# Walter Zimmermann's Modified Chant Transcriptions

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## Contents

1	Mātrālakṣaṇam	<b>2</b>
<b>2</b>	Transcription and Intonation	4
3	Das irakische Alphabet	12
4	Chantbook of Modified Melodies	15
<b>5</b>	Some final observations	<b>21</b>

## 1. Mātrālakṣaṇam

The following introductory texts are excerpted from Wayne Howard's critical edition of the  $M\bar{a}tr\bar{a}laksanam$ .<sup>1</sup> Walter Zimmermann transcribed the melodic fragments documented in this book to make his compositions 127 Svaras (2003/04<sup>2</sup>), Das irakische Alphabet (2005<sup>3</sup>, rev. 2017<sup>4</sup>), and the Chantbook of Modified Melodies (2011<sup>5</sup>).

#### [from Jacket Note]

The  $M\bar{a}tr\bar{a}laksanam$  ("Description of Mātrā") is one of the most important technical treatises belonging to the Kauthuma–Rānāyanīya branch of the Sāmaveda. ... [I]t deals not merely with textual and notational formation but with the chants as they are actually sung. ... Throughout his translation of the entire text and most of the commentary, the author has provided copious notes, which include 127 musical transcriptions of chant fragments pertinent to the various subjects addressed by the  $M\bar{a}tr\bar{a}laksanam$ .

#### [from the Foreword by Kapila Vatsyayan]

 $M\bar{a}tr\bar{a}laksanam$  ... is one of the first attempts at transcribing the world's most complex system of orally accented verses which were transmitted through oral intonation into a written textual form. ... The contents of the  $M\bar{a}tr\bar{a}laksanam$  are of fundamental importance because this is perhaps the first text to discuss the concept of a time-unit measure  $(m\bar{a}tr\bar{a})$ . The importance of  $m\bar{a}tr\bar{a}$  as measure with the mathematical syllabic time value of vowels in their aspects of elongation, tempo, pitch and interval cannot be understood without taking into account sound as measure. In delineating the semantic relationship between syllable and letter, vowels and consonants, it lays the foundation of disciplines today recognised as phonetics, linguistics and prosody. Equally important is the discussion on sound and notes, in doing so it is a proto fore-runner of the 'modal' system of Indian music.

#### [from the Preface]

To illustrate, as far as possible, the rules of the treatise, transcribed specimens of Kauthuma-Rānāyanīya chant from the Tanjore District in Tamilnadu and the North

<sup>1.</sup> Wayne Howard, Mātrālakṣaṇam, Text, Translation, Extracts from the Commentary, and Notes, Including References to Two Oral Traditions of South India (New Delhi: Indira Gandhi National Centre for the Arts, 1988)

<sup>2.</sup> Walter Zimmermann, 127 Svaras, source: Mātrālaksaņam ed. by Wayne Howard, manuscript, 2003

<sup>3.</sup> Walter Zimmermann, Das irakische Alphabet für Gesang und Bass-Flöte, Musik: Walter Zimmermann, Worte: Joachim Sartorius, Einrichtung der Intonation: Marc Sabat, manuscript, 2005

<sup>4.</sup> Walter Zimmermann, Das irakische Alphabet, Neufassung für Singstimme und 7 Stimmgabeln, Musik: Walter Zimmermann, Worte: Joachim Sartorius, manuscript, 2017

<sup>5.</sup> Walter Zimmermann, Chantbook of Modified Melodies for double string-duo, JI Notation by Stefan Bartling, Source: Mātrālakṣaṇam by Wayne Howard, manuscript, 2011

Kannara District in Karnataka are offered. The Tanjore style represented here is the strongest and most widespread sāmavedic tradition in all of India. The chanters employ a seven-tone scale with a central pitch located approximately in the middle of the gamut (pitches are relative); an eighth tone is heard but rarely.





... [M]embers of the Hāvik sect in North Kannara ... recognize a six-tone scale with intervallic relationships different from those of the Tanjore system, although a central pitch is prominent here as well.

Figure 2: Scale Example 2



[from the Introduction]

The essence of the Sāmaveda is chant  $(s\bar{a}man)$ ; in the Mātrālaksana (ML) the various laws regarding duration refer specifically to these melodies, which appear in notated form in four chantbooks  $(g\bar{a}nas)$ . The ML uses quotations from the chantbooks to illustrate its rules. ... The ... Pūrvārcika ... contains verses addressed to the gods Agni, Indra, and Soma Pavamāna ... Each verse ... serves as the textual basis of one or more chants in the Grāmageyagāna (Village Chantbook). Attached to the end ... is the Āranyakasamhitā (Forest Collection), the verses of which are esoteric and philosophic in nature. ... The chants of the Grāmageyagāna and the  $\bar{A}$ ranyakasamhita are [respectively] the basis (*prakrti*) for the derivative (*vikrti*)  $s\bar{a}mans$  that occur in the other two chantbooks; hence the village and forest chants are sometimes called collectively the Prakrtigāna. All of the melodies cited by the ML and its commentary are drawn from the Prakrtigana, although the present writer has utilized transcribed specimens from all four chantbooks for illustrative purposes. The Ūhagāna (Chantbook of Modified [Melodies]) and the Ūhyagāna or Ūharahasyagāna (Chantbook of Modified Secret [Melodies]...) repeat melodies, albeit with occasional modifications...

The chantbook quotations in the ML make use of ... numerals notation ... The numbers ... signify hand postures  $[(mudr\bar{a}s)]$ , which invoke musical phrases and motifs (*svaras*). The reader is reminded that the Vedic *svara* is different from the *svara* of Indian classical music, where the term is used to denote scale degrees...

In the the Sāmaveda a multitude of *svaras* belongs to each of the fundamental numbers ( $mudr\bar{as}$ ); hence the music that is heard in any given instance depends on the numerical context, the length of the vowel carrying the *svara*, and sometimes the *svara's* position within the chant section (*parvan*).

[from the Notes, Chapter 1]

The ML concerns itself solely with the time measurement of musical sound (*svara*)... The chant extracts used ... are ... typical cases ...

## 2. Transcription and Intonation

In 2003/4 Walter Zimmermann transcribed the 127 chantbook examples notated in Wayne Howard's translation of the Mātrālakṣaṇam. His score makes explicit the indicated transpositions of the diatonic modes, retaining the metronome markings, the original beamings (transcribed as phrasing slurs), and the commas (transcribed as rests of varying duration). Compare the first 17 chant examples and the first page of 127 Svaras reproduced below. The original text syllables are copied above the transcribed melodies.

Underneath the melodies, additional accidentals have been added, written in the Extended Helmholtz-Ellis JI Pitch Notation.<sup>6</sup> These annotations suggest possible "modifications" of the original diatonic pitches, based on a speculative application of extended just intonation (JI). This *untempered* tuning of the melodies was conceived by the author at Walter Zimmermann's invitation. The tonal space chosen includes well-known intervals of Pythagorean-Ptolemaic 5-limit just intonation (Zarlino's "senario"), as well as less common 13-limit intervals – natural sevenths, elevenths and thirteenths. To facilitate the realisation of this special intonation, additional sustaining pitches were composed, adding a new "drone" voice to accompany the original chant fragments. These bordun-pitches are notated in the lowest stave.







6. Marc Sabat, The Extended Helmholtz-Ellis JI Pitch Notation, http://www.marcsabat.com/pdfs/notation.pdf, 2005

Example 2 (T). 1 mātrā = sixteenth note. Mahāvaiśvāmitram I (GG 343.6).



Example 3 (T). 1  $m\bar{a}tr\bar{a}$  = eighth note. Vāmadevyam (ŪG 1.1.5).



Example 4 (T). 1  $m\bar{a}tr\bar{a}$  = sixteenth note. Harivarnam I (GG 383.1).



Example 5 (T). 1  $m\bar{a}tr\bar{a}$  = sixteenth note. Janitram II (GG 484.2).



Example 6 (T). 1  $m\bar{a}tr\bar{a}$  = eighth note. Bārhaspatyam (GG 91.1).



Example 7 (T). 1  $m\bar{a}tr\bar{a}$  = sixteenth note. Mahāvaiśvāmitram I (GG 343.6).



5

Example 8 (T). 1  $m\bar{a}tr\bar{a}$  = sixteenth note. Sāmvargah (GG 11.1).



Example 9 (T). 1  $m\bar{a}tr\bar{a}$  = eighth note. Āmahīyavam (ŪG 1.1.1).



Example 10 (NK). 1  $m\bar{a}tr\bar{a}$  = eighth note. Gayatram.



Example 11 (T). 1 mātrā=eighth note. Āmahīyavam (ŪG 1.1.1).



Example 12 (NK). 1 mātrā=sixteenth note. Āmahīyavam (ŪG 1.1.1).



Example 13 (T). 1 mātrā=eighth note. Gāyatram.



6

Example 14 (T). 1 *mātrā* = sixteenth note. Vāco Vratam I (ĀrG *Stobha*, before 94.1).



Example 15 (T). 1  $m\bar{a}tr\bar{a}$  = eighth note. Amahīyavam (ŪG 1.1.1).



Example 16 (NK). 1 mātrā=sixteenth note. Sāmvargah (GG 11.1).



Example 17 (T). 1 *mātrā*=eighth note. Āmahīyavam (ŪG 1,1.1).



Figure 4: 127 Svaras, first 17 melodies			
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To explain how this somewhat unusual collaboration came about, I will begin with the story of how I originally met Walter Zimmermann, almost a decade earlier, at the beginning of the 1990s. At the time, I was living in Toronto, working as a freelance composer and violinist. My colleague and friend, composer Allison Cameron, was curating a series of "experimental" music concerts at a new music space called the Music Gallery. She asked me to participate as performer in a string trio evening including works by Walter Zimmermann, Aldo Clementi and Rudolf Komorous, among others.

Walter's piece was the Canadian premiere of the remarkable and extremely difficult *Distentio* (1992), in which the players must awkwardly compress and stretch their hands to realise paradoxically composed double-stops, playing glissandi while attempting to hold steady tones. These figures, and the activity of sounding them, become both musical and physical metaphors for the human experience of time. The work is based on passages from Saint Augustine's *Confessions*.

#### Figure 5: Distentio, cover

AUGUSTINUS, CONFESSIONES, LIBER XI:

- AD I: 'DISTENDITUR EST VITA MEA.' (XI 29, 39)
- AD II: DISTENDITUR VITA HUIUS ACTIONIS MEAE' (XI 28, 38)
- AD III; "AN VERO, SI CESSARENT CAELI LUMINA ET MOVERETUR ROTA FIGULI", NON ESSET TEMPUS, QUO METRIREMUR EOS GYROS ET DICEREMUS AUT AEQUALIBUS MORULIS AGI, AUT SI ALIAS TARDIUS, ALIAS VELOCIUS MOVERETUR, ALIOS MAGIS DIUTURNOS ESSE, ALIOS MINUS?" (XI 23, 29)
- AD IV: ... ET TUMLTUOSIS VARIETATIBUS DILANIANTUR COGITATIONES MEAE, INTIMA VISCERA ANIMAE MEAE ...' (XI 29, 39)
- AD V: AT EGO IN TEMPORA DISSILUI, QUORUM ORDINEM NESCIO

Towards the end of the score, the musicians are asked to spin a potter's wheel, playing it and periodically bringing it to a stop with the tips of their bows. This is an uncomfortable request to make of string players, given the risk of damaging the delicate wooden bows. After some doubt and discussion, however, we decided to go ahead with the piece, substituting modest bows made of synthetic material so we could follow Walter's indications to produce the friction sounds he had scored. As I recall, our live performance, though perhaps imperfect, was quite poetic for some of the listeners. Allison sent the recording to Walter, who was moved and impressed enough to invite us to play it again in a concert of his music organised in Chicago by the Goethe Institute. My two colleagues were committed to opera performances the night before, and funds were limited, so we all met up around midnight and drove from Toronto to Chicago through the night, arriving the next morning. Meeting Walter in person for the first time in Chicago was the beginning of a long and ongoing artistic mentorship and friendship.

A few years later, I came to be a regular member of the Toronto-based new music collective ARRAYMUSIC. At the ensemble's request, Walter had written an arrangement of one of the movements from his cycle *Lokale-Musik*, as well as having composed a new piece, *Northwest Passage*. During his visit to Canada for the first performances, he took time between rehearsals to look at my own music, which was exploring microtonal just intonation, a topic that clearly interested him as well. We discussed the complexities of tuning and its realisation on acoustic instruments.

A few years later, in 1999, I moved to Berlin, where Walter was living and working as a professor of composition at the Hochschule der Künste. In my first years in Berlin, Walter introduced me to Wolfgang von Schweinitz, with whom I began developing a practical system of notating just intonation.<sup>7</sup>

In 2001, Walter composed the solo violin work *Die Sorge geht über den Fluss II* at my request. In the process of learning the score, I realised that the intonation of certain passages could be explicitly and usefully notated in extended just intonation. I prepared a playing edition of the piece, including microtonal indications written in the newly developing JI notation (see example from page 1).

The underlying principle of extended just intonation, as I have come to work with it, is based on an intervallic rather than a spectral approach to sounds. Aggregates of tones, which may combine to make chords or melodic cells, are built up from a certain number of so-called "tuneable" intervals. These are sounds that may be precisely realised by simultaneously sounding two tones. This approach implies the possibility of a contextually modulating intonation rather than taking an approach based on fixed structures (e.g. harmonic series over a single fundamental or modal, scale-based techniques). It leaves the door open for tonal forms that are internally coherent while varying across a broad spectrum of relative dissonance ranging from intense, periodic friction to absolute consonance (fusion).

Upon transcribing the 127 Svaras, which are originally based on diatonic modes, Walter asked me about just intonation possibilities. I initially suggested that he could apply transposed versions of the "natural scale". By this I meant a sequence of increasingly smaller steps (ranging from a large whole tone to a small semitone), following successive intervals of the harmonic series in the range from partial 7 through partial 28. For the

<sup>7.</sup> The HEJI notation was developed between 1999 and 2005 (with a small revision in 2017) by Marc Sabat and Wolfgang von Schweinitz in Berlin.



#### Figure 6: Die Sorge geht über den Fluss II, first page

most part this would be restricted to a set of seven notes, tuning the scale shown in Figure 1 above as partials 16, 14, 13, 12, 11, 10, 9, with the central note being partial 12. This intonation, written up in HEJI accidentals with corresponding cent deviations from 12ED2,<sup>8</sup> assuming a fundamental tuned to 0 cents, is sketched out as a small footnote at the end of the manuscript. In a similar manner, the second scale in Figure 2 above might be tuned with partials 16, 15, 13, 12, 10, 9.

1/27	SVARAS" in reiner (fimming: Coolt)
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	HARMONIC: 19, 17. 1. (15) 7. 13. 27.) 3. 11. 10. 9.
	Ab= ( Voil Empiricator 1-2 +5 -12 -34-59 +54 -16 +4 d
	Which meed Dy thas for is che + 34+215 -215-273-653 + 53-215 d

Figure 7: 127 Svaras in just intonation, first version

## 3. Das irakische Alphabet

In 2005, Walter decided to make a new arrangement of the microtonally modified svaras, a work called *Das irakische Alphabet* for voice and bass flute. The original text was replaced with a German poem by Joachim Sartorius, following the individual letters of the alphabet with phonetically related images associated with the region now known as Iraq. The drone notes are to be sustained by means of electronics designed by composer Stefan Bartling. To suit the voice of performer Natalia Pschenitschnikowa, who realised both parts in the first performance,<sup>9</sup> the melodies were transposed one octave higher.

I decided to revisit my suggested "intonation" of the melodies on a phrase-by-phrase basis and to notate a version for voice. To avoid explicit notation of syntonic commas, the following instruction describing the tuning is appended to the score.

Figure 8: Das irakische Alphabet, first version

Note about the intonation :

The microtonal accidentals indicate Just Intonation intervals based on overtones/undertones of the bordun notes. Major and minor thirds with normal accidentals should be adjusted to pure ratios (5:4 and 6:5), with major thirds sung narrower and minor thirds sung wider than the tempered norm by approximately 1/12-tone or 15 cents. In addition, the following signs based on the Helmholtz-Ellis JI Pitch Notation are used:

for the 7th overtone (approximately 1/6-tone or 31 cents lower than tempered pitch)

for the 11th overtone/undertone (approximately 1/4-tone or 51 cents higher/lower than tempered pitch)

for the 13th overtone (approximately 1/3-tone or 59 cents lower than tempered pitch)

8. The division of the proportion 1:2, *i.e.*, one octave, into 12 proportionally equal parts, each with ratio  $1: \sqrt[12]{2}$ ; commonly referred to as twelve-tone equal temperament.

9. Sunday, 19 March 2006, 11:00 at the Haus der Berliner Festspiele as part of MaerzMusik – Festival für aktuelle Musik.

Septimal, undecimal and tridecimal signs are written out, defining the less familiar JI inflections, while realisation of conventional intervals is left to the performer's discretion. A brief comparison of the new score with the accidentals sketched into the 127 Svaras indicates how substantially the tuning has been transformed.

In the first phrase, which now begins in the second bar, a Pythagorean relationship between the drone note Fi (partial 12) and melody notes Gi (27) and Bi (1) is maintained, rather than intoning the Gi, *i.e.*, as the 13th partial of Bi. The first bar of the piece establishes the drone and serves to invoke the first letter of the alphabet.

In the second and third phrases, the central tones, originally written as  $F^{\sharp}$  and  $D^{\sharp}$ , are now enharmonically rewritten (and retuned) as  $G^{\flat}$  and  $E^{\flat}$ . Following the suggested realisation of major and minor thirds as noted above, the performer would tune the second phrase's drone note as  $G^{\flat}$ , and the first three phrases would thus outline a 5-limit just minor triad (15:12:10).<sup>10</sup>

In phrase 3, the drone note  $E^{\flat}$  is treated in a new manner: it serves as the fundamental of the melody, rather than taking the part of the 12th partial. In general, the new approach to composing the intonation allows drone notes to take on different functions, giving the implied harmonic changes a less predictable, "parallel" structure.

After five phrases, there is a comma, followed by a second sustained drone note, upon which the second letter of the alphabet is intoned. In phrases 6–8, the natural scale is altered to a chromatic-diatonic trichord in which both the 5-limit minor (A $\ddagger$ ) and major (A $\ddagger$ ) thirds are articulated against the F $\ddagger$  drone. This small chromatic semitone lies further up in the series, between partials 24 and 25. With the addition of the major whole tone G $\ddagger$ , these four notes form a mutual proportion of 40:45:48:50. This is a clear departure from the previous scales, which were generally composed of successive partials from the fourth octave of the harmonic series.

Phrases 9–11 reprise the higher partials 7 and 13, and in phrase 11 the tuning of phrase 1 recurs. Phrase 12 introduces the minor wholetone 9:10, and the following phrases continue in 5-limit tuning, exploring the major and minor thirds and the difference between the smaller chromatic and larger diatonic semitones. By working more sparingly with the extended JI intervals, the melodically articulated harmony takes on an increasingly structural function in which different prime limits articulate larger formal divisions.

<sup>10.</sup> See the discussion below (in the following section) of the parallel passage in *Chantbook*, where syntonic commas are explicitly notated.

#### Figure 9: Das irakische Alphabet, first page

#### "DAS IRAKISCHE ALPHABET"

für Natalia Pschenitschnikowa, Gesang und (Bass-) Flöte

Musik : Walter Zimmermann 2005 Worte : Joachim Sartorius



Einrichtung der Intonation: Marc Sabat

















## 4. Chantbook of Modified Melodies

Chantbook of Modified Melodies (2011) for double string-duo was written for the JACK Quartet and premiered at the Wittener Tage für neue Kammermusik. The JI notation and the vertical correlation of the two duos was made by Stefan Bartling. Two pairs of instruments – violin 1 and violin 2; viola and cello – simultaneously play through the 127 Svaras, observing intonation modifications very similar to those notated in Das irakische Alphabet. In this case, however, the melodies are set in counterpoint.

At any given time, two different chants are superposed. The upper duo follows the original order of the material, moving from phrase 1 through 127, played at the same octave transposition used in *Das irakische Alphabet*. The lower duo also moves consecutively through the phrases, but taken in small sets, beginning near the end and gradually working towards the beginning. This duo plays in the original (lower) octave, as transcribed in *127 Svaras*.

For example, in mm. 1–20, the two violins move successively through phrases 1–14. During the same bars, the viola and cello begin with phrase 115 and proceed through phrase 127. From measure 21, while the violins continue with phrase 15, the viola and cello jump back to 107, and proceed onward until 114. A similar method is followed consistently throughout the composition (see below for a complete table of correlations).

Changes of tempo between phrases have been eliminated, so that both duos are coordinated in a common tempo – quarter-note=120bpm, which is the fastest phrase-tempo occurring in the  $M\bar{a}tr\bar{a}laksanam$  examples. Changing meters have also been replaced with a constant 4/4 time. The dynamic level, originally *mezzo piano*, has been softened to vary between *pp* and *mp*, with the duos generally playing *piano*. The detailed little phrases of the original material, closely bound to the syllabic text setting, have been replaced with longer legato slurs.

In *Das irakische Alphabet*, the flute and digital delay set up drones against which the subsequent phrase is played and sung. The just intonation inflections indicate intervals based on partials 7, 11 and 13, while the interpretation of 5-limit Pythagorean-Ptolemaic tuning is left to the performer's discretion. In *Chantbook of Modified Melodies*, all of the JI accidentals, including syntonic commas (80:81), are indicated.

In phrase 2, for example, the drone is written as  $G^{\flat}$ , establishing a central tone that links the first 3 phrases harmonically, explicitly outlining the previously implied 5-limit minor triad, in proportion 15:12:10 (15 is the phrase 1 fundamental  $B^{\flat}$ , 12 is the phrase 2 fundamental  $G^{\flat}$ , and 10 is the phrase 3 fundamental  $E^{\flat}$ ).



\*) c.l.t.>ord: one half circle mt>p changing without breaking the sound into arco ord.. \*\*) The 32nds are vibrato trills, not slured, distinct fingering \*\*\*) The two duos sit seperate, facing each other

In m. 2, while violin 1 plays the phrase 1 melody against the drone note F $\ddagger$  in violin 2, the cello enters with the melody of phrase 115, presentating an anticipatory imitation that unites in unison with violin 1 at the third eighth-note of m. 2. Phrase 115 continues with the viola in m. 3 introducing an F $\ddagger$  drone, one syntonic comma higher than the previous F $\ddagger$  in violin 2. This raising of the F causes the septimal A<sup>4</sup>/<sub>9</sub> from mm. 1–2 to be also raised by a comma, so it is played as A<sup>4</sup>/<sub>9</sub> in m. 4. The two tunings share a common tone, Pythagorean G $\ddagger$ . The small septimal third-tone trill (27:28) played in m. 2 widens to the larger septimal semitone (20:21) in m. 4. The cello ends phrase 1 in m. 6, reaching the drone note F $\ddagger$ , before moving downward by a diatonic semitone 16:15 to the next drone note, Pythagorean E $\ddagger$ . At this point it becomes clear that the upward movement by a syntonic comma in m. 3 was designed to permit a simple harmonic connection *in the melody* between successive phrases.

The tuning in mm. 2–3 coordinates phrases 1 and 115 into tonal unison, then in m. 3, with a tiny microtonal alteration, the two duos are flung harmonically far apart. The G<sup>b</sup> drone in phrase 2 and the F<sup>b</sup> are a Pythagorean limma apart (256:243); by phrase 3, the two duos are, in fact, playing partials of two fundamentals a syntonic comma apart. E<sup>b</sup> in violin 2 is juxtaposed with F<sup>b</sup> in the viola, and the latter note functions here as the

9th partial of E<sup>5</sup>.

Compare the setting of phrase 115 when it occurs in the upper duo. The passage may be found in mm. 219–223. Here, phrase 115 is played against an F $\ddagger$  drone established immediately by violin 2, which then proceeds similarly to the earlier example, falling by a diatonic semitone 16:15 to reach the next drone note, E $\ddagger$ , in m. 223. In this case, the syntonically raised intonation with the 20:21 semitone – G $\ddagger$  and A<sup>ib</sup> – is chosen as the tuning for the entire phrase.





Note the  $E^{\flat}$  in the cello, which establishes a drone note for phrase 12. Once again, Bartling chooses the harmonically distant relationship, setting the duos a comma apart as in the previous occurrence in m. 4. Even though the ratio between drone notes is distant (729:320), it is interesting to note that the interval from  $E^{\flat}$  to  $A^{\iota\flat}$  is close to a pure fourth, differing from the simpler ratio by only -5.8 cents (5103:5120).

Phrase 13 superposes the tones  $F_{\natural}$ ,  $G_{\natural}$ ,  $A_{\flat}$ ,  $B_{\flat}$  in the cello, against the tones  $F_{\natural}$ ,  $G_{\natural}$ ,  $A_{\flat}$  in violin 1.<sup>11</sup> Then, once again, as in mm. 2–4, the  $G_{\natural}$  is a common tone, and the two F's are a syntonic comma and an octave apart. In this case, the cello plays a 5-limit minor third, which is a septimal comma (63:64) higher (and an octave lower) than the

<sup>11.</sup> These notes are established as a melodic tetrachord already in mm. 217–218; the viola and cello play phrase 17 while the other duo takes a rest, allowing the intonation to be unequivocally established.

septimal minor third played by the violin. When correctly intonated, the effect should be to blur these two notes with fast beating.

In both cases, m. 4–7 and mm. 219–222, the two duos are placed slightly "out-oftune", emphasizing their contrapuntal separation. The inharmonicity is subtle enough to suggest an intentional *temperament* of the sounds, but nonetheless sufficient to be clearly noticeable, *i.e.*, perceived as intentional colouring of the harmonic space. The term *tolerance*<sup>12</sup> refers to a region around a given interval in which complex ratios are perceived as slightly beating variants of simpler ratios; here this psychoacoustic phenomenon is used compositionally to move the two duos in and out of focus.

The following table gives an overview of how the phrases are overlaid in both duos. Note there are exceptions to the sequential flow, occurring in measure ranges marked with a star. Generally, melodic and drone roles alternate between partners in each duo.

Violin 1 plays melodies 1, 3, 6, 9, 11, 13, 15, 17, 19, 21, 24, 26, 28, 29, 30, 32, 34, 35, 36, 38, 40, 43, 46, 48, 49, 51, 53, 54, 57, 59, 61, 65, 66, 68, 69, 72, 74, 76, 78, 80, 82, 83, 84, 87,  $36^*$ , 91, 93, 96, 98, 100, 103, 105, 107, 108, 109, 111, 113, 115, 117, 118, 120, 122, 124, 126, and 127 with violin 2 playing a drone in (most of) those phrases.

Listed in order of occurrence, the viola plays melodies 116, 119, 121, 123, 125, 107, 108, 109, 111, 113, 97, 99, 101, 102, 104, 106, 90, 92, 94, 95, 84, 87, 79, 81, 83 (shared), 73, 75, 77, 67, 58, 60, 62, 63, 64, 55, 56, 53, 54, 50, 46, 43, 40, 39, 38, 34, 35, 32, 27, 24, 21, 20, 19, 16, 12, 14, 7, 8, 10, and 1 with the cello playing a drone in (most of) those phrases.

A further analysis of *Chantbook* might proceed by comparing and differentiating the two counterpuntal settings of each phrase. In the case of harmonically distant relationships between duos, indirectly suggested "nearby" harmonies may be found by searching for simpler enharmonic variants of the intervals sounded.<sup>13</sup>

<sup>12.</sup> James Tenney, From Scratch, Writings in Music Theory, ed. Larry Polansky et al. (Illinois: University of Illinois Press, 2015)

<sup>13.</sup> See the web-based javascript HE-Calc which includes an enharmonic search feature: Thomas Nicholson, *Helmholtz-Ellis 31-Limit Harmonic Space Calculator*, https://www.plainsound.org/HEJI/, 2018

### Sabat

measures	duo 1 phrases	duo 2 phrases
1 - 20	1-14	115 - 127
21 - 36	15 - 21	107 - 114
37 - 55	22 - 30	97 - 106
56 - 70	31 - 36	89–96
71 - 77	37 - 38	84-88
78 - 90	39 - 42	79 - 83
91 - 100	43 - 47	72 - 78
101 - 107	48 - 51	67 - 71
108 - 119	52 - 57	57 - 66
120 - 126	58 - 65	55 - 56
127 - 131	$66-\!67$	52 - 54
132 - 136	68 - 71	48 - 51
137 - 143	72 - 77	46 - 47
144 - 149	78 - 79	43 - 45
150 - 157	80-82	40 - 42
157 - 162	83-84	39 - 40
163 - 167	85-88	37 - 38
$168^{*}-171^{*}$		33, 34+89, 35
$172^{*}-175^{*}$	90+36, 91	
176 - 182	92 - 95	31 - 32
183 - 192	96 - 101	26 - 30
193 - 198	102 - 105	24 - 25
199 - 205	106 - 109	21 - 23
206 - 209	110	20
209 - 212	111 - 112	18 - 19
214 - 217	113 - 114	15 - 17
218 - 222	115	12 - 14
223 - 230	116 - 121	6 - 11
231 - 238	122 - 127	1 - 5



In mm. 214–216, Phrase 15 is intonated by the cello as suggested in *Das irakische Alphabet*. The drone note is Pythagorean F (viola, m. 213) and the cello intonates the major and minor thirds as 5/4 (A $\ddagger$  and 6/5 A $\ddagger$ ). Superposed is phrase 113, with melody in violin 1. The 2005 intonation sets B $\ddagger$  as drone and fundamental, with the melody traversing partials 14, 16, and 13. In Bartling's reworking, the drone has been altered to B $\ddagger$ , 7/4 above C $\ddagger$ , and the 13th partial replaced with the 5-limit minor sixth G $\ddagger$ .

This choice once again produces a slightly small fourth of 492.3 cents (with ratio 1701/1280) between the two drone notes, rather than keeping a small-number ratio of 4/3 between Pythagorean B<sup>b</sup> and F. The logic lies in prioritising melodic harmonicity within each duo rather than establishing a simple harmonic proximity between the duos. In phrases 112 and 114 the drone notes are both E. To maintain a simple ratio 7:5 between drone notes, producing a consonant diminished fifth, B<sup>b</sup> is chosen.

In general, a fairly strict treatment of melodic intonation is observed, connecting phrases for the most part using small-number ratios. The melodic flow of each duo follows the simplest ratios that allow a nearly consonant (if sometimes harmonically distant) connection between the two duos, while remaining two independent identities. In setting the counterpoint, which is inherently bitonal, specific choices made about the intonation and coordination determine to what extent the two duos will share, or *suggest to the ear*, a discernable harmonic interaction.

In some cases, as in mm. 217–218, one duo is allowed to sound alone. Sometimes, Bartling chooses a tuning that forces a dissonant correlation between duos. In many other cases, however, the tuning of the duos is designed to interact and imply a common vertical connection, without necessarily forcing it. Such movement in and out of tuneable interval relationships, exploring the boundaries of tolerance, indicates the flexibility possible within strict JI composition, allowing the counterpoint to work in a manner analagous to the principles of "non-centered tonality" characteristic of Walter Zimmermann's music.

## 5. Some final observations

Walter Zimmermann's work may be loosely linked to a community of composers who studied and lived around Köln in the 1970s and 1980s, among them Kevin Volans, Gerald Barry, Claude Vivier, Chris Newman, Maria de Alvear, Clarence Barlow among many others.

All shared a need to move beyond the schematic constructions of the post-war generation that preceded them. As individuals they were searching for a new music, which at its best might be described as uniquely joyous, vivid, punky but also strict, embracing the radical virtuosity of the early music movement, and somehow fusing the directness of the diatonic with the clarity and structuralism of the post-serialists. Moving outside the European art world, they sought out local traditions and grammars, discovering, each for themselves, what Volans called a "New Simplicity".<sup>14</sup>

Walter's remarkable book *Desert Plants*, as well as his legendary loft series *Beginner Studio*, featured experimental music from outsider voices ignored or not yet discovered by the German mainstream, and his own work has always been characterised by a fleeting and shifting search for individual and personal imaginative worlds. He draws upon memory fragments, existing and found materials – from literature, philosophy, maps, linguistics – to create lexicons of sounding glyphs, a kind of virtual language which, like a neural network of inherited structural characteristics, manages to evoke a kind of mysterious, unknowable communication.

The series of works discussed here have a special place in Zimmermann's work. The transcription process is extremely direct, yet it immediately removes by virtue of the strictness of notation any direct sonic association with Vedic chant. Instead it becomes a fundamental alphabet of basic melodies and rhythms, one which the "composer" has managed to remain at arm's length from. Given how remote his own involvement with the technical details of the works themselves remained, I find it especially remarkable how these pieces still manage to emerge as absolutely characteristic examples of Walter's very unique voice within experimental music, as well as being in themselves very special explorations in the newly emerging field of music composed with respect to just intonation.

<sup>14.</sup> This term in its German form, *Neue Einfachkeit*, has been mistakenly applied by some writers to describe a contemporaneous German school of neo-Romantics, a completely unrelated group of composers whose work, in the opinion of this author, was arguably seeking neither newness nor simplicity.

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