staff starts with an 11-measure rest, then continues in 3/4 time with quintuplets and triplets, marked with a tempo of 768, and ends with a double bar line and a tempo of 64.

tags: *2-ways*; *Equiv Ratio Pairs*. Audio example number 11009.

## 168. Eq Rats2 (fast w beat)

Two staves of musical notation. The first staff is in 3/4 time, marked with a tempo of 192, and contains a sequence of eighth notes with stems pointing up. The second staff continues the sequence in 3/4 time, marked with a tempo of 128, and contains a sequence of eighth notes with stems pointing up, including triplets. The piece ends with a double bar line and a tempo of 128.

tags: *2-ways*; *Equiv Ratio Pairs*. Audio example number 11010.

62. 21:4 regr

tags: *Near Rats*; *ReGroup*; *Yeasty*; *AproPo*. Audio example number 9015.

63a. w decimals 21:4

21:4 – each = .1905	# 63		
attacks at	Conventch - Bars 1, eg	wrong by	
1.00	1.0		
1.19			
1.38	4		
1.57			
1.76	1.75	.01	E
1.95	6	3	
2.14			
2.33	2.33	.00	O
2.52			
2.71	5		
2.91	5		
3.10			
3.29	3.25	.04	E
3.48			
3.67	5		
3.86	5		
4.05			
4.24	4.25	.01	L
4.43	4		
4.62		bar 1 total = .06	
4.81	5	= .015 avg wrong	
HAM = 6555		bar 2 = .020 avg	
		bar 3 = .028	

Tag: *Decimals*.

## 63. same AproPo, Groupings below dur

Exercise 63 consists of two staves of music. The first staff contains two measures of music. The first measure has a quarter note with a '4' below it, followed by a quarter note with a '3' below it, a quarter note with a '5' below it, and a quarter note with a '5' below it. The second measure has a quarter note with a '4' below it, a quarter note with a '4' below it, a quarter note with a '4' below it, a quarter note with a '3' below it, and a quarter note with a '2' below it. The second staff contains two measures of music. The first measure has a quarter note with a '3' above it, followed by a quarter note with a '3' above it, a quarter note with a '3' above it, and a quarter note with a '5' above it. The second measure has a quarter note with a '5' above it, followed by a quarter note with a '5' above it, a quarter note with a '5' above it, and a quarter note with a '5' above it. The piece ends with a double bar line.

## 66. 2 versions

Exercise 66 consists of two staves of music, both in 3/4 time. The first staff shows a sequence of 19 eighth notes, with a bracket above the notes and the number '19' above the bracket. The second staff shows the same sequence of 19 eighth notes, with a bracket above the notes and the number '19' above the bracket. The piece ends with a double bar line.

## 67. div with #s

Exercise 67 consists of a single staff of music in 3/4 time. The first measure has a quarter note with a '5' above it, followed by a quarter note with a '5' above it, a quarter note with a '5' above it, and a quarter note with a '5' above it. The second measure has a quarter note with a '5' above it, followed by a quarter note with a '5' above it, a quarter note with a '5' above it, and a quarter note with a '5' above it. The third measure has a quarter note with a '5' above it, followed by a quarter note with a '5' above it, a quarter note with a '5' above it, and a quarter note with a '5' above it. The fourth measure has a quarter note with a '5' above it, followed by a quarter note with a '5' above it, a quarter note with a '5' above it, and a quarter note with a '5' above it. The fifth measure has a quarter note with a '5' above it, followed by a quarter note with a '5' above it, a quarter note with a '5' above it, and a quarter note with a '5' above it. The sixth measure has a quarter note with a '5' above it, followed by a quarter note with a '5' above it, a quarter note with a '5' above it, and a quarter note with a '5' above it. The seventh measure has a quarter note with a '5' above it, followed by a quarter note with a '5' above it, a quarter note with a '5' above it, and a quarter note with a '5' above it. The eighth measure has a quarter note with a '5' above it, followed by a quarter note with a '5' above it, a quarter note with a '5' above it, and a quarter note with a '5' above it. The piece ends with a double bar line.

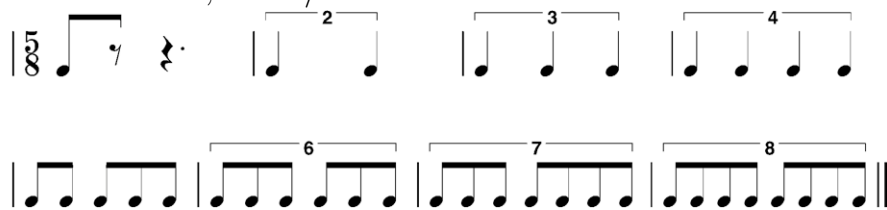
Audio example number 9018.

## 78. 3-5-4

Exercise 78 consists of a single staff of music in 4/4 time. The first measure has a quarter note with a '5' above it, followed by a quarter note with a '5' above it, a quarter note with a '5' above it, and a quarter note with a '5' above it. The second measure has a quarter note with a '5' above it, followed by a quarter note with a '5' above it, a quarter note with a '5' above it, and a quarter note with a '5' above it. The third measure has a quarter note with a '5' above it, followed by a quarter note with a '5' above it, a quarter note with a '5' above it, and a quarter note with a '5' above it. The fourth measure has a quarter note with a '5' above it, followed by a quarter note with a '5' above it, a quarter note with a '5' above it, and a quarter note with a '5' above it. The fifth measure has a quarter note with a '5' above it, followed by a quarter note with a '5' above it, a quarter note with a '5' above it, and a quarter note with a '5' above it. The sixth measure has a quarter note with a '5' above it, followed by a quarter note with a '5' above it, a quarter note with a '5' above it, and a quarter note with a '5' above it. The seventh measure has a quarter note with a '5' above it, followed by a quarter note with a '5' above it, a quarter note with a '5' above it, and a quarter note with a '5' above it. The eighth measure has a quarter note with a '5' above it, followed by a quarter note with a '5' above it, a quarter note with a '5' above it, and a quarter note with a '5' above it. The piece ends with a double bar line.

tags: *Duplex*. Audio example number 7014.

## 171. x:Odd, ratio/5-8



Audio example number 3009.

## 171. x:Odd, ratio/5-8



tags: *Const x/change y; x:5/8 & all 5/8's*. Audio example number 3009.

## 217. Transform Into



tags: *Transform Into*. Audio example number 7016.

## 217. Ferney (excerpt from Brian Ferneyhough)

$\text{♩} = 48$

1

2

3

4

9

10

$\text{♩} = 48$

11

Audio example number 26006.

253. Maintain

Musical score for 'Maintain' consisting of three staves. The first staff has a tempo of 60 and a 5-measure phrase in 2/4 time, followed by a tempo change to 80 and another 5-measure phrase in 4/4 time, and finally a 2-measure phrase in 2/4 time. The second staff has a tempo of 60 and a 4-measure phrase in 2/4 time, followed by a tempo change to 80 and a 4-measure phrase in 4/4 time, and finally a 2-measure phrase in 2/4 time. The third staff has a tempo of 60 and a 5-measure phrase in 2/4 time, followed by a tempo change to 80 and a 3-measure phrase in 4/4 time, and finally a 2-measure phrase in 2/4 time.

tags: *Met Mod*; *Met Mod Maintain*; *Offsets*.

309. Q Q. (Excerpt from *Paraphrases* by Milton Babbitt)

Musical score for 'Q Q.' consisting of three staves. The first staff has a tempo of 74 and a 4-measure phrase in 7/8 time, followed by a 5-measure phrase in 4/4 time, a 5-measure phrase in 4/4 time, and a 5-measure phrase in 11/8 time. The second staff has a 5-measure phrase in 3/4 time, a 6-measure phrase in 2/4 time, a 3-measure phrase in 3/4 time, a 3-measure phrase in 3/8 time, a 4-measure phrase in 8/8 time, and a 3-measure phrase in 8/8 time. The third staff has a 3-measure phrase in 4/4 time, a 3-measure phrase in 7/8 time, a 3-measure phrase in 2/4 time, a 3-measure phrase in 3/4 time, a 4-measure phrase in 11/8 time, and a 2-measure phrase in 2/4 time.

tags: *Long-Hand*; *Q Q.*. Audio example number 19013.

151. Met Mod

Musical score for 'Met Mod' consisting of three staves. The first staff has a tempo of 80 and a 3-measure phrase in 2/4 time, followed by a tempo change to 107 and a 3-measure phrase in 3/4 time, and finally a 3-measure phrase in 4/4 time. The second staff has a 3-measure phrase in 4/4 time, followed by a tempo change to 80 and a 3-measure phrase in 3/4 time, and finally a 3-measure phrase in 2/4 time. The third staff has a tempo of 53 and a 3-measure phrase in 2/4 time, followed by a tempo change to 80 and a 3-measure phrase in 2/4 time, and finally a 3-measure phrase in 2/4 time.

tag: *Met Mod*. Audio example number 20016.

## 151b2. deMet Mod

tag: *Met Mod.*

## 2.4

## 362. all note heads

tags: *Const x/change y; Fun; Lollipop; Long-Hand; Metronome; Yeasty; Beam-Beat.* Audio example number 2003.



## 362. evry 4

$\text{♩} = 57$

The musical score consists of 30 measures of music in a single treble clef staff. The tempo is marked as quarter note = 57. The score is divided into three systems of ten measures each. The time signatures are highly complex, often involving multiple stacked fractions. The notes are primarily eighth and sixteenth notes, with some beamed sixteenth notes. There are some rests and dynamic markings like accents.

Measure 1:  $8 + \frac{32}{32}$

Measure 2:  $4 + \frac{16}{16}$

Measure 3:  $\frac{32}{32} + 4$

Measure 4:  $\frac{3}{16} + \frac{2}{16}$

Measure 5:  $4 + \frac{16}{16} + \frac{2}{4}$

Measure 6:  $\frac{3}{8}$

Measure 7:  $\frac{2}{8} + \frac{2}{8} + \frac{1}{8}$

Measure 8:  $\frac{3}{16} + \frac{32}{32}$

Measure 9:  $\frac{3}{16}$

Measure 10:  $\frac{6}{16}$

Measure 11:  $\frac{32}{32} + 4$

Measure 12:  $\frac{6}{32}$

Measure 13:  $4 + \frac{32}{32} + \frac{32}{32}$

Measure 14:  $\frac{3}{16} + \frac{4}{16}$

Measure 15:  $\frac{4}{32} + \frac{32}{32} + \frac{32}{32}$

Measure 16:  $\frac{3}{8}$

Measure 17:  $\frac{6}{16}$

Measure 18:  $\frac{3}{8} + \frac{1}{8}$

Measure 19:  $4 + \frac{5}{32}$

Measure 20:  $\frac{32}{32}$

Measure 21:  $\frac{3}{8} + \frac{3}{16}$

Measure 22:  $\frac{32}{32} + \frac{3}{16}$

Measure 23:  $4 + \frac{3}{16}$

Measure 24:  $\frac{3}{16} + \frac{32}{32} + \frac{3}{16}$

Measure 25:  $\frac{1}{8}$

Measure 26:  $\frac{3}{32} + \frac{3}{16} + \frac{32}{32}$

Measure 27:  $4$

Measure 28:  $\frac{3}{16} + \frac{32}{32}$

Measure 29:  $\frac{3}{8} + \frac{1}{16}$

Measure 30:  $\frac{32}{32}$

tag: *Every x.*

## 394. evry 3

The musical score for 'evry 3' consists of 30 measures, each with a unique time signature. The notation is in a single treble clef. The time signatures are: 1.  $8+32$ , 2.  $4+16$ , 3.  $32+4$ , 4.  $16+16$ , 5.  $4+16+4$ , 6.  $3$ , 7.  $8+8+8$ , 8.  $16+32$ , 9.  $16$ , 10.  $6$ , 11.  $32+4$ , 12.  $6$ , 13.  $4+32+32$ , 14.  $16+16$ , 15.  $32+32+32$ , 16.  $3$ , 17.  $6$ , 18.  $3$ , 19.  $4+32$ , 20.  $32$ , 21.  $8+16$ , 22.  $32+16$ , 23.  $4+16$ , 24.  $16+32+16$ , 25.  $8$ , 26.  $32+16+32$ , 27.  $4$ , 28.  $16+32$ , 29.  $8+16$ , 30.  $32$ .

tag: *Every x*. Audio example number 2003.

**362.** circles (invert)

A musical score for a single melodic line in treble clef. The piece consists of 22 measures, divided into seven systems. The first system (measures 1-3) features a 3/2 time signature, with notes marked with accents and some circled. The second system (measures 4-6) includes a 7/16 time signature. The third system (measures 7-9) is characterized by sixteenth-note patterns with vertical stems. The fourth system (measures 10-12) includes a 3/16 time signature. The fifth system (measures 13-15) includes a 7/32 time signature. The sixth system (measures 16-18) includes a 9/32 time signature. The seventh system (measures 19-22) includes a 3/4 time signature. The piece concludes with a double bar line.

**362.** scale (No TS)

Musical score for exercise 362, scale (No TS). The score consists of five staves of music in a single treble clef. The first staff contains measures 1-6, the second 7-12, the third 13-18, the fourth 19-23, and the fifth 24-25. The music is a scale with various rhythmic patterns, including eighth and sixteenth notes, and rests.

Audio example number 2011.

**362.** accents

Musical score for exercise 362, accents. The score consists of five staves of music in a single treble clef. The first staff contains measures 1-9, the second 10-12, the third 13-18, the fourth 19-25, and the fifth 26. The music features a variety of time signatures (9/32, 7/4, 3/2, 1/4, 7/16, 3/4, 2/4, 3/2, 1/6, 1/4, 6/16, 3/2, 3/8, 3/4, 3/2, 1/4, 3/2, 3/16) and accents (A) over notes.

362. invert

The image shows a musical score for exercise 362, titled "invert". It consists of five staves of rhythmic notation in 4/4 time. The notation is primarily composed of eighth and sixteenth notes, often grouped in pairs or fours. Accents (marked with a triangle above the note) and slurs are used throughout. Measure numbers 4, 6, 8, and 10 are indicated at the beginning of their respective staves. The piece concludes with a double bar line at the end of the fifth staff.

tags: *Invert*; *Odd Evening*. Audio example number 2009.



# Chapter 3

## 3.1

### 147. free



Audio example number 1006.

### 156. Met Mod

Musical notation for exercise 156, 'Met Mod'. It consists of three staves in 4/4 time with a treble clef. The piece is divided into three sections with different tempos: the first section is marked '♩ = 60', the second '♩ = 80', and the third '♩ = 120'. The notation includes various rhythmic patterns, accents, slurs, and dynamic markings such as '6A', '6', '5', and '3'. The piece ends with a double bar line and repeat dots.

Tag: *Met Mod*. See also: 25; 39; 40; 58; 65; 105; Audio example number 20015.

## 158. very fast

tag: **Fun** Audio example number 11008.

## 148. div mid - 3

Audio example number 3013.

## 3.2

## 185. offset / beat accel-fix-Oblique

tag: **Look Diffic/Are Easy**

In exercise 185 the notated duration between articulations (as opposed to the implied duration of *sound*) increases (or slows). Each beat is 4 16ths in duration. Thus the durations between articulations are 4455667788.

But the included instruction—“Attacks should be equally spaced”—simultaneously with the instruction that the beat accelerates, changes the resultant rhythm.

This example is very easy to perform, even sight-read.

If one wanted to notate this example in conventional notation one must offset the increase in notated duration between articulations with note-speeds (ratios) that proportionally decrease the duration between articulations (increase the speed) 4:1, 4:1, 5:1, 5:1, etc. (This is not to suggest that one *permanently* renotate examples, but often times a temporary renotation can facilitate learning the correct rhythm. For many of the examples in this book one may need more than one way of conceiving or notating an example.)



### 186. Conventional

In exercise 186 a beat consists of 4 stems in duration. This means that some special ratios will be partial; e.g., we see the speed of quintuplets but there are only 4 per beat (a shorter beat). Noteheads are attacks. Headless stems are silent. The example results in doubling the beat-speed. Audio example number 17003.

### 186b. Figure

### 397. 3-2-4

Audio example number 17014.

## 214. Duplex

tags: *Duplex*; *Long-Hand*; *Differ Nests/same speed*; *Look Differ/Are Same* Audio example number 6013.

## 280. Silly Nest

tags: *Nests*; *Differ Nests/same speed*; *Levels*; *Look Differ/Are Same*; *Look Diffic/Are Easy* Audio example number 6014.

## 95. Duplex 4s

tag: *Duplex* Audio example number 1005.

## 3.3

## 355a. w Beat-Patt Notation, each/once

The image shows five staves of musical notation, each containing six rhythmic patterns. The patterns are written in a treble clef with a 2/4 time signature. The notes are quarter notes, and the patterns are separated by bar lines. Above each pattern is a three-letter beat-pattern notation. The notations are: OBB, OAB, OOB, OBA, OAA, OOA (Staff 1); OBO, OAO, OOO, ABB, AAB, AOB (Staff 2); ABA, AAA, AOA, ABO, AAO, AOO (Staff 3); BBB, BAB, BOB, BBA, BAA, BOA (Staff 4); BBO, BAO, BOO (Staff 5).

Tag: **BAMO**. Audio example number 18003.

The tag BAMO refers to exercises in which we pay attention to whether an onset occurs before (“B”), after (“A”), or directly on (“O”) the beat. See also 356. other tags: *Each/Once/(Spread)*; *No #s*; *Short-Hand/Patt 1st*; *Show Beat*; *Yeasty*.

### 356. w Beat

The musical score consists of seven staves of music in 2/4 time. Each staff contains rhythmic patterns of eighth and sixteenth notes, often beamed together. Above the notes are letter tags (B, A, O) indicating the placement of the notes relative to the beat. Some tags include a dot (e.g., BBA, BAA, BOO, AAB, AAA) to denote specific rhythmic groupings. Fingerings (numbers 1-5) are indicated above certain notes. The score ends with a double bar line and a repeat sign on the seventh staff.

tag: *BAMO*; *Look Diffic/Are Easy*

As in the previous example, “B,” “A,” and “O” mean before, after, or on the beat, respectively.

### 356b. Taffy-Conventch

Musical score for 'Taffy-Conventch' in 2/4 time. The score consists of six lines of music. The first line starts with a treble clef and a 2/4 time signature. It features eighth-note patterns with fingerings 7, 9, and 7-7. The second line continues with eighth-note patterns and fingerings 5, 10, 5, 7, 3, 11, and 11. The third line has eighth-note patterns with fingerings 9, 9, 5, 5, 10, 10, and 10. The fourth line has eighth-note patterns with fingerings 6, 9, 9, 11, and 7. The fifth line shows a change in time signature to 3/4, with eighth-note patterns and fingerings 7, 7, 5, 5, 10, 10, and 11. The sixth line returns to 2/4 time with eighth-note patterns and fingerings 11, 7, 7, 3, and 3.

### 5. rotate w beat

Musical score for '5. rotate w beat' in 4/4 time. The score consists of four lines of music. The first line starts with a treble clef and a 4/4 time signature. It features quarter notes and rests. The second line has a 3-measure rest followed by eighth-note patterns. The third line has a 5-measure rest followed by eighth-note patterns. The fourth line has a 7-measure rest followed by quarter notes and a double bar line.

## 548. 3&amp;4 feelings

Musical notation for exercise 548, '3&4 feelings'. The piece is written in 3/4 time and consists of seven staves of music. The first six staves are numbered 1 through 6, and the seventh staff is numbered 13. The notation features a mix of eighth and quarter notes with a steady bass line of quarter notes.

tag: *Awkward sensations* Audio example number 7015.

## 277. Transf into

Musical notation for exercise 277, 'Transf into'. The piece is written in 3/4 time and consists of two staves of music. The tempo is marked as quarter note = 60. The notation features a mix of eighth and quarter notes with a steady bass line of quarter notes. The first staff is numbered 3 and 7, and the second staff is numbered 5, 6, and 7.

Tag: *Transform Into*. See also: 402; 217. Audio example number 18014.



### 374h. fern levels

$\text{♩} = 40$

1 5 9 13 17 21 25 29 33

tags: *Levels*



### 374j2. w Dur in 64th Triplets

$\text{♩} = 30$

28 28 8.5 8.5 8.5 8.5 18 18 18 (24)

24 48 36 60

tags: *Show Like-Dur Beams*

### 458. 12-beat-bar

$\text{♩} = 120$

Audio example number 25017.

## 392. tuf rats

Musical score for '392. tuf rats' consisting of five staves of music. The first staff starts with a treble clef and a 3/4 time signature, followed by a 3/4 time signature, and then a 2/4 time signature. The second staff starts with a 2/4 time signature, followed by a 2/4 time signature, and then a 3/4 time signature. The third staff starts with a 2/4 time signature, followed by a 4/4 time signature, and then a 2/4 time signature. The fourth staff starts with a 4/4 time signature, followed by a 3/4 time signature, and then a 4/4 time signature. The fifth staff starts with a 2/4 time signature, followed by a 4/4 time signature, and then a 3/4 time signature. The score includes various rhythmic patterns and fingerings (3, 6, 7, 8, 2, 5, 7, 7, 3, 5, 4, 4, 5, 8).

tags: *2-ways*; *Met Mod*; *Tough Order* Audio example number 5004.

## 402. imposs

Musical score for '402. imposs' consisting of two staves of music. The first staff starts with a treble clef and a 3/4 time signature, followed by a 3/4 time signature, and then a 3/4 time signature. The second staff starts with a treble clef and a 3/4 time signature, followed by a 3/4 time signature, and then a 3/4 time signature. The score includes various rhythmic patterns and fingerings (11, 9, 7, 12, 5, 5, 11).

tags: *Impossibles*; *Transform Into* Audio example number 11014.

### 3.4

#### 197e. Simple pitches

♩ = 108



Audio example number 16003.

#### 197g. his rhy/my pi

♩ = 108

♩ = 120

♩ = 135

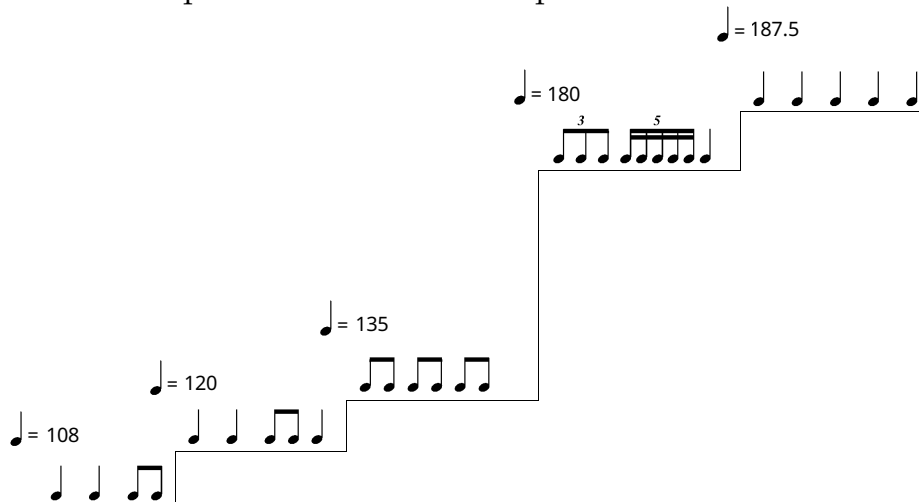
♩ = 180

♩ = 189



Audio example number 16007.

#### 196c. Simple on Plateau w tempi



Audio example number 16007.

196c. Simple on Plateau w tempi, continued

$5/3 \times 5/4 = 25/12 \times 90 = 187.5$

197. Ferneyhough orig

Audio example number 16008.

197a. Ferney wo most things

197b. compare w mult & sound-BN

Musical notation for 197b, consisting of three rows of three measures each. The first row starts with a tempo of 90 and features a 6:5 ratio. The second row starts with a tempo of 108 and features a 4:3 ratio. The third row starts with a tempo of 108 and features a 135 ratio. The notation includes various time signatures and rhythmic patterns.

197d. Ferney w his pitches-my rhy

Musical notation for 197d, consisting of two lines of music. The first line has a tempo of 188 and includes a 3-measure triplet and a 5-measure group. The second line is a 4-measure phrase.

197a2. Ferney w his Rhy & my pi

Musical notation for 197a2, consisting of a single line of music with a tempo of 90. It features a 6-measure group, two 3-measure triplets, and a 5-measure group.

Audio example number 16014.



# Chapter 4

## 4.1

### 180. 4/12 bar

Musical notation for example 180, showing a 4-measure phrase with changing time signatures and tempo markings. The notation is on a single staff in treble clef. Above the staff, four tempo markings are shown: ♩ = 84, ♩ = 56, ♩ = 84, and ♩ = 126. The first measure is in 4/4 time with a triplet of eighth notes. The second measure is in 3/8 time with a dotted quarter note. The third measure is in 4/4 time with a triplet of eighth notes. The fourth measure is in 2/4 time with a dotted quarter note. The piece ends with a double bar line and repeat dots.

tag: *Fun*. Audio example number 28010.

### 182. Different Rat/same speed

Musical notation for example 182, showing a sequence of measures with different time signatures and triplets. The notation is on a single staff in treble clef. The time signatures are 1/4, 3/8, 2/4, 4/4, 2/4, and 3/4. Above the staff, there are three triplet markings (3) over eighth notes. The piece ends with a double bar line.

The tempo changes from measure to measure but the sounded rhythm is ESPIT (equally spaced in time). Tags: *Different Rat/same speed*; *Met Mod*.

**216c. Start on Beat**

Musical notation for 216c. Start on Beat. The piece is in 2/8 time. It consists of three staves of music. The first staff starts with a treble clef and a 2/8 time signature. The second staff starts with a treble clef and a measure rest, followed by a 5 above the staff. The third staff starts with a treble clef and a 9 above the staff. The notation includes eighth notes, quarter notes, and rests.

tag: *Rotation*. Audio example number 10018.

**385a. 1/4 - 6/32**

Musical notation for 385a. 1/4 - 6/32. The piece is in 4/4 time. It consists of three staves of music. The first staff starts with a treble clef and a 4/4 time signature. The second staff starts with a treble clef and a 4/4 time signature. The third staff starts with a treble clef and a 4/4 time signature. The notation includes quarter notes, eighth notes, and rests.

Audio example number 17017.



## 4.2

### 395. prob

Musical notation for exercise 395. prob, consisting of four staves. Each staff begins with a time signature: 4:3, 8:3, 5:3, and 7:3. The notation includes quarter notes, eighth notes, and triplets, with some notes marked with a '0' (likely representing a whole rest or a specific fret position). The first staff has a triplet of eighth notes. The second staff has a triplet of eighth notes. The third staff has a triplet of eighth notes. The fourth staff has a triplet of eighth notes. The notation ends with a double bar line.

tags: *3/4; Look Differ/Are Same; Look Diffic/Are Easy; No #s; Show Beat; VB; Yeasty.*

### 395g3. fig

Musical notation for exercise 395g3. fig, consisting of four staves. The notation is in 3/4 time and features a complex rhythmic figure with eighth and sixteenth notes. The first staff shows the basic figure. The second staff repeats the figure. The third staff includes triplets and a 4:3 ratio. The fourth staff includes a quintuplet and a 4:3 ratio. The notation ends with a double bar line.

## 395L. other rats

Musical notation for 395L. other rats, consisting of three staves of music in 3/4 time. The first staff contains measures 1-3 with triplets and a 4:3 ratio. The second staff contains measures 4-6 with triplets, 5:3 ratios, and quintuplets. The third staff contains measures 7-8 with septuplets and 7:3 ratios.

## 419. partial rats

Musical notation for 419. partial rats, consisting of three staves of music in various time signatures. The first staff contains measures 1-4 with time signatures 3/4, 2/4, 5/4, and 3/4, and note values 85, 79, 74, and 71. The second staff contains measures 5-9 with time signatures 4/4, 2/4, 3/4, 2/4, and 3/4, and note values 68, 60, 51, 48, and 45. The third staff contains measures 10-14 with time signatures 4/4, 2/4, 1/4, 2/4, and 4/4, and note values 40, 34, 30, 26, and 24. The notation includes various ratios and groupings.

tag: *Partial Rats*. Audio example number 29002.

422. big copy

The musical score consists of eight staves of music, each starting with a measure number and a rhythmic pattern. The patterns are: 4242, 4232, 3233, 32124, 32123, 32133, 33123, 23223, 24224, 42341, 42241, 42231, 42331, 42321, and 52351. The music is written in a single treble clef with various time signatures including 8/8, 6/16, 7/16, 2/4, 3/4, 5/8, 12/16, 3/8, 7/8, 9/8, 3/4, 3/8, 2/4, 3/4, 6/8, 4/4, 4/16, 5/16, 4/16, 6/8, and 4/4. The score includes various musical notations such as slurs, accents, and dynamic markings.

tags: *2-ways; Const x/change y; Find Patts; Generate Ex-  
amples; Reducing Fractions; Same durs seq / diff beat;  
Short-Hand/Patt 1st; Yeasty.*

### 422.1. reveal

4 6 2 4 4 6      6 9 3 6 6 9      8 (12) 4 8 8 (12)

Audio example number 2018.

### 422j. Figure-orig order

422 j		
13:2	13:3	13:4
ea = .15385	ea = .23077	ea = .3077
<b>Dur = 462446</b>	<b>Dur = 693669</b>	<b>Dur = 8(12)488(12)</b>
	or (reduced) = <b>231223</b> for each	
1.00 •	1.00 •	1.00 •
1.15	1.23 •	1.31
1.31 •	1.46 •	1.62 •
1.46	1.69	1.92
1.62	1.92	2.23
1.77 •	2.15 •	2.54 •
1.92 •	2.38 •	2.85 •
2.08	2.62	3.15
2.23 •	2.85 •	3.46 •
2.38	3.08	3.77
2.54 •	3.31 •	4.08 •
2.69	3.54	4.38
2.85	3.77	4.69

### 422. Figures

The figures (i.e., numbers) are those in the table above (422j).

### 422. 13s



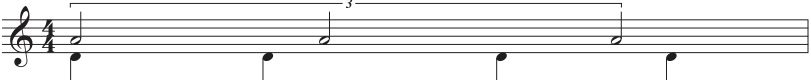
## 461. Shapey (from Weisberg)

$\text{♩} = 50$

$\text{♩} = 100$

Audio example number 21002.

461z. Shapey w lines



## 130. Simp/Compound

Musical notation for exercise 130, Simp/Compound. The notation is in treble clef and consists of four staves. The first staff shows a sequence of notes in 6/8, 3/4, and 6/8 time signatures. The second staff continues with similar patterns. The third staff includes triplets and an 8-measure rest. The fourth staff features a 5-measure rest, a 10-measure rest, and more rhythmic patterns.

Audio example number 5005.

## 410b1. quin-5/8

Musical notation for exercise 410b1, quin-5/8. The notation is in treble clef and 2/4 time signature. It consists of three staves of music. The first staff shows a sequence of notes with quintuplets and triplets. The second staff continues with similar patterns. The third staff features more rhythmic patterns, including quintuplets and triplets, and ends with a double bar line.

tag: *Beat Note/Beat-Bar*. Audio example number 26012.



410d1. quin-5/8

$\text{♩} = 100$

The musical score is written on a single treble clef staff in 5/8 time. It consists of three lines of music. The first line contains measures 1 through 4. Measure 1 has an accent (>) under the first eighth note. Measure 2 has accents under the first and third eighth notes. Measure 3 has a triplet of eighth notes marked with a '3' above them. Measure 4 has a dotted quarter note followed by an eighth note. The second line contains measures 5 through 8. Measure 5 has a '5' above the first eighth note. Measures 6 and 7 each have a triplet of eighth notes marked with a '3' above them. Measure 8 has a dotted quarter note followed by an eighth note. The third line contains measures 9 through 12. Measure 9 has a triplet of eighth notes marked with a '3' above them. Measure 10 has a triplet of eighth notes marked with a '3' above them. Measure 11 has a dotted quarter note followed by an eighth note. Measure 12 has a triplet of eighth notes marked with a '12 3' above them. The piece ends with a double bar line and repeat dots.

Audio example number 26013.

## 424ab. Rite

424A

B

tags: *Fun*; *Known Tune/Wrong Rhy*. Audio example number 19002.

424cd. Rite

C

Musical notation for section C, measures 1-12. It consists of four staves of music in treble clef with a 12/8 time signature. The melody is primarily eighth notes with some sixteenth notes. The bass line consists of dotted quarter notes. The key signature has one sharp (F#).

D

Musical notation for section D, measures 1-12. It consists of four staves of music in treble clef with a 6/8 time signature. The melody is primarily eighth notes with some sixteenth notes. The bass line consists of dotted quarter notes. The key signature has one sharp (F#).

### 424ef. Rite

The musical score for '424ef. Rite' consists of two parts, E and F, with complex rhythmic patterns and multiple time signatures.

**Part E:** This part is written in treble clef and 3/8 time. It features a series of eighth and sixteenth notes with various rests and accidentals. The notation includes slurs and ties, indicating a continuous melodic line. The key signature has one sharp (F#).

**Part F:** This part is written in treble clef and 3/8 time. It features a series of eighth and sixteenth notes with various rests and accidentals. The notation includes slurs and ties, indicating a continuous melodic line. The key signature has one sharp (F#).

**Rhythmic Variations:** The score includes several measures with different time signatures, such as 3/8, 2/4, 1/4, 3/4, 5/8, and 2/2. These variations are indicated by the time signature changes at the beginning of the measures.

### 424gh. Rite

G

H

Harkins

### 424ijk. Rite

The musical score for '424ijk. Rite' is presented in two main sections, I and K, each with two staves. Section I consists of two staves of music. The first staff begins with a treble clef and a key signature of one sharp (F#). It features a complex rhythmic pattern of eighth and sixteenth notes, with several measures marked with a '7' above the staff, indicating a seven-measure rest or a specific rhythmic grouping. The second staff continues this pattern, ending with a double bar line. Section K also consists of two staves. The first staff begins with a treble clef and a key signature of one sharp. It features a complex rhythmic pattern of eighth and sixteenth notes, with several measures marked with a '7' above the staff. The second staff continues this pattern, ending with a double bar line. The score includes various time signatures, including 16/16, 3/8, 6/16, 7/16, 2/4, 3/8, 5/16, 1/4, and 3/4. The notation includes notes, rests, and accidentals, with some notes marked with a 'b' for flat.

425. true

13:11

11:9

9:7

13:10

11:8

13:9

11:7

13:8

## 425b2. AproPo CR

$\text{♩} = 85$

13:11

11:9

9:7

13:10

11:8

13:9

11:7

13:8

Audio example number 30006.



425. figure

Ratio	HAM	Decimal Duration
4:3	211	.750
11:8	21,211, 211	.727
18:13	21,211,21,211,211	.722
7:5	21,211	.714
17:12	21,21,211,21,211,211	.706
10:7	21,21,211	.700
13:9	21,21,21,211	.692
3:2	21	.667
11:7	211,21,21	.636

296. my 32nds

The musical notation consists of four staves of music. Each staff begins with a treble clef and a 2/4 time signature. The first staff contains 3 notes. The second staff contains 4 notes. The third staff contains 7 notes. The fourth staff contains 10 notes. The time signature changes to 6/16 after the first measure of each staff, and to 3/8 after the second measure of each staff. The notes are quarter notes in 2/4, eighth notes in 6/16, and quarter notes in 3/8.

tag: *Fun.* Audio example number 24008.

## 428.2. Grad met. Rit. Q Q. w decimals

The musical score consists of ten staves of music, each starting with a measure number on the left. The notation includes various time signatures (4/4, 5/16, 3/8, 7/16, 2/4) and rhythmic values (e.g., 7, 6, 5, 8, 10, 3). The notes are primarily eighth and sixteenth notes, often beamed together. Some notes have decimal values written below them, such as .143, .208, .300, .458, .570, .125, .179, .250, .350, .500, .250, .313, .375, .434, .500, .143, .179, .214, .250, .286, .125, .156, .188, .219, .250, .125, .139, .150, .159, .167, .143, .156, .167, .175, .182, .167, .179, .188, .194, .200, .167, .179, .188, .194, .200, .167, .179, .188, .194, .200, .167, .179, .188, .194, .200. The final staff (48) features a sequence of notes with ratios written above them: 7:4, 6:5, 5:3, 8:7, and 3:2.

428. w beat

Audio example number 12004.

4.4

112j. no beats-Interrupted Ratio

## 112. Artic points / decimal durations

#112	
1.00	4
1.25	4
1.50	4
1.75	4
2.00	3
2.33	3
2.67	3
3.00	4
3.25	4
3.50	3
3.83	3
4.17	4
4.42	4
4.67	4
4.92	3
5.25	3
5.58	3
5.92	3
6.25	4
6.50	3
6.83	3
7.17	4
7.42	4
7.67	3

### 112h. Partial Rat w beat



Audio example number 12011.

### 112h1. interrupted - w beat



### 112r3. tune



Audio example number 12018.

# Chapter 5

## 5.1

254. rad 4:3

RH  
LH

109. pat 1st sho beat on top

Audio example number 30003.

**279. Partial Rats**

Musical notation for 'Partial Rats' in treble clef. The piece consists of four lines of music. The first line contains two measures with eighth notes and a triplet of eighth notes. The second line starts with a measure of a 9-note beamed eighth-note run, followed by two measures of eighth notes with a 7-note beamed eighth-note run. The third line contains two measures of eighth notes with a 7-note beamed eighth-note run, followed by two measures of eighth notes with a 5-note beamed eighth-note run. The fourth line starts with two measures of eighth notes with a 7-note beamed eighth-note run, followed by two measures of eighth notes with a 5-note beamed eighth-note run, ending with a double bar line.

tags: *Beam-Beat*; *Partial Rats*. Audio example number 3002.

**386. Rotate**

Musical notation for 'Rotate' in treble clef, 7/4 time signature. The piece consists of a single line of music with a repeat sign at the beginning and end. The notation features a complex rhythmic pattern of eighth and sixteenth notes, with some notes beamed together.

tag: *Rotation*. Audio example number 11013.



## 513. List Glance

The image displays three columns of musical notation for the piece 'List Glance'. Each column contains seven staves. The notation includes various rhythmic patterns, time signatures (such as 7/2, 3/2, 3/4, 3/8, 3/16, 2/8, 3/2, 3/4, 3/8, 3/16, 2/8), and melodic lines. The first column uses a 7/2 time signature, the second uses 3/2, and the third uses 3/2. The notation is presented in a grid-like format with each staff in a separate box.

tag: *Typical Myst.*

## 571. 8:5:3

The image displays two staves of musical notation for the piece '8:5:3'. The first staff is in 7/4 time and features a complex rhythmic pattern with a tempo marking of  $\text{♩} = 72$ . The second staff is in 8/4 time and features a complex rhythmic pattern with a tempo marking of  $\text{♩} = 115$ . The notation includes various rhythmic patterns, time signatures, and melodic lines. The first staff has a tempo marking of  $\text{♩} = 72$  and the second staff has a tempo marking of  $\text{♩} = 115$ . The notation is presented in a grid-like format with each staff in a separate box.

tags: *AproPo*; *Composite Ratios*. Audio example number 3005.



**571b.** Invert 8/5-5/8

Audio example number 3006.

**572.** Proximities for 5,7 & 9:11

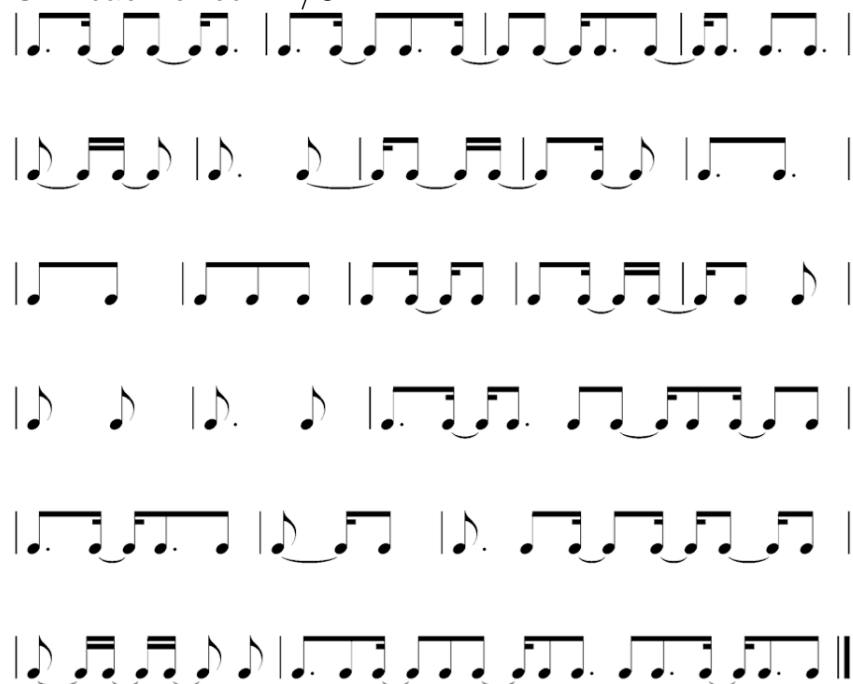
		5, 7 & 9:11			
11	9	7	5	AproPo Proximities	Ratio used
Dur. = 1.00 Pitch = F	Dur. = 1.22 Pitch = D	Dur. = 1.57 Pitch = B	Dur. = 2.2 Pitch = A		
1.0	1.0	1.0	1.0		
2.0	2.22			.02	5:1
		2.57		.03	5
3.0			3.2	.00	5
	3.44			.04	5
4.0		4.14		.01	8
	4.67			.00	6
5.0			5.4	.02	8
	5.89	5.71		.04	8
				.01	8
6.0					
7.0	7.11			.02	8
		7.29		.04	8
			7.6	.03	8
8.0					
	8.33			.00	6
		8.86		.02	6
9.0					
	9.56			.04	5
			9.8	.00	5
10.0					
	10.78	10.43		.05	8
				.03	8
11.0					
(1.0)				total = .40 fr 18 AP's avg. = .022	

tags: *Decimals; Short-Hand/Patt 1st; Simul/Sequent.*

**572a.** 1 Part-Composite-no nests apro

Audio example number 10016.

## 132. each once - 2/3



tags: *2-Hands; Class Representatives; Each/Once/(Spread); Fun*. Audio example number 25003.

Here one will hear the same rhythms over and over regardless of notation. The notes are all the same length but the beats change a little. The duration of each note is the same but won't necessarily look the same.

The last measure in line one: there are 2 attacks of the note (which are the same duration as all the notes that precede them) but 3 beats.

132. Class Reps-each/once

132	
Note Durations	Beat Durations

## 132. 2-hands

The musical score for exercise 132, 2-hands, consists of six staves of music. The first staff starts in 3/4 time and changes to 3/8. The second staff starts in 3/8, changes to 16/8, and then to 8/8. The third staff starts in 16/8, changes to 3/8, then to 6/8, and finally to 16/8. The fourth staff starts in 16/8, changes to 3/8, then to 16/8, and finally to 2/4. The fifth staff starts in 3/8, changes to 16/8, then to 12/8, and finally to 3/8. The sixth staff starts in 12/8 and ends with a double bar line.

Audio example number 25005.

**132.** new one

The image shows five staves of musical notation for exercise 132. Each staff begins with a treble clef. The first staff contains four measures of music. The second staff is marked with a '6' above the first measure and contains four measures. The third staff is marked with an '11' above the first measure and contains four measures. The fourth staff is marked with a '16' above the first measure and contains four measures. The fifth staff is marked with a '20' above the first measure and contains four measures, ending with a double bar line and repeat dots. The notation includes various rhythmic values such as eighth and sixteenth notes, often beamed together, and rests.

Audio example number 25007.

## 455. Special ReGroups

The musical score consists of six staves of music in 4/4 time. The first four staves are in 4/4 time, and the fifth and sixth staves are in 2/4 time. The score features various rhythmic patterns, including eighth and sixteenth notes, and rests. The first staff has a 7-measure rest, the second a 6-measure rest, the third a 9-measure rest, and the fourth a 10-measure rest. The fifth and sixth staves have 7-measure and 9-measure rests. The score is written in a single treble clef with a key signature of one flat.

tag: *ReGroup*. Audio example number 28006.

## 5.3

## 442. CR regroup

4:3 in 3's

5:2 in 3's

7:4 in 3's

3:2 in 4's

7:3 in 4's

8:5 in 2's  
and 3's

7:5 in 4's

7:5 in 3's

5:3 in 3's

5:3 in 4's

tag: *ReGroup*. In this exercise the performer is doing something that sounds fancy but in a sense is 4 against 3. There are two parts moving independently which converge in only two places in each line (other than the starting point). The notation might be confusing. This might be difficult at first. Audio example number 14008.

## 447. ratio to Odd

$\bullet = 40$

$\bullet = 70$

$\bullet = 40$

$\bullet = 70$

tag: *ratio to Odd*. Audio example number 28005.

## 449. my short-long

Audio example number 17015.



### 603f. Orig Metric

The musical score consists of seven staves of music, each containing five measures. The time signatures for the measures in each staff are as follows:

- Staff 1: 5/16, 7/16, 9/16, 11/16, 5/16
- Staff 2: 7/16, 9/16, 11/16, 7/16, 9/16
- Staff 3: 11/16, 5/16, 7/16, 9/16, 11/16
- Staff 4: 5/16, 9/16, 11/16, 5/16
- Staff 5: 7/16, 9/16, 11/16
- Staff 6: 5/16, 7/16, 9/16, 11/16
- Staff 7: 5/16, 7/16, 9/16

The notes are grouped with slurs and numbered above them, indicating the number of notes in each group: 3, 4, 5, 6, 7, 8, 9, 10, and 11.

tags: *Q Q.*; *Yeasty.*

**603d.** w Beats & Subbeams & 3 Rat

The musical score consists of eight staves of music, each containing a sequence of rhythmic patterns. The patterns are written in a single melodic line with a bass line accompaniment. The patterns are numbered 3 through 11, indicating the number of notes in the sequence. The patterns are written in a single melodic line with a bass line accompaniment. The patterns are numbered 3 through 11, indicating the number of notes in the sequence. The patterns are written in a single melodic line with a bass line accompaniment. The patterns are numbered 3 through 11, indicating the number of notes in the sequence.



## 446. 3+2 diff contx

♩ = 60

♩ = 120

♩ = 96

♩ = 60

Audio example number 23008.

## 510. 7:5 modifys

♩ = 70

♩ = 98

Audio example number 30004.

## 471. same patt/dif rat

♩ = 60

♩ = 75

♩ = 100

♩ = 60

♩ = 80

tags: *Levels; Same Patt/Differ Rat.* Audio example number 5014.



## 481. Met Mod Accel

Musical score for '481. Met Mod Accel' in treble clef. The piece consists of two staves of music. The first staff begins with a tempo marking of ♩ = 50 and features a sequence of eighth notes with a 7-measure rest. The tempo then changes to ♩ = 70. The second staff starts with a tempo marking of ♩ = 98 and continues with eighth notes and rests, with tempo markings of ♩ = 137 and ♩ = 192. The piece concludes with a double bar line.

tag: *Met Mod*. Audio example number 5016.

## 224. rats 5/8

Musical score for '224. rats 5/8' in treble clef with a 5/8 time signature. The score is divided into five systems, each starting with a measure number (1, 3, 5, 7) and a fermata. The music features eighth notes and rests, with various fingering numbers (5, 7, 3) and dynamic markings (.40, .38, .43) above the notes. The piece ends with a double bar line.

Audio example number 27010.

### 5.4

#### 194. ferney orig - from Brian Ferneyhough, *Kurze Schotten II*

quasi pizz. (p) 7 5:3 5 5 5:5 norm. (p) 7:4 sh

ppp p pp mp pp mf pp

(ppp) mf pp

(24:17) (24:17) (24:17)

#### 194. ed kurze

7:4 6:3 5:3 5:4 5:4 6:4 5:4 5:4 7

(p) (p) (p)

(24:17) (24:17) (24:17)

194. Bottom w word-bars 1-5+reveal

Bottom Part – Beats 1-5

194. bot w conven-Levels-triplets

194. Simpler 2-Triplet (fr 55)



### 194n. aside AproPo Bot

$\text{♩} = 40$

7 7 7

.71 .93 .14 .57  
.67 .92 .17 .58

6  $\text{♩} = 40$

7 7

Detailed description: This block contains two staves of musical notation. The first staff is in 4/4 time with a tempo of quarter note = 40. It contains five measures of music. The first measure has a quarter note G4. The second measure has a quarter rest followed by a quarter note A4. The third measure has a quarter note B4 with a slur and a '7' above it. The fourth measure has a quarter note C5 with a slur and a '7' above it. The fifth measure has a quarter note D5 with a slur and a '7' above it. Below the staff are four pairs of numbers: (.71 .93), (.14 .57), (.67 .92), and (.17 .58). The second staff starts at measure 6 and contains two measures. The first measure has a quarter rest followed by a quarter note Bb4. The second measure has a quarter note C5 with a slur and a '7' above it, followed by a quarter note D5 with a slur and a '7' above it.

### 194m. Simpler 1 -a 5/8 to a 3/4

3 3 3 3 3

etc

12

2 3 3 3 3 3

etc

12

3 etc

Detailed description: This block contains three staves of musical notation. The first staff is in 5/8 time and contains five measures of music, each with a triplet of eighth notes. The notes are G4, A4, and B4. Below the staff is a bracket labeled '12' under the first two measures, and the word 'etc' is centered under the last two measures. The second staff is in 3/4 time and contains six measures of music, each with a triplet of eighth notes. The notes are G4, A4, and B4. Below the staff is a bracket labeled '12' under the first two measures, and the word 'etc' is centered under the last two measures. The third staff is in 3/4 time and contains six measures of music, each with a quarter note. The notes are G4, A4, B4, G4, A4, B4. Below the staff is the word 'etc' centered under the last two measures.

### 194k. Simpler 3 (pitch too)

$\text{♩} = 120$

6  $\text{♩} = 120$

Detailed description: This block contains two staves of musical notation. The first staff is in 3/4 time with a tempo of quarter note = 120. It contains five measures of music. The first measure has a quarter note G4. The second measure has a quarter note A4. The third measure has a quarter note B4. The fourth measure has a quarter note C5. The fifth measure has a quarter note D5. The second staff starts at measure 6 and contains two measures. The first measure has a quarter note Bb4. The second measure has a quarter note C5 with a slur and a '7' above it, followed by a quarter note D5 with a slur and a '7' above it.

### 194. Propor Bottom part B-3

Musical notation for 194. Propor Bottom part B-3. The score is in 3/8 time and consists of a single melodic line. It features three measures, each with a 24:17 ratio indicated above the staff. The notes are: G4 (1.0), A4 (2.00), B4 (2.42), C5 (2.67), D5 (2.92), E5 (3.16), F5 (4.0), G5 (4.58), and A5 (5.0). The notes are connected by a long slur.

### 194. Propor Bot B-6 no rats, decs or ties

Musical notation for 194. Propor Bot B-6 no rats, decs or ties. The score is in 3/8 time and consists of a single melodic line. It features a sequence of notes: G4, A4, B4, C5, D5, E5, F5, G5, and A5.

### 194. all correct (-7s) w dec

Musical notation for 194. all correct (-7s) w dec. The score is in 4/4 time and consists of four staves. The tempo is marked as quarter note = 30. The notation includes various rhythmic patterns and accidentals, with time signatures in seconds below the notes. The notes are: G4 (0.07), A4 (0.14), B4 (0.21), C5 (0.29), D5 (0.36), E5 (0.43), F5 (0.52), G5 (0.60), A5 (0.69), B5 (0.77), C6 (0.86), D6 (0.16), E6 (0.24), F6 (0.32), G6 (0.40), A6 (0.48), B6 (0.53), C7 (0.58), D7 (0.64), E7 (0.69), F7 (0.75), G7 (0.67), A7 (0.92), B7 (0.16), C8 (0.32), D8 (0.48), E8 (0.64), F8 (0.80), G8 (0.96), A8 (0.17), B8 (0.34), C9 (0.51), D9 (0.68), E9 (0.85), F9 (1.02), G9 (1.19), A9 (1.36).

# Chapter 6

## 6.1

### 311. Expand patt



### 320. rit



Audio example number 32001.

**321. rit**

*♩ = 90*

The musical score consists of five staves of music. The first staff is in 16/16 time, starting with a treble clef and a key signature of one flat. It contains eight measures of music. The second staff is in 32/32 time, starting with a treble clef and a key signature of one flat, and contains eight measures. The third staff is in 8/8 time, starting with a treble clef and a key signature of one flat, and contains eight measures. The fourth staff is in 32/32 time, starting with a treble clef and a key signature of one flat, and contains ten measures. The fifth staff is in 16/16 time, starting with a treble clef and a key signature of one flat, and contains four measures. The tempo marking *rit* is indicated at the beginning of the first staff.

Audio example number 32002.

**376. 2+3**

Audio example number 5012.

**443. no layer-beat**

tag: *Class Representatives*. Audio example number 23005.

## 6.2

## 595. Hi-Number Ratios

Ratio Call	Dur of ea	Near Dec	Near Rat	slight dif	Totl Dif	HAM	Next APoint
213 : 61	.28638	.28571	7 : 2	faster	.00067	43	3.004
913 : 684	.74917	.75000	4 : 3	slower	.00083	211	4.997
94 : 28	.29787	.30000	10 : 3	slower	.00213	433	3.979
129 : 207	1.60465	1.60000	5 : 8	faster	.00465	110,110,10	9.023
61 : 53	.86885	.85714	7 : 6	faster	.01171	211111	7.082
53 : 17	.32075	.33333	3 : 1	slower	.01258	3	1.962
23 : 31	1.34783	1.33333	3 : 4	faster	.01450	1110	5.043
17 : 13	.76471	.75000	4 : 3	faster	.01471	211	4.059

129:207

.02

5:8

61:53

.08

7:6

tags: *Near Rats; Reducing Fractions.*

### 557. Dobrian Rhy

The musical notation for 'Dobrian Rhy' consists of four staves. The first staff is in 17/16 time and features a sequence of eighth notes with a 10-measure slur and a 5-measure slur. The second staff is in 2/4 time and features a sequence of eighth notes with a 10-measure slur. The third staff is in 3/4 time and features a sequence of eighth notes with a 5-measure slur. The fourth staff is in 4/4 time and features a sequence of eighth notes with a 14-measure slur.

tags: *One NV*; *Show Beat*. Audio example number 16017.

### 590. My Babbitt

The musical notation for 'My Babbitt' consists of three staves. The first staff is in 3/4 time and features a sequence of eighth notes with a 4-measure slur, a 3-measure slur, and a 5-measure slur. The second staff is in 3/4 time and features a sequence of eighth notes with a 5-measure slur. The third staff is in 3/4 time and features a sequence of eighth notes with a 5-measure slur, a 3-measure slur, and a 3-measure slur.

Audio example number 21018.

**590.** tuf Babbitt

from Babbitt's "Playing for time"



from Babbitt's "My Compliments to Roger" (Sessions)

**606.** 4.5:5.5

Audio example number 7017.

**6.3****612.** 7:5 in 3,4,5

1.71 2.42 3.14 3.86 4.57 5.29  
2.25 3.50 4.75

2 1.57 2.14 2.71 3.29 3.86 4.43  
2.0 3.0 4.0

3 1.43 1.86 2.29 2.71 3.14 3.57

Audio example number 27005.



**495c3.** No Ratios, TS, static Tempi accel

The musical score consists of three staves of music. Each staff contains a treble clef, a key signature of one flat (B-flat), and a 4/4 time signature. The music is a continuous eighth-note pattern. The first staff has four measures. The second staff starts at measure 4 and has four measures, with tempo markings above the first three measures: ♩ = 93, ♩ = 97, and ♩ = 100. The third staff starts at measure 8 and has four measures, with tempo markings above the first and third measures: ♩ = 107 and ♩ = 109. The piece ends with a double bar line and repeat dots.

Audio example number 25005.

**538a.** Same Patt/diff speeds

The image displays eight staves of musical notation, each representing a different speed for the exercise. The staves are numbered 1 through 8. Each staff begins with a tempo marking: 1. ♩ = 40, 2. ♩ = 60, 3. ♩ = 80, 4. ♩ = 100, 5. ♩ = 120, 6. ♩ = 140, 7. ♩ = 160, and 8. ♩ = 180. The notation includes various rhythmic patterns, such as eighth and sixteenth notes, and rests. Some patterns are grouped with brackets and labeled with numbers 3 or 5, indicating triplets or quintuplets. The time signature for each staff is 2/4. The music is written in a single treble clef.

tags: *2-ways; Levels; Same Patt/Differ Rat; Short-Hand/Patt 1st.*  
Audio example number 28013.

### 538f. Patt Notation

The image displays eight staves of musical notation, each representing a different tempo for the 'Patt Notation' exercise. The notation is written on a single treble clef staff with a common time signature of 4/4. Each staff begins with a tempo marking: 1. ♩ = 40, 2. ♩ = 60, 3. ♩ = 80, 4. ♩ = 100, 5. ♩ = 120, 6. ♩ = 140, 7. ♩ = 160, and 8. ♩ = 180. The notation consists of a sequence of notes: a quarter note, followed by two eighth notes, then a group of five sixteenth notes (indicated by a '5' above the group), followed by another quarter note, and finally another eighth note. The notes are placed on the first four lines of the staff, with the fifth line being empty. The eighth staff ends with a double bar line.

Audio example number 28014.

540. 7:5 AproPo Scale - hear 3 times ea

Avg. .0283 off

tag: *Near Rats*. Audio example number 18007.

540b. Figure

540					
apropo	7:5		apropo	7:5	
AP's	AP's	Off	Dur	Dur	Off
1.0	1.0				
1.75	1.71	.04	.75	.71	.04
2.40	2.43	.03	.65	.71	.06
3.13	3.14	.01	.73	.71	.02
3.88	3.86	.02	.75	.71	.04
4.60	4.57	.03	.72	.71	.01
5.25	5.29	.04	.65	.71	.06
		.17			.23
		Avg = .028 off			Avg = .038

542. Ferney carceri-p.5

A handwritten musical score for 'Ferney carceri-p.5'. The score is written on a single staff with a treble clef. It features complex rhythmic notation, including many beamed notes and rests. Above the staff, there are several annotations: 'sffz' (sforzando) with a wavy line, '(J.)' in a circle, and various arrows and brackets indicating phrasing or dynamics. Below the staff, there are dynamic markings 'ff' (fortissimo) and 'sfz' (sforzando), along with a long horizontal line that tapers from left to right, possibly indicating a crescendo or a specific performance technique.

tags: *Decimals; Levels; Look Diffic/Are Easy; Near Rats; Nests; Proportional; Yeasty.*

542a1. Levels w decimals

A musical score for '542a1. Levels w decimals' consisting of five staves of music. The tempo is marked as  $\text{♩} = 30$ . The notes are placed on a five-line staff. Below the notes, numerical values and ratios are written to indicate specific levels or proportions. The values are: 1.0, 2.0, 3.0, 4.0, 5.0, 6.0 on the second staff; 1.0, 2.20, 3.40, 4.60, 5.80 on the third staff; 1.0, 1.60, 2.20, 2.80, 3.40, 4.0, 4.60, 5.20, 5.80, 6.4 on the fourth staff; and 1.0, 1.34, 1.68, 2.03, 2.37, 2.71, 3.05, 3.40, 3.63, 3.85, 4.30, 4.53, 4.75, 4.98, 5.20, 5.56, 5.92, 6.28, 6.64 on the fifth staff. Ratios are indicated above some notes: 5:6 on the third staff, 5:6 on the fourth staff, 7:4 on the fifth staff, 4:3 on the fifth staff, and 5:3 on the fifth staff.

## 542b. word Apro decimals

2.4 div 7=.34

1.8 div 8=.23

1.8 div 5=.36

<b>1.0</b>		<b>3.40</b>		<b>5.20</b>
<b>1.34</b>		3.63		<b>5.56</b>
1.68		3.85		<b>5.92</b>
2.03		<b>4.08</b>		6.28
2.37		4.30		6.64-7.0
<b>2.71</b>		4.53		
<b>3.05-3.40</b>		<b>4.75</b>		
		4.98-5.20		

The numbers are beat values of all the onsets in the last staff of the preceding example. The ones that are sounded are shown in boldface.

## 542c. propor w decimals

1.34 2.71 3.05 3.40 4.08 4.75 5.20 5.56 5.92

1.0 2.0 3.0 4.0 5.0 6.0

BEATS

## 169. beam-beat-501

tags: *Beam-Beat*; *Invert*; *Look Diffic/Are Easy*; *Odd Evening*. Audio example number 17007.

169zz. renotated 169

Musical notation for 169zz. renotated 169. It consists of four staves of music. The first staff is in 3/4 time, the second in 8/4, the third in 7/4, and the fourth in 2/4. The notation includes various rhythmic patterns, including eighth and sixteenth notes, and rests.

*Look Differ/Are Same.*

42c. Pattern Notation-Bars 1-5

Musical notation for 42c. Pattern Notation-Bars 1-5. It consists of two staves of music. The first staff is in 4/4 time, with a tempo marking of ♩ = 60. It features two measures of music with a 5:4 ratio indicated above the first measure and a 5:6 ratio indicated above the second measure. The second staff is in 8/4 time, with a 5:4 ratio indicated above the first measure. The notation includes various rhythmic patterns, including eighth and sixteenth notes, and rests.

## 504. all Beatings

$\text{♩} = 32$     $\text{♩} = 64$     $\text{♩} = 96$     $\text{♩} = 128$     $\text{♩} = 160$

tags: *Beatings*; *Long-Hand*. Audio example number 22005.

## 5. Rotation - 4 equal



## 11. Displaced Rats wo Beats

$\text{♩} = 72$

upper notes- attack points

Line 1	1.00	1.57	2.14	2.71	3.29	3.86	4.43
Line 2	1.25	1.82	2.39	2.96	3.53	4.10	4.67
Line 3	1.50	2.07	2.64	3.21	3.78	4.35	4.92
Line 4	1.75	2.32	2.89	3.46	4.03	4.60	5.17

tag: *Displaced Rats*. Audio example number 20006.



### 618.11. Levels

The musical notation for 'Levels' consists of five staves. Staff 2 shows a sequence of five eighth notes with time markers at 1.0, 2.0, 3.0, 4.0, and 5.0. Staff 3 shows a sequence of four eighth notes with a bracket above labeled '4:5' and time markers at 1.0, 2.25, 3.50, and 4.75. Staff 4 shows a sequence of four eighth notes with a bracket above labeled '4:5' and time markers at 1.63, 2.25, 3.50, and 4.75. Below this staff is a complex rhythmic pattern with a bracket labeled '7:6'. Staff 5 shows a sequence of eighth notes with time markers at 1.63, 2.0, 3.0, 3.50, 4.0, 4.75, and 5.00. Below this staff is another complex rhythmic pattern with time markers at 1.63, 1.90, 2.16, 2.43, 2.70, 2.97, and 3.23.

### 618.12. Ferney wo dec/rat #s & Propor

The musical notation for 'Ferney wo dec/rat #s & Propor' consists of a single staff with a sequence of eighth notes.

**618e3.** Too Fast w dec ea=near. 2143. (Fix ending)

$\text{♩} = 60$

1.63 1.90 2.16 2.43 2.70 2.97 3.23 3.50 4.75

7

7

7

Audio example number 7012.

# Chapter 7

## 7.1

### 384a. rotate

384. 

tag: *Fun.* Audio example number 11012.

**440k1. 6-3/4**

$\text{♩} = 72$

Musical score for 440k1. 6-3/4. The score is written in treble clef and consists of three systems of music. The first system has a 3/4 time signature and contains measures 1-6. The second system has a 12/8 time signature and contains measures 7-12. The third system has a 3/4 time signature and contains measures 13-18. The music features a mix of eighth and sixteenth notes, often beamed together, and rests. The bass line is a simple eighth-note accompaniment.

Audio example number 1004.

**531b. Perc**

$\text{♩} = 68$

Musical score for 531b. Perc. The score is written in treble clef and consists of three systems of music. The first system has a 3/4 time signature and contains measures 1-5. The second system has a 3/4 time signature and contains measures 6-10. The third system has a 3/4 time signature and contains measures 11-15. The music features a mix of eighth and sixteenth notes, often beamed together, and rests. The bass line is a simple eighth-note accompaniment.

Audio example number 15015.

### 524. Natural ReGroup

The musical score for 'Natural ReGroup' consists of seven staves of music in treble clef. The piece begins in 4/4 time and features a complex rhythmic pattern of eighth and sixteenth notes. The first staff (measures 1-3) includes five-measure rests (5) and five-measure notes (5). The second staff (measures 4-6) changes to 3/4 time and continues with similar rhythmic patterns. The third staff (measures 7-9) returns to 4/4 time and introduces three-measure rests (3) and three-measure notes (3). The fourth staff (measures 10-11) changes to 3/4 time and features three-measure rests (3) and three-measure notes (3). The fifth staff (measures 12-14) returns to 4/4 time and includes three-measure notes (3) and five-measure notes (5). The sixth staff (measures 15-18) changes to 3/4 time and features three-measure notes (3) and five-measure notes (5). The seventh staff (measures 19-20) changes to 4/4 time and concludes with five-measure notes (5). The piece ends with a double bar line.

tag: *ReGroup*

## 7.2

## 573b. 25:16,14:9,17:11-Patt,Similar-composit

♩ = 80

25  
16

14  
9

17  
11

♩ = 125

.56 .13 .69 .25 .81 .38 .94 .50

.06 .63 .19 .75 .31 .88 .44

The top three staves show similarities in the three patterns. The first pattern, 25:16, is then approximated in two ways: first, as well as possible using up to 32nd-note divisions and triplets, and second, taking the nearest 16th note. The numbers above the Ds in the lower version show the number of beats after the most recent F each D should exactly appear. These are successive multiples of the fraction  $25/16$ , with the integer parts dropped. Every alternate one (shown slightly raised: 0,13, etc.)) is a whole number of 32nd notes. Audio example number 21014.



### 573c. Above Simul - soft - How Close

$\text{♩} = 80$

25:16

14:9

17:11

Audio example number 21016.

### 624. 32/25. Avg=01.40 off

$\text{♩} = 100$

.78 .56 .34 .13 .91 .69

.47 .25 .03 .81 .59 .38

.16 .94 .72 .50 .28 .06 .84

.63 .41 .19 .97 .75 .53

.31 .09 .88 .66 .44 .22

tags: *Nudged Rats*; *Yeasty*. Audio example number 6002.

## 624. w slanted lines

Musical notation for exercise 624, featuring slanted lines and time values. The notation is organized into four rows of notes, each with a time value above it. The notes are connected by slanted lines, and the time values are: 1.0, 1.78, 2.56, 3.34, 4.13, 4.91, 5.69, 6.47, 7.25, 8.03, 8.81, 9.59, 10.38, 11.16, 11.94, 12.72, 13.50, 14.28, 15.06, 15.84, 16.63, 17.41, 18.19, 18.97, 19.75, 20.53, 21.31, 22.09, 22.88, 23.66, 24.44, 25.22.

## 624. Nudged Rats

Musical notation for exercise 624, titled "Nudged Rats". The notation is a single line of music in 3/4 time, featuring a series of eighth notes with stems that are slightly slanted to the right, creating a "nudging" effect. The notes are grouped into measures, and the piece ends with a double bar line.

624. A's. (32:25)

The musical score is written in 2/4 time with a tempo of 100. It consists of five staves of music. The first staff begins with a tempo marking of 100. The notation includes various rhythmic values and fingerings: Staff 1: Quarter notes with fingerings 5, 7, 3, 10, 3. Staff 2: Quarter notes with fingerings 7, 5, 5. Staff 3: Quarter notes with fingerings 6, 7, 7, 6. Staff 4: Quarter notes with fingerings 5, 5. Staff 5: Quarter notes with fingerings 7, 10, 3, 7, 5. The piece concludes with a double bar line.

Avg=01.40 off

**628.** 8:5 & 5:8 Inverts-fast

The musical score consists of six staves, numbered 1 through 6. Staves 1 and 2 are in 8/4 time, with a tempo marking of ♩ = 120. A bracket above staff 1 spans the first five notes and is labeled '5:8'. Staff 2 is in 5/4 time, with a tempo marking of ♩ = 75, and a bracket below it spans the first five notes and is labeled '8:5'. Staves 3 and 4 are in 8/4 time, with a tempo marking of ♩ = 120. Staff 3 features five slurs, each labeled with the number '5', covering groups of notes. Staff 4 is in 5/4 time, with a tempo marking of ♩ = 75. Staves 5 and 6 are in 8/4 time, with a tempo marking of ♩ = 120. Staff 5 features four slurs, each labeled with the number '5', covering groups of notes. Staff 6 is in 5/4 time, with a tempo marking of ♩ = 75, and contains a complex rhythmic pattern with many beamed notes.

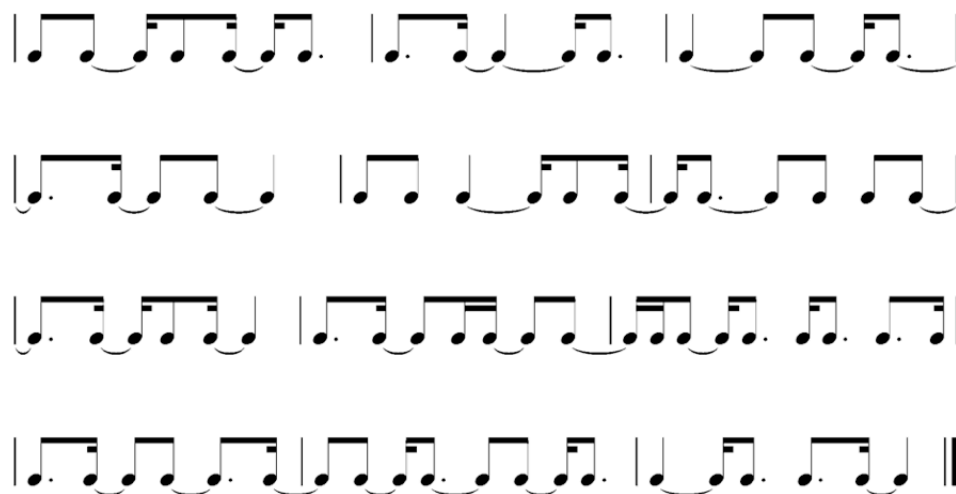
Audio example number 22007.

647. Triple Nest

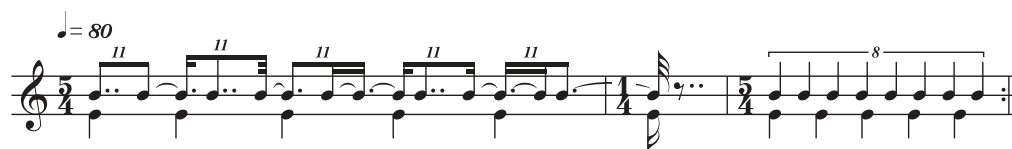
1	2	3	4	5	6	7	8	9	10	
1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0-11.0	
1	2	3	4	5	6	7	8	9	10	11
1.0	1.91	2.82	3.73	4.64	5.55	6.45	7.37	8.27	9.18	10.09-11.0
1	2	3	4	5	6	7	8	9	10	11
1.0	1.83	2.65	3.48	4.30	5.13	5.96	6.78	7.61	8.43	9.26-10.09
1	2	3	4	5	6	7	8	9	10	11
1.0	1.75	2.50	3.25	4.00	4.76	5.51	6.26	7.01	7.76	8.51-9.26

## 7.3

## 257. rotate - same NV-Ties



## 543. 8:5 - 11:7 AproPo



1st 8 of 11:7 = .0429 Avg. off

tag: *Near Rats* Audio example number 18009.

**543e.** 8:5 - 11:7 proportional

The image shows two staves of musical notation in 7/4 time. The first staff contains notes with rhythmic values .64, .27, .91, .55, .18, .82, and .45. A bracket above the first four notes is labeled '11:7'. The second staff contains notes with rhythmic values .63, .25, .88, .50, .13, .75, and .38. A bracket above the first four notes is labeled '8:5'. Both staves end with a double bar line.

tag: *Near Rats*. Audio example number 18009.

**543d.** figuring

543.			
Note #	11:7	8:5	Difference
1	1.00	1.00	
2	1.64	1.63	1
3	2.27	2.25	2
4	2.91	2.88	3
5	3.55	3.50	5
6	4.18	4.13	5
7	4.82	4.75	7
8	5.45	5.38	7
9	6.09		total = 30
10	6.73		Avg. = 4.29
11	7.37		
	1.00		

**583g3.** fast-Haydn 260

Audio example number 5010.

**583e.** Hear





583f. fig

Drew				Dur	Tempo
# Notes	Dur			1.00	64
				0.50	128
1	1.00			0.25	256
1	0.60			0.125	512
4	0.45				
1	0.60				
3	0.22				
4	0.28				
1	0.22				
1	0.57				
3	0.38				
1	0.57				
3	0.34				
3	0.23				
1	1.00				
1	0.67				
3	0.44				
1	1.00				
# 583					
Tempi Sorted	Durs Sorted				
64	1.00				
106	0.67	$1.0 - .67 = .33$	$.33 / .50 = .67$	$1.67 \times 64 = 106$	
115	0.60				
119	0.57				
(128)	(0.50)				
153	0.45	$.50 - .45 = .05$	$.05 / .25 = .20$	$1.20 \times 128 = 153$	
159	0.44				
189	0.38				
210	0.34				
240	0.28				
(256)	(0.25)				
297	0.23	$.25 - .23 = .02$	$.02 / .125 = .16$	$1.16 \times 256 = 297$	
317	0.22				
(512)	(0.125)				

593. 7:4 w differ sound durs



tag: *Diff Dur Rat notes*. Audio example number 17006.

555. 7/8 & 8/7

tags: *Q Q.*; *Show Beat*. Audio example number 20007.

565. Throw and Scale patt over Differ Durs, Rit

tags: *Scale it to fit*; *Short-Hand/Patt 1st*; *Show Beat*. Audio example number 27006.

435. Beat Accel fixed

tag: *HAMs*. Audio example number 7019.

### 592. Dec Rats. 19 against 3.25, 4.33, 2.6, and 13

$\text{♩} = 60$

Staff 1 (4/4):  $\overset{.17}{19:13}$   $\overset{.08}{.25}$

Staff 2 (2/4):  $\overset{.23}{19:17}$   $\overset{.33}{3}$

Staff 3 (3/4):  $\overset{.14}{19}$   $\overset{.20}{5}$

Staff 4 (12/4):  $\overset{.68}{19}$

Audio example number 12007.

### 608. $39:24 = 3-13:8s$

$\text{♩} = 60$

Staff 1 (3/4):  $\overset{1.92}{\Delta}$   $\overset{2.15}{\Delta}$   $\overset{39:24}{\Delta}$   $\overset{2.85}{\Delta}$   $\overset{3.08}{\Delta}$   $\overset{3.77}{\Delta}$

Staff 2 (2/4):  $\overset{39}{\Delta}$

Staff 3 (3/4):  $\overset{39}{\Delta}$

Audio example number 18013.

### 7.4

#### 560. Original Usher - Notes+Rests 5&7

The musical score consists of two systems of two staves each. The first system starts with a tempo marking of quarter note = 72. The first staff uses a treble clef and a 2/4 time signature, featuring eighth-note patterns with slurs and fingering numbers 7 and 5. The second staff uses a bass clef and a 2/4 time signature, featuring eighth-note patterns with slurs and fingering numbers 5 and 7. The second system continues with similar notation, including a 9/8 note in the first staff and various slurs and fingering numbers throughout.

tags: *Decimals; Diff Dur Rat notes; Full Value; Long-Hand; New Tempi / Rats; ReTempo/ReRatio; Same Patt/Differ Rat; Show Beat; Simul/Sequent; Yeasty.* Audio example number 8004.

#### 560b2. Full value Rhythm w Lines

The musical score consists of two staves. The first staff is a single treble clef staff with a series of eighth notes and rests. The second staff is a single treble clef staff with a series of eighth notes and rests, including a measure with a 2/8 note.

Audio example number 8008.

## 560. new 11-septuplets &amp; quintts

Musical score for example 560, measures 19-26. The score is in 7/4 time and begins with a tempo marking of  $\text{♩} = 72$ . Measures 19-21 feature complex rhythmic patterns with 7-measure groupings. Measures 22-26 consist of a sequence of 7-measure groups, with some groups containing 4, 8, 2, 4, 2, 4, 6, 4, and 2 measures respectively. The notation includes various note values, rests, and articulation marks.

Audio example number 8008.

## 560e4. Bars 5-8 of orig 7 &amp; 5:1

Musical score for example 560e4, measures 3-8. The score is in 7/4 time and begins with a tempo marking of  $\text{♩} = 59$ . Measures 3-4 feature 7-measure groupings. Measures 5-6 feature 9-measure and 5-measure groupings. Measures 7-8 feature 7-measure and 5-measure groupings. The notation includes various note values, rests, and articulation marks.

Audio example number 8011.

**560M.** Composite-done w 1 instru-5:1

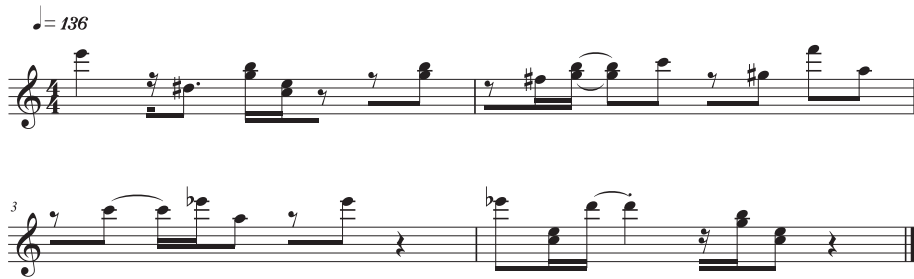
$\text{♩} = 109$



Audio example number 8010.

**560e6.** 4-1

$\text{♩} = 136$



Audio example number 8014.

**560k.** 6:1

$\text{♩} = 90$



Audio example number 8015.

**560L. 7:1**

♩ = 78

Audio example number 8016.

**560. Propor Tempi**

## Proportionality

Ratio x Tempo = same sound

5:1		♩ = 109
4:1	$5/4 \times 109 =$	♩ = 136
6:1	$5/6 \times 109 =$	♩ = 91
7:1	$5/7 \times 109 =$	♩ = 78



## 560. durations

#'s = duration in 16th note sextuplets (n = note, r = rest)

Read Left to Right

4n	1r	3n	1n	1n	4r	2n
2r	1n	3n	2n	2r	2n	2n
2n	2r	3n	1n	2n	2r	2n
4r	2n	1n	5n	1r	1n	2n



# Chapter 8

## 8.1

587.8. 4, 3+2s

$\text{♩} = 70$

The musical score is written on three staves. The first staff is in 10/4 time and begins with a tempo marking of  $\text{♩} = 70$ . The second staff is marked with a '2' above the treble clef, and the third staff is marked with a '6' above the treble clef. The music consists of a sequence of chords and melodic lines, with a specific chord in the first staff highlighted by a box.

Audio example number 19010.

**626.1.** Short Hand-Jersild

The musical score for 'Short Hand-Jersild' consists of five staves of music. Each staff begins with a measure number (1, 3, 5, 7, 9) and a treble clef. The first two staves are in 4/4 time, the third is in 3/4, and the fourth and fifth are in 4/4. The score features a variety of rhythmic patterns, including eighth and sixteenth notes, and rests. Four-measure phrases are indicated by a bracket with the number '4' above the notes. The piece concludes with a double bar line and repeat dots at the end of the fifth staff.

Audio example number 23004.

### 626. Same-Pat/Dif-Rat Long Hand

The musical score consists of five staves of music, each starting with a measure number (1, 3, 5, 7, 9) and a treble clef. The music is written in a single melodic line with a bass line of notes below. The time signature changes from 4/4 to 3/4, then to 2/4, and finally to 3/4. The notation includes various rhythmic values such as quarter, eighth, and sixteenth notes, as well as rests and accidentals. The piece concludes with a double bar line and repeat dots.



## 8.2

## 391. Rats accel w Beat

Audio example number 5003.

## 347d1. Orig Ratios - 7. Fast

tags: *Invert*; *Show Beat*.

**347b.** Invert Rats-Fix Beat Instruction - 8.

The musical notation consists of three staves. The first staff begins with a treble clef and a 21/16 time signature, followed by a series of notes and rests. The second staff starts with a 7/4 time signature, then changes to 2/4, and ends with a 18/16 time signature. The third staff begins with a 18/16 time signature, then changes to 2/4, and ends with a 21/16 time signature. The notes are primarily eighth and sixteenth notes, with some quarter notes and rests.

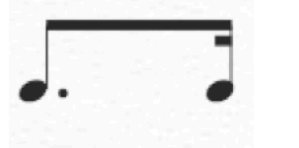


The high notes are to be vocalized and the low notes, regardless of the notation, are to be equally spaced beats and not vocalized.



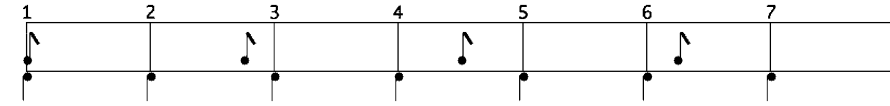
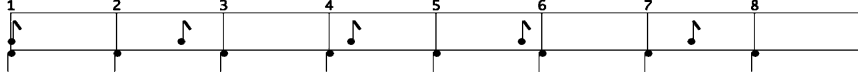
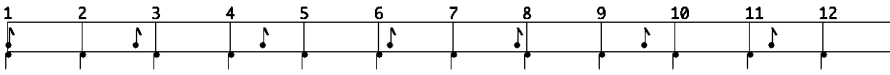


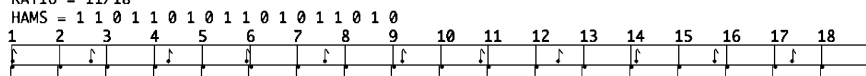

**646.** 7 Composite Rat Patts

tag: *Composite Ratios*. Audio example number 31004.

646. 7 Rats, components w dec

					
.60		.40		.09	
.63		.43		.10	
.64		.45		.13	
.67		.50 - 3		.14	
.70		.55		.18	
.71		.57		.20 - 2	
.73		.60		.25 - 2	
.75 - 2				.27	
.80 - 2				.29	
.82				.30	
.86				.33	
.88				.36	
.90				.38	
.91				.40	
		For Ratios -			
		4/7			
		7/12			
		10/17			
		3/5			
		11/18			
		8/13			
		5/8			

### 646. 7 Word/pdf

<p>RATIO = 4/7 HAMS = 1 1 0 1 0 1 0</p> 
<p>RATIO = 5/8 HAMS = 1 1 0 1 1 0 1 0</p> 
<p>RATIO = 7/12 HAMS = 1 1 0 1 0 1 1 0 1 0 1 0</p> 
<p>RATIO = 8/13 HAMS = 1 1 0 1 1 0 1 0 1 1 0 1 0</p> 
<p>RATIO = 10/17 HAMS = 1 1 0 1 0 1 1 0 1 0 1 1 0 1 0 1 0</p> 
<p>RATIO = 11/18 HAMS = 1 1 0 1 1 0 1 0 1 1 0 1 0 1 1 0 1 0</p> 
<p>RATIO = 3/5 HAMS = 1 1 0 1 0</p> 

## 104. ReGroup

Musical notation for '104. ReGroup' showing rhythmic patterns in various time signatures:

- Line 1:  $\frac{2}{4}$  time signature. A quarter note, followed by a triplet of quarter notes, followed by another quarter note. Then a  $\frac{3}{4}$  time signature. A triplet of eighth notes, followed by a quarter note, then a triplet of eighth notes, followed by a quarter note.
- Line 2:  $\frac{4}{4}$  time signature. A group of five eighth notes, followed by a group of three eighth notes.
- Line 3:  $\frac{5}{4}$  time signature. A group of five eighth notes, followed by a group of three eighth notes.
- Line 4:  $\frac{6}{4}$  time signature. A group of five eighth notes, followed by a group of three eighth notes.

tag: *ReGroup*.

## 104d. With Beat

Musical notation for '104d. With Beat' showing rhythmic patterns with a steady beat:

- Line 1: Treble clef. A quarter note, followed by a triplet of quarter notes, followed by a quarter note. Then a  $\frac{3}{4}$  time signature. A triplet of eighth notes, followed by a quarter note, then a triplet of eighth notes, followed by a quarter note.
- Line 2: Treble clef. A quarter note, followed by a triplet of quarter notes, followed by a quarter note. Then a  $\frac{5}{4}$  time signature. A group of five eighth notes, followed by a group of three eighth notes.
- Line 3: Treble clef. A group of five eighth notes, followed by a group of three eighth notes.

Audio example number 14014.

### 8.3

#### 632. 13:11 + apro and 2-hands

Musical score for example 632, 13:11 + apro and 2-hands. The score consists of four staves of music. The first staff has a treble clef and contains a sequence of eighth notes with fingerings 6, 3, 3, 6. The second staff has a bass clef and contains a sequence of eighth notes with fingerings 6, 3, 3, 6. The third staff has a treble clef and contains a sequence of eighth notes with fingerings 13 and 11. The fourth staff has a treble clef and contains a sequence of eighth notes with fingerings 3, 5, 5, 3.

Audio example number 20008.

#### 179. tempo warp

Musical score for example 179, tempo warp. The score consists of two staves of music. The first staff has a treble clef and contains a sequence of eighth notes with accents. The second staff has a treble clef and contains a sequence of eighth notes with accents and fingerings 3, 3.

Audio example number 22009.

## 273. MetMod retempi

The musical score for 'MetMod retempi' consists of four staves of music. The first staff starts in 4/4 time with a tempo of 60, then changes to 5/4 with a tempo of 75, and returns to 4/4 with a tempo of 60. The second staff starts in 5/4 with a tempo of 75, then changes to 4/4 with a tempo of 60, and returns to 5/4 with a tempo of 75. The third staff starts in 5/4 with a tempo of 60, then changes to 4/4 with a tempo of 80, and returns to 5/4 with a tempo of 60. The fourth staff starts in 5/4 with a tempo of 60, then changes to 3/4 with a tempo of 90, and ends with a double bar line.

Audio example number 6011.

## 610f. 17:13 show no beats

The musical score for '610f. 17:13 show no beats' consists of a single staff of music in 4/4 time. The staff contains a 17-measure rest, indicated by a horizontal line with the number 17 above it.

Tag: *Yeasty*.

The term “Yeasty” was used by the composer John Silber to describe ideas or artifacts that grow over time. Revisit these and you may see more than was there before. See also: 133; 133b; 62; 362; 355a; 374; 374b; 355a; 395; 422; 440; 603f; 542; 618.10; 542b; 542c; 624; 583; 62.

**610a.** 17:13 fig

<b>17:13</b>	<b>Conv</b>	<b>off</b>
1.00	1.00	.00
1.76	1.75	.01
2.53	2.50	.03
3.29	3.33	.04
4.06	4.13	.07
4.82	4.83	.01
5.59	5.60	.01
6.35	6.33	.02
7.12	7.13	.01
7.88	7.88	.00
8.65	8.67	.02
9.41	9.40	.01
10.18	10.17	.01
10.94	10.88	.06
11.71	11.67	.04
12.47	12.50	.03
13.24	13.25	.01
		avg .024

**610e2.** 17:13 w beat & simul

Audio example number 22012.

**610g1.** 17:13 Apro

610. same w dec

610b. 17:13 Hark vert & HAM

RATIO = 17/13  
 HAMS = 2 1 1 2 1 1 2 1 1 2 1 1 1




### 610c. 17:13 Hark dec vert

RATIO = 17/13  
HAMS = 2 1 1 2 1 1 2 1 1 2 1 1 1



### 610j. same w 8th notes & simul



## 4. rotate

A musical score consisting of six staves of music. Each staff begins with a treble clef and a 7/8 time signature. The music is written in a single melodic line with a bass line. The notes are primarily eighth and sixteenth notes, often beamed together. A '7' is written above the first note of each staff, indicating a seventh fret. The piece concludes with a double bar line and repeat dots.

Audio example number 6017.

## 172b1. 15,14,13

A musical score for a piece titled '172b1. 15,14,13'. It is written in 3/8 time and begins with a forte (*f*) dynamic marking. The score is divided into three systems, each with a treble clef. The first system contains six measures, with fret numbers 15, 14, 13, 12, 11, and 10 written above the notes. The second system contains nine measures, with fret numbers 8, 7, 6, 5, 4, 3, 2, 1, 1, 2, 3, 4, 5, 6, 7, 8, and 9 written above the notes. The third system contains six measures, with fret numbers 9, 10, 11, 12, 13, 14, and 15 written above the notes. The piece ends with a double bar line and repeat dots.

Audio example number 18012.

### 617. Magadini

♩ = 40

18 36 11:4

14 29 14:4

31 31 13:4 .09 36 11:4

7 29 57 7:4

### 627. 7:5 & 5:7 Inverts

♩ = 112

5 5 5 5

♩ = 80

7 7 7 7

tag: *Invert*. Audio example number 24011.

629. Ratio subd as Basis for apro Div

629



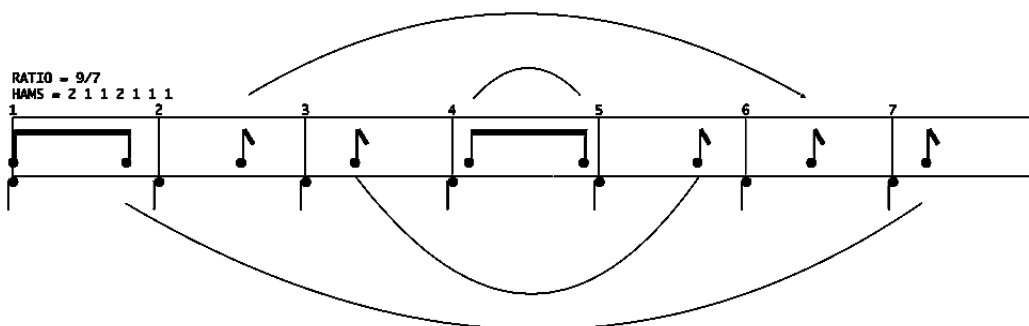
4:5		4:3		5:3	
11:5	3323	10:3	3223	15:3	33333
12:5	3333	11:3	3323	16:3	43333
13:5	4333	12:3	3333	17:3	44333
14:5	4433	13:3	4333	18:3	44433
15:5	4443	14:3	4433	19:3	44443
16:5	4444	15:3	4443	20:3	44444
17:5	5444	16:3	4444	21:3	54444
18:5	5544	17:3	5444	22:3	55444
19:5	5554	18:3	5445	23:3	55544
20:5	5555	19:3	5455	24:3	55554
21:5	6555	20:3	5555	25:3	55555
22:5	6655	21:3	6555	26:3	65555
23:5	6665	22:3	6655	27:3	66555
24:5	6666	23:3	6665	28:3	66655
		24:3	6666	29:3	66665
				30:3	66666

+ other orderings, eg -4333, 3433,3343,3334

3 simple ratios as basis for aprox division

tags: *Nudged Rats*; *Subdiv Rats*.

639. Rat symmetry



534cc. hoquet

The musical score consists of six staves of music, arranged in three pairs. Each pair represents a different instrument. The first pair (staves 1 and 2) is in 9/8 time, with a treble clef and a key signature of one sharp (F#). The second pair (staves 3 and 4) is in 12/8 time, with a treble clef and a key signature of one sharp. The third pair (staves 5 and 6) is in 9/8 time, with a treble clef and a key signature of one sharp. The music features a complex rhythmic pattern of eighth and sixteenth notes, characteristic of a hoquet.

Audio example number 16018.

## 8.4

## 535a. HAMs by rat

1:1	1.000	1	13:5	.385	332 32
2:1	.500	2	13:6	.462	322222
3:1	.333	3	13:7	.538	2222221
3:2	.667	21	13:8	.615	221 221 21
4:1	.250	4	13:9	.692	21 21 21 211
4:3	.750	211	13:10	.769	211 211 2111
5:1	.200	5	13:11	.846	211111 2111111
5:2	.400	32	13:12	.923	2+1x11
5:3	.600	221	14:1	.071	14,
5:4	.800	2111	14:3	.214	554
6:1	.167	6	14:5	.357	333 32
6:5	.833	21111	14:9	.643	221 21 21 21
7:1	.143	7	14:11	.786	211 2111 2111
7:2	.286	43	14:13	.929	2+1x12
7:3	.429	322	15:1	.067	15,
7:4	.571	2221	15:2	.133	87
7:5	.714	21 211	15:4	.267	4443
7:6	.857	211 111	15:7	.467	3222222
8:1	.125	8	15:8	.533	22222221
8:3	.375	332	15:11	.733	21 211 211 211
8:5	.625	221 21	15:13	.867	2111112111111
8:7	.875	2111 111	15:14	.933	2+1x13
9:1	.111	9	16:1	.063	16,
9:2	.222	54	16:3	.188	655
9:4	.444	3222	16:5	.313	43333
9:5	.556	22221	16:7	.438	322 3222
9:7	.778	211 2111	16:9	.563	22221 2221
9:8	.889	21111 111	16:11	.688	21 21 21 21 211
10:1	.100	10,	16:13	.813	2111x2+21111
10:3	.300	433	16:15	.938	2+1x14
10:7	.700	21 21 211	17:1	.059	17,
10:9	.900	211111111	17:2	.118	98
11:1	.091	11,	17:3	.176	665
11:2	.182	65	17:4	.235	5444
11:3	.273	443	17:5	.294	43 433
11:4	.364	3332	17:6	.353	333 332
11:5	.455	32222	17:7	.412	32 32 322
11:6	.545	222221	17:8	.471	32222222
11:7	.636	221 21 21	17:9	.529	222222221
11:8	.727	21 211 211	17:10	.588	2221+221x2
11:9	.818	2111 21111	17:11	.647	221+21 x4
11:10	.909	2111111111	17:12	.706	2121211 21211
12:1	.083	12,	17:13	.765	211x3+2111
12:5	.417	32 322	17:14	.824	2111+21111x2
12:7	.583	2221 221	17:15	.882	2,+1x6+2,+1x
12:11	.917	21111111111	17:16	.941	2+1x15
13:1	.077	13,	18:1	.056	18,
13:2	.154	76	18:5	.278	443 43
13:3	.231	544	18:7	.389	332 32 32
13:4	.308	4333	18:11	.611	221x3+ 21

**535b.** HAMS by dec

25:1	.040	25,	25:6	.240	544444
24:1	.042	24,	4:1	.250	4
23:1	.043	23,	23:6	.261	444443
22:1	.045	22,	19:5	.263	44443
21:1	.046	21,	15:4	.267	4443
20:1	.050	20,	11:3	.273	443
19:1	.053	19,	18:5	.278	443 43
18:1	.056	18,	25:7	.280	443 43 43
17:1	.059	17,	7:2	.286	43
16:1	.063	16,	24:7	.292	43 43 433
15:1	.067	15,	17:5	.294	43 433
14:1	.071	14,	10:3	.300	433
13:1	.077	13,	23:7	.304	433 4333
25:2	.080	13,12	13:4	.308	4333
12:1	.083	12,	16:5	.313	43333
23:2	.087	12,11	19:6	.316	433333
11:1	.091	11,	22:7	.318	4333333
21:2	.095	11,10	25:8	.320	43333333
10:1	.100	10,	3:1	.333	3
19:2	.105	10,9	23:8	.348	33333332
9:1	.111	9	20:7	.350	3333332
17:2	.118	98	17:6	.353	333332
25:3	.120	988	14:5	.357	33332
8:1	.125	8	25:9	.360	33332 3332
23:3	.130	887	11:4	.364	3332
15:2	.133	87	19:7	.368	3332 332
22:3	.136	877	8:3	.375	332
7:1	.143	7	21:8	.381	332 332 32
20:3	.150	776	13:5	.385	332 32
13:2	.154	76	18:7	.389	332 32 32
19:3	.158	766	23:9	.391	332 32 32 32
25:4	.160	7666	5:2	.400	32
6:1	.167	6	22:9	.409	32 32 32 322
23:4	.174	6665	17:7	.412	32 32 322
17:3	.176	665	12:5	.417	32 322
11:2	.182	65	19:8	.421	32 322 322
16:3	.188	655	7:3	.429	322
21:4	.190	6555	23:10	.435	322x2+3222
5:1	.200	5	16:7	.438	322 3222
24:5	.208	55554	25:11	.440	322+3222x2
19:4	.211	5554	9:4	.444	3+ 2x3
14:3	.214	554	20:9	.450	3222 32222
23:5	.217	554 54	11:5	.455	3+ 2x4
9:2	.222	54	24:11	.458	3+2x4,3+2x5

### 535c. HAMs by Family

5's & 4's	4's & 3's	3's & 2's	2's & 1's	2's & 1's
9:2 54	7:2 43	5:2 32	3:2 21	8:5 221 21
14:3 554	10:3 433	7:3 322	4:3 211	12:7 2221 221
19:4 5554	13:4 4333	9:4 3222	5:4 2111	16:9 22221 2221
24:5 55554	16:5 43333	11:5 32222	6:5 21111	20:11 222221 22221
	19:6 433333	13:6 322222	7:6 211111	24:13 2222221 222221
9:2 54	22:7 4333333	15:7 3222222	8:7 2111111	
13:3 544	25:8 43333333	17:8 32222222	9:8 21111111	8:5 221 21
17:4 5444		19:9 322222222		13:8 221 221 21
21:5 54444	7:2 43	21:10 3222222222	5:3 221	18:11 221 221 221 21
25:6 544444	11:3 443	23:11 32222222222	7:4 2221	23:14 221 221 221 221 21
	15:4 4443	25:12 322222222222	9:5 22221	
	19:5 44443		11:6 222221	10:7 2121 211
22:5 54 544	23:6 444443	5:2 32	13:7 2222221	17:12 2121 211 21 211
		8:3 332	15:8 22222221	24:17 2121 211 21 211 21 211
23:5 554 54	11:3 443	11:4 3332	17:9 222222221	
	18:5 443 43	14:5 33332	19:10 2222222221	11:8 21 211 211
	25:7 443 43 43	17:6 333332	21:11 22222222221	18:13 21 211 21 211 211
11:2 65		20:7 3333332	23:12 22222222221	25:18 21 211 21 211 21 211 211
16:3 655		23:8 33333332	25:13 222222222221	
21:4 6555				
	17:5 43 433		7:5 21 211	12:7 2221 221
17:3 665	24:7 43 43 433	12:5 32 322	9:7 211 2111	17:10 2221 221 221
23:4 6665		16:7 322 3222	11:9 2111 21111	22:13 2221 221 221 221
	23:7 433 4333	20:9 3222 32222	13:11 21111 211111	
13:2 76		24:11 32222 322222	15:13 211111 2111111	16:9 22221 2221
19:3 766			17:15 2111111 21111111	23:13 22221 2221 2221
25:4 7666		12:5 32 322	19:17 21111111 211111111	
		17:7 32 32 322	21:19 211111111 2111111111	16:13 2111 2111 21111
20:3 776		22:9 32 32 32 322	23:21 2111111111 21111111111	21:17 2111 2111 2111 21111
			25:23 21111111111 211111111111	
15:2 87		13:5 332 32		19:16 21111 21111 211111
22:3 877		18:7 332 32 32	7:5 21 211	25:21 21111 21111 211111 211111
		23:9 332 32 32 32	10:7 21 21 211	
23:3 887			13:9 21 21 21 211	17:14 2111 21111 21111
		13:5 332 32	16:11 21 21 21 21 211	23:19 2111 21111 21111 21111
17:2 98		19:7 3332 332	19:13 21 21 21 21 21 211	
25:3 988		25:9 33332 3332	22:15 21 21 21 21 21 21 211	
			25:17 21 21 21 21 21 21 21 211	



### 535d. HAMS by Family 2

	<b>X</b> : 2		<b>X</b> : 6		<b>X</b> : 8
21	3:2		111110	5:6	21111111
32	5:2		222221	11:6	32222222
43	7:2		333332	17:6	43333333
54	9:2		444443	23:6	54444444
			555554	29:6	
	<b>X</b> : 3				21,211,211
110	2:3		211111	7:6	32,322,322
221	5:3		322222	13:6	43,433,433
332	8:3		433333	19:6	54,544,544
443	11:3		544444	25:6	
554	14:3				221,221,21
665	17:3		<b>X</b> : 7		332,332,32
			100,1000	2:7	443,443,43
211	4:3		211,2111	9:7	554,554,54
322	7:3		322,3222	16:7	
433	10:3		433,4333	23:7	22222221
544	13:3				33333332
655	16:3		10,10,100	3:7	44444443
			21,21,211	10:7	55555554
	<b>X</b> : 4		32,32,322	17:7	
1110	3:4		43,43,433	24:7	<b>X</b> : 9
2221	7:4				1000,10000
3332	11:4		110,10,10	4:7	2111,21111
4443	15:4		211,21,21	11:7	3222,32222
5554	19:4		322,32,32	18:7	4333,43333
6665	23:4		433,43,43	25:7	
					10,10,10,100
2111	5:4		1110,110	5:7	21,21,21,211
3222	9:4		2221,221	12:7	32,32,32,322
4333	13:4		3332,332	19:7	43,43,43,433
5444	17:4		4443,443	26:7	
6555	21:4				110,10,10,10
			1111110	6:7	221,21,21,21
	<b>X</b> : 5		2222221	13:7	332,32,32,32
11110	4:5		3333332	20:7	443,43,43,43
22221	9:5		4444443	27:7	
33332	14:5				11110,1110
44443	19:5		2111111	8:7	22221,2221
55554	24:5		3222222	15:7	33332,3332
			4333333	22:7	44443,4443
10000	1:5		5444444	29:7	
21111	6:5				111111110

**536a.** Various Ratio Reckon-by rat

Ratio	HAM	Ratios Sequence	Parents (& Crams)	Equiv Ratio	Subdl Unec	Pat 1st	Speed UP	X+ Y:Z	Dec
3:2	21					*		*	.6666
3:4	1110					*			1.333
4:3	211					*		*	.7500
4:5	11110								1.250
5:2	32					*	*		.4000
5:3	221					*	*	*	.6000
5:4	2111					*		*	.6000
6:5	21111		2:5 (33) 3:5 (222)	3:2 1/2 2:1 2/3					.8333
7:2	43						*		.2857
7:3	322					*	*	*	.4286
7:4	2221					*	*	*	.5714
7:5	21,211	3:2 + 4:3							.7143
8:3	332		4:3 (2222) 2:3 (44)	2: 3/4 4:1 1/2		*	*	*	.3750
8:5	221,21	5:3 + 3:2	4:5 (22) 2:5 (44)	2:1 1/4 4:2 1/2			*		.6250
8:7	2111,111		4:7 (2222)						.8750
9:2	54		3:2 (333)			*			.2222
9:4	3222		3:4 (333)			*	*		.4444
9:5	22221		3:5 (333)						.5555
9:7	211,2111	4:3 + 5:4							.7777
10:3	433		2:3 (55)	5:1 1/2		*			.3000
10:7	21,21,211	3:2 + 3:2 + 4:3							.7000
11:2	65				323 434				.1616
11:3	443					*			.2727
11:4	3332					*			.3636
11:5	32222								.4545
11:7	221,21,21	5:3 + 3:2 + 3:2							.6363
11:8	21,211,211	3:2 + 4:3 + 4:3							.7272
11:9	2111,21111	5:4 + 6:5							.8181
12:5	32,322	5:2 + 7:3	3:5 (444) 4:5 (3333) 2:5 (66)	— 3:1 1/4 6:2 1/2					.4166
12:7	2221,221	7:4 + 5:3	3:5 (444)						.5833
13:2	76			13:2	433 544				.1538
13:3	544					*			.2306
13:5	332,32	6:3 + 5:2							.3646
13:6	4333								.4615
13:8	221,221,21	5:3 + 5:3 + 3:2							.6154
13:9	212121,211	(3:2 x3) + 4:3							.6923
14:3	554		7:3 (2222222) 2:3 (77)	— 7:1 1/2					.2143
14:5	33332								.3571
15:2	67		3:2 (555) 5:2 (33333)						.1333
15:4	4443		3:4 (555) 5:4 (33333)			*			.2666
15:7	3222,222		4:7 (4344)						.4666

### 536b. Various Ratio Reckon-by Decimal

Ratio Reckoning (non-long-hand)

Ratio	HAM	Ratios Sequence	Parents (& Crams)	Equiv Ratio	Subdi Uneq	Pat1st	Speed up	X+ Y:Z	Dec
25:3	988		5:3 (55555)						.1200
15:2	87		3:2 (555) 5:2 (33333)						.1333
20:3	776		4:3 (5555) 5:3 (44444)	5:3/4 4:3/5					.1500
13:2	76				4/33 5/44				.1538
19:3	766	(3:2 x 5) + 4:3	5:3 (44344)						.1579
25:3	988		5:3 (55555)						.1200
23:4	6665				3222223 4333334	*			.1739
17:3	665		4:3 (4544)		32223 43334				.1765
11:2	65				3/23 4/34				.1818
16:3	655		4:3 (4444) 2:3 (88)	4:3/4 8:11/2					.1875
21:4	6555		3:4 (777) 7:4 (3333333)		34333 45444				.1905
24:5	555,54		3:5 (888) 4:5 (6666) 8:5 (33333333)	— — —	6:11/4				.2083
19:4	5554								.2105
14:3	554		7:3 (2222222) 2:3 (77)	— 7:11/2					.2143
23:5	554,54	14:3+9:2	4:5 (6566)						.2174
9:2	54		3:2 (333)			*			.2222
22:5	54,544	9:2+13:3	7:5 (3334333)						.2273
13:3	544					*			.2308
17:4	5444					*			.2353
21:5	54,444		7:5 (3333333) 3:5 (777)						.2381
25:6	544444								.2400
19:5	44443		5:3 (44344)						.2632
23:6	444443								.2632
15:4	4443		3:4 (555) 5:4 (33333)			*			.2666
11:3	443					*			.2727
18:5	443,43	11:3 +7:2	3:5 (666)						.2777
7:2	43						*		.2857
24:7	43,43,433	7:2x2+10:3	4:7 (6666)						.2917
17:5	43,433	7:2 + 10:3	4:5 (4544) 3:5 (656)						.2941
10:3	433		2:3 (55)	5:11/2		*			.3000
23:7	433,4333	10:3+13:4	4:7 (6566)						.3043
16:5	43,333		4:5 (4444) 2:5 (88) 8:7 (22222222)	4:11/4 8:21/2 2: 7/8					.3125
19:6	433333								.3158
22:7	4333333								.3182
25:8	43333333								.3200
23:8	33333332								.3478
20:7	3333332		4:7 (5555)						.3500



# Index

- 2. typical mist, 12
- 4. rotate, 166
- 5. Rotation - 4 equal, 122
- 5. rotate w beat, 54
- 11. Displaced Rats wo Beats, 123
- 22-26. accels, 13
- 33. same patt/dif rat, 12
- 42c. Pattern Notation-Bars 1-5, 121
- 43a. Different Rat/same speed, 3
- 44b. Patt 1st Rit Oblique, 3
- 46. 4:1 APs-Hocket, each/once, 14
- 62. 21:4 regr, 35
- 63a. w decimals 21:4, 35
- 63. same AproPo, Groupings below  
dur, 36
- 66. 2 versions, 36
- 67. div with #s, 36
- 68. look simp/not, 19
- 68b. look simp/not, 19
- 76c. ReTempo/reRatio, 10
- 78. 3-5-4, 36
- 80b. Odd dupl, 5
- 80e. Part rat, 4
- 89b. Tibet, 2
- 90b. Duplex, 11
- 95. Duplex 4s, 51
- 104. ReGroup, 160
- 104d. With Beat, 160
- 105b. Indian ReGroup, 6
- 106. Pat 1st, 1
- 107a. ReGroup, 2
- 108b. With beat, Patt 1st, 2
- 109. pat 1st sho beat on top, 87
- 112. Artic points / decimal durations,  
86
- 112h1. interrupted - w beat, 86
- 112h. Partial Rat w beat, 86
- 112j. no beats-Interrupted Ratio, 85
- 112r3. tune, 86
- 114. Extreme partial AproPo, 7
- 114. Extreme partial AproPo, as it  
sounds, 9
- 114. Extreme partial AproPo, as num-  
bers, 8
- 125. rotate 2, 25
- 127. All 6, 30
- 127. Two-hands, 29
- 128. THE held, 30
- 130. Simp/Compound, 74
- 131. 1 NV, 26
- 131. Odd Evening, 26
- 132. 2-hands, 94
- 132. Class Reps-each/once, 93
- 132. each once - 2/3, 92
- 132. new one, 95
- 133. Music 2, 32
- 133b. 2-Hands, 33
- 141. 2/3-All Contexts (369), 26
- 142. 2/3-All Contexts (369), 27
- 145. THE Rhythm, 31
- 146. w heard beat, 32
- 147. free, 47
- 148. div mid - 3, 48
- 151. Met Mod, 40
- 151b2. deMet Mod, 40
- 156. Met Mod, 47
- 158. very fast, 48
- 166. Eq Rats, 34
- 168. Eq Rats2 (fast w beat), 34
- 169. beam-beat-501, 120
- 169zz. renotated 169, 121
- 171. x:Odd, ratio/5-8, 37
- 172b1. 15,14,13, 166
- 179. tempo warp, 161

180. 4/12 bar, 65  
 182. Different Rat/same speed, 65  
 185. offset / beat accel-fix-Oblique, 49  
 186. Conventional, 49  
 186b. Figure, 50  
 187. Magic 14 chart, 17  
 187b. 187 score, 18  
 188, 18  
 189, 18  
 194. Bottom w word-bars 1-5+reveal, 106  
 194. Propor Bot B-6 no rats, decs or ties, 108  
 194. Propor Bottom part B-3, 108  
 194. Simpler 2-Triplet (fr 55), 106  
 194. all correct (-7s) w dec, 108  
 194. bot w conven-Levels-triplets, 106  
 194. ed kurze, 105  
 194. ferney orig - from Brian Ferneyhough, *Kurze Schotten II*, 105  
 194k. Simpler 3 (pitch too), 107  
 194m. Simpler 1 -a 5/8 to a 3/4, 107  
 194n. aside AproPo Bot, 107  
 196c. Simple on Plateau w tempi, 60  
 196c. Simple on Plateau w tempi, continued, 61  
 197. Ferneyhough orig, 61  
 197a2. Ferney w his Rhy & my pi, 63  
 197a. Ferney wo most things, 62  
 197b. compare w mult & sound-BN, 62  
 197d. Ferney w his pitches-my rhy, 62  
 197e. Simple pitches, 60  
 197g. his rhy/my pi, 60  
 2-Hands, **33**, 92  
 2-ways, 34, 59, 69, 116  
 214. Duplex, 50  
 216c. Start on Beat, 66  
 217. Ferney (excerpt from Brian Ferneyhough), 38  
 217. Transform Into, 37  
 224. rats 5/8, 104  
 253. Maintain, 39  
 254. rad 4:3, 87  
 257. rotate - same NV-Ties, 138  
 260. Haydn - 331, 583G, 15  
 273. MetMod retempi, 162  
 277. Transf into, 55  
 279. Partial Rats, 88  
 280. Silly Nest, 51  
 294. Invert, 33  
 296. my 32nds, 83  
 3/4, 67, 71  
 309. Q Q. (Excerpt from *Paraphrases* by Milton Babbitt), 39  
 311. Expand patt, 109  
 320. rit, 109  
 321. rit, 110  
 331. Haydn rat, 17  
 347b. Invert Rats-Fix Beat Instruction - 8. , 156  
 347d1. Orig Ratios - 7. Fast, 155  
 355a. w Beat-Patt Notation,each/once, 52  
 356. w Beat, 53  
 356b. Taffy-Conventch, 54  
 362  
 362. accents, 45  
 362. circles (invert), 44  
 362. evry 4, 42  
 362. invert, 46  
 362. scale (No TS), 45  
 362. all note heads, 41  
 371. 2x speed w bashnaggles, 33  
 371. One NV, 34  
 374. 9-7-15 scale, 56  
 374b. Ferney Orig, 56  
 374h. fern levels, 57  
 374j2. w Dur in 64th Triplets, 58  
 376. 2+3, 111  
 384a. rotate, 128  
 385a. 1/4 - 6/32, 66  
 386. Rotate, 88  
 388. 4 & 3:1 AP/dur-All, 14  
 391. Rats accel w Beat, 155  
 392. tuf rats, 59  
 394. evry 3, 43  
 395L. other rats, 68  
 395. prob, 67  
 395g3. fig, 67  
 397. 3-2-4, 50  
 402. imposs, 59

405. simple patt in all contexts, 154  
 410b1. quin-5/8, 74  
 410d1. quin-5/8, 75  
 415B. in 4/4, 29  
 415g3. in 7, 29  
 419. partial rats, 68  
 422.1. reveal, 70  
 422. 13s, 71  
 422. Figures, 70  
 422. big copy, 69  
 422j. Figure-orig order, 70  
 424ab. Rite, 76  
 424cd. Rite, 77  
 424ef. Rite, 78  
 424gh. Rite, 79  
 424ijk. Rite, 80  
 425. figure, 83  
 425. true, 81  
 425b2. AproPo CR, 82  
 428.2. Grad met. Rit. Q Q. w decimals, 84  
 428. w beat, 85  
 435. Beat Accel fixed, 144  
 440. 6-3/4 alone beat-bar, 381, 71  
 440b2. 6-3/4, 71  
 440k1. 6-3/4, 129  
 440k1. 6-3/4, 72  
 442. CR regroup, 97  
 443. no layer-beat, 111  
 444. 7s typ mist, 12  
 446. 3+2 diff contx, 102  
 447. ratio to Odd, 98  
 449. my short-long, 98  
 455. Special ReGroups, 96  
 458. 12-beat-bar, 58  
 461. Shapey (from Weisberg), 72  
 461z. Shapey w lines, 73  
 471. same patt/dif rat, 102  
 473. rats-met mod, 27  
 481. Met Mod Accel, 104  
 495c3. No Ratios, TS, static Tempi accel, 115  
 504. all Beatings, 122  
 505. Near Pats, 89  
 508. Grouping, 28  
 510. 7:5 modifys, 102  
 513. List Glance, 90  
 524. Natural ReGroup, 130  
 525. all 5/8s, 103  
 530a. 11:4 Near, 124  
 531b. Perc, 129  
 534cc. hockey, 169  
 535a. HAMs by rat, 170  
 535b. HAMs by dec, 171  
 535c. HAMs by Family, 172  
 535d. HAMs by Family 2, 173  
 536a. Various Ratio Reckon-by rat, 174  
 536b. Various Ratio Reckon-by Decimal, 175  
 538a. Same Patt/diff speeds, 116  
 538f. Patt Notation, 117  
 540. 7:5 AproPo Scale - hear 3 times ea, 118  
 540b. Figure, 118  
 542. Ferney carceri-p.5, 119  
 542b. word Apro decimals, 120  
 542c. propor w decimals, 120  
 542a1. Levels w decimals, 119  
 543. 8:5 - 11:7 AproPo, 138  
 543e. 8:5 - 11:7 proportional, 139  
 543d. figuring, 139  
 548. 3&4 feelings, 55  
 555. 7/8 & 8/7, 143  
 557. Dobrian Rhy, 113  
 560L. 7:1, 149  
 560M. Composite-done w 1 instru-5:1, 148  
 560. Original Usher - Notes+Rests 5&7, 146  
 560. Propor Tempi, 149  
 560. new 11-septuplets & quints, 147  
 560b2. Full value Rhythm w Lines, 146  
 560e4. Bars 5-8 of orig 7 & 5:1, 147  
 560e6. 4-1, 148  
 560. durations, 150  
 560k. 6:1, 148  
 565. Throw and Scale patt over Differ Durs, Rit, 143  
 570  
 570. 17:11 Lolli-HAM, 21  
 570. 14:9, 24

570. vert (17:11 decimals vert), 22
570. compos (Patt w dec-composite patt), 20
570. conventch not ful-dur, 22
570. conventch, 21
570. hocket 1, 20
570. invert, 23
570. noodgie w/rats, 23
570. propor, 22
570. seq/simul, 23
570. tun 1a, 19
570. tun 1b, 19
571. 8:5:3, 90
- 571b. Invert 8/5-5/8, 91
572. Proximities for 5,7 & 9:11, 91
- 572a. 1 Part-Composite-no nests apro, 92
- 573b. 25:16,14:9,17:11-Patt,Similar-composite, 131
- 573c. Above Simul - soft - How Close, 132
- 583e. Hear, 140
- 583e2. w Beat, 141
- 583f. fig, 142
- 583g3. fast-Haydn 260, 140
- 587.8. 4, 3+2s, 151
590. My Babbitt, 113
590. tuf Babbitt, 114
592. Dec Rats. 19 against 3.25, 4.33, 2.6, and 13, 145
593. 7:4 w differ sound durs, 143
595. Hi-Number Ratios, 112
603. rit. lists, 101
- 603d. w Beats & Subbeams & 3 Rat, 100
- 603f. Orig Metric, 99
604. 10:9, 4
606. 4.5:5.5 , 114
608. 39:24 = 3-13:8s, 145
610. same w dec, 164
- 610a. 17:13 fig, 163
- 610b. 17:13 Hark vert & HAM, 164
- 610c. 17:13 Hark dec vert, 165
- 610e2. 17:13 w beat & simul, 163
- 610f. 17:13 show no beats, 162
- 610g1. 17:13 Apro, 163
- 610j. same w 8th notes & simul, 165
612. 7:5 in 3,4,5, 114
617. Magadini, 167
- 618.10. ferney, 124
- 618.11. Levels, 125
- 618e3. Too Fast w dec ea=near. 2143. (Fix ending), 126
- 618.12. Ferney wo dec/rat #s & Propor, 125
624. 32/25. Avg=01.40 off, 133
624. A's. (32:25), 135
624. Nudged Rats, 134
624. w slanted lines, 134
- 626.1. Short Hand-Jersild, 152
626. Same-Pat/Dif-Rat Long Hand, 153
627. 7:5 & 5:7 Inverts, 167
628. 8:5 & 5:8 Inverts-fast, 136
629. Ratio subd as Basis for apro Div, 168
632. 13:11 + apro and 2-hands, 161
639. Rat symmetry, 168
646. 7 Composite Rat Patts, 157
646. 7 Rats, components w dec, 158
646. 7 Word/pdf, 159
647. Triple Nest, 137
- All are silent, 30
- All are ties, 30
- AproPo, 7, 35, 90
- Awkward sensations, 55
- BAMO, **52**, 53
- Beam-Beat, 41, 88, 120
- Beat Note/Beat-Bar, 74
- Beatings, 122
- Class Representatives, 14, 92, 111
- Composite Ratios, 90, 157
- Const x/change y, 37, 41, 69
- Decimals, **35**, 91, 119, 146
- Diff Dur Rat notes, 143, 146
- Differ Nests/same speed, 50, 51
- Different Rat/same speed, **3**, 65, 71
- Displaced Rats, 123



- Divide into two, 33  
door mat (d'Order matters), 14  
Duplex, 2, 5, **11**, 36, 50, 51
- Each/Once/(Spread), 14, 52, 92  
Equiv Ratio Pairs, 34  
Equivalent Note-Values, 71  
Every x, 42, 43
- Find Patts, 69  
Flitting, 89  
Full Value, 146  
Fun, 2, 14, 16, 25, 26, 41, 48, 65, 76, 83, 92, 128, 154
- Generate Examples, 69
- HAMs, 144  
Hard Rhy/Easy Pi, 56
- Impossibles, 59  
Invert, 29, 30, **33**, 46, 120, 155, 167
- Known Tune/Wrong Rhy, 16, 76
- Levels, 51, 56, 57, 102, 116, 119  
Lollipop, 41  
Long-Hand, 19, 39, 41, 50, 122, 146  
Look Differ/Are Same, 29, 30, 50, 51, 67, 71, 121  
Look Diffic/Are Easy, 19, 49, 51, 53, 67, 71, 119, 120
- Met Mod, 27, 39, 40, **47**, 59, 65, 104  
Met Mod Maintain, 39  
Metronome, 41
- Near Rats, 35, 112, 118, 119, 124, 138, 139  
Nests, 51, 119  
New Tempi / Rats, 146  
No #s, 52, 67, 124  
Nudged Rats, 133, 168
- Odd Evening, 26, 46, 120  
Offsets, 39  
One NV, 113
- Partial Rats, 7, 68, 88  
Proportional, 56, 119
- Q Q., 39, 99, 143
- ratio to Odd, 98  
Reducing Fractions, 69, 112  
ReGroup, **2**, 6, 28, 35, 96, 97, 130, 160  
ReTempo/ReRatio, 146  
Rotation, 25, 27, 66, 88
- Same durs seq / diff beat, 69  
Same Patt/Differ Rat, **12**, 102, 116, 146  
Scale it to fit, 143  
Short-Hand/Patt 1st, 3, 52, 69, 91, 116, 143, 154  
Show Beat, 52, 67, 113, 143, 146, 155  
Show Like-Dur Beams, 56, 58  
Simul/Sequent, 91, 146  
Subdiv Rats, 168
- THE, 29–32  
Tibet, **2**  
Tough Order, 59  
Transform Into, 37, **55**, 59  
Typical Myst, **12**, 12, 89, 90
- VB, 67
- x:5/8 & all 5/8's, 37
- Yeasty, 32, 33, 35, 41, 52, 56, 67, 69, 71, 99, 119, 124, 133, 146, **162**