

Harmonygrams in practical exercises

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The song examples discussed below and the worksheets created from them (for lack of a better name) have been selected so that their lengths, the number of occurring harmonic intervals, and also the complexity of the voice leading increase as the collection progresses. In this way, I would like to gradually introduce the use of Harmonygrams as practical tools. I have also added a few songs that - for various reasons - I have grown particularly fond of, and where the 'Harmonygram perspective' has helped me to discover new aspects for myself that I would like to share. These are partly technical details that I found helpful for singing, but also partly the recognition of interesting musical structures that suddenly become apparent with the help of the Harmonygram.

The first three songs (*Nanina*, *Iavnana* and *Batonebo*) are examples of two-part songs, which are rather rare in traditional Georgian vocal music. However, they can be used to practice singing a simple bass voice with a continuous sustained note (drone) and listening to the harmonic relationships to the other voices at the same time. Singing a relaxed drone is often much more difficult than one might think. If one listens too much to one's own voice, e.g. by covering one's ear because one thinks one can perceive and control the pitch of one's own voice better that way, the connection to the other voices is easily lost. On the other hand, with 'open ears', each harmonic interval exerts a different "sensory friction" that must be endured. Particularly with intervals that are perceived as dissonant, the need to change the pitch of one's own voice in order to achieve a more "pleasant" sound easily arises.

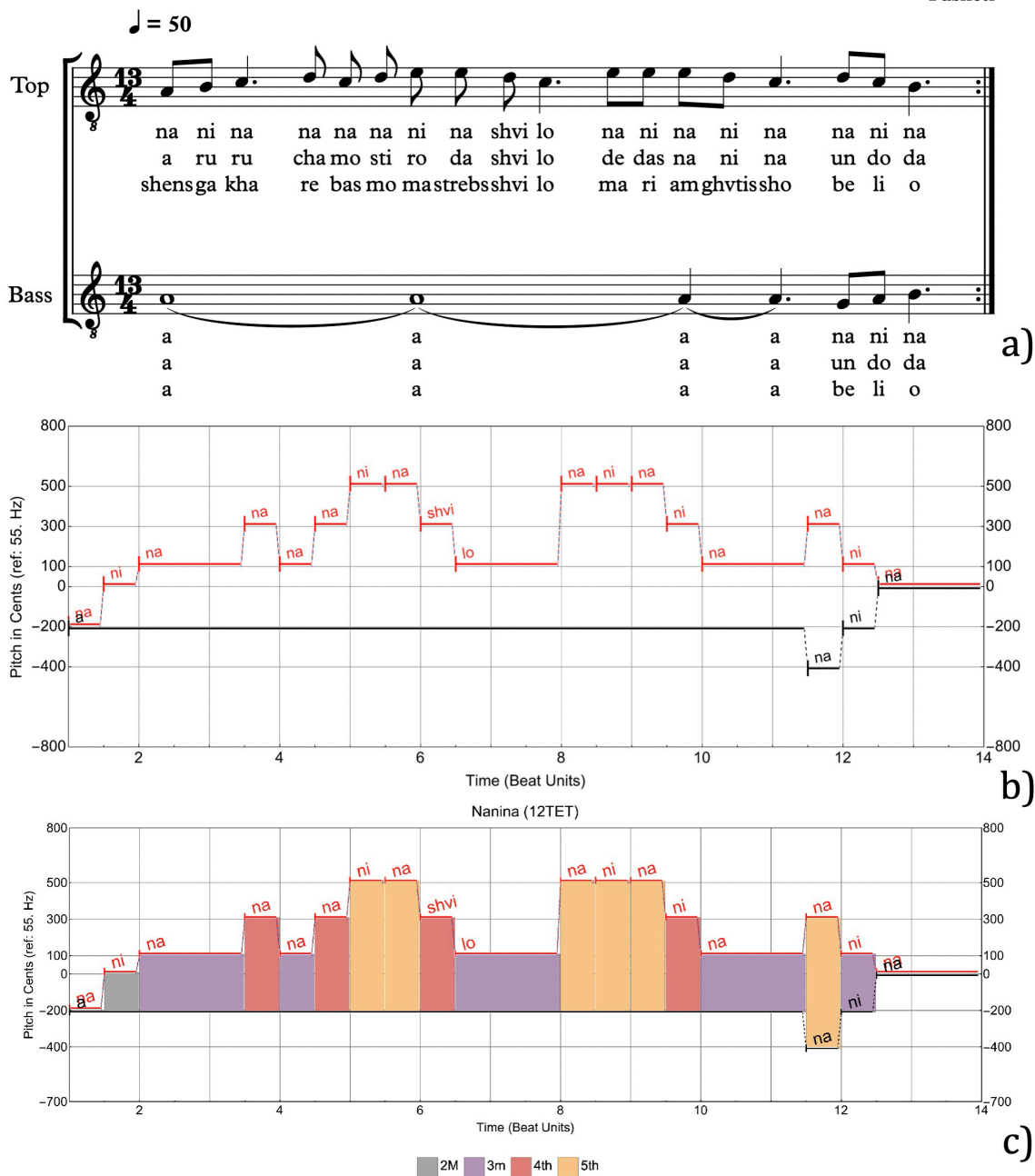
In line with the motto "Don't be afraid to do simple things!", which I adopted many years ago from Robin Adams, one of the pioneers of exploring the earth's deep interior, I always find working with simple songs very stimulating and enriching.

Exercise sheet 1 Nanina

The first example, the song *Nanina*, which I learned from Nana Mzhavanadze, is shown in Fig. 1 in various forms of representation.

Nanina

Tusheti



1. na ni na na na na ni na shvi lo na ni na ni na na ni na
2. a ru ru cha mo sti ro da shvi lo de das na ni na un do da
3. shens ga kha re bas mo ma strebs shvi lo ma ri am ghtvis sho be li o
4. na ni na na na na ni na shvi lo na ni na ni na na ni na

Fig. 1 Score (a), melodygram (b) and Harmonygram (c) of the song *Nanina*. The pitch representation in b) and c) is given in cents, with 1200 cents corresponding to an octave, 100 cents to a semitone and 200 cents to a whole tone.

Possible exercises with this song:

- 1) This song contains a continuous sustained note (drone) in the bass voice, which is initially only sung on the vowel 'a' and only changes to the text of the respective verse with the last three syllables. To sing a drone, the breath must flow evenly. I learned a wonderful exercise for this a few years ago in a workshop by the Armenian singer Aram Kerovpian. The exercise consists of smelling an orange with your eyes closed and concentrating only on its scent. Only when you have the feeling that the scent of the orange fills you completely and your breath is relaxed and flows evenly, do you start humming a sound, the pitch of which you do not control, but only 'listen to'.
- 2) All members of the group start by humming a tone (still without lyrics) that is roughly in the middle range of the pitches that seem comfortable for everyone. When this sounds relaxed and even, everyone intones the vowel "a". Then one voice begins to sing the melody of the upper voice (in an order that is agreed upon beforehand) and everyone else sings the bass voice (which only requires the lyrics to be sung at the end of the phrase). When the first person has sung the three verses of the upper voice, they join the bass voice again and another person takes over the upper voice. This happens in turn until everyone has sung both the bass and the upper voice. The actual exercise consists of singing in a relaxed manner at the same time, as slowly as is bearable, and listening to **the other voices and the overall sound** the whole time. You could also say that the exercise consists of **NOT** listening to yourself. For this exercise, it is sufficient to know the melodic progressions and the text, which can be taken from the melodygram in Fig. 1b).
- 3) Only when exercise 2) is perceived as pleasant does the Harmonygram in Fig. 1c) come into play. The sequence of the exercise is the same as in the previous one, but now it is about integrating the knowledge of the individual harmonic intervals into your perception. In other words, first of all just to feel what acoustic impressions the individual intervals evoke in me, initially without wanting to name the intervals. Can I differentiate between the intervals in terms of the feeling they trigger in me or not? Nothing more. It is very helpful to sing slowly and always listen more to the other voices than to one's own. Ideally, one should be able to hear all voices with equal intensity and allow

one's attention to wander from one voice to the other. To this end, it is also advisable for the whole group to sing comparatively quietly, but not too quietly of course.

- 4) This exercise is about trying to recognize the intervals based on their 'acoustic impression'. For example, to 'feel' when one sings a familiar interval with an other voice. The easiest way to do this is of course with the prime, i.e. when all voices sing the same pitch, or with the octave, which does not occur in this song. This is due to the proximity of the sounds involved in these intervals in the natural overtone series. In the prime, the same overtones are present in both sounds involved in the interval, which leads to an ideal fusion of the sounds. However, the relative proportion of the individual overtones in the sounds involved is usually different due to the different timbres. In the octave, not all but many overtones in the two sounds are the same. This means that the fusion of the sounds is still very strong. The next closest related interval in terms of the blending of the sounds is the fifth, which also appears in the song Nanina. Like the prime and the octave, this interval belongs to the so-called pure intervals. The fifth is perceived as very consonant in many cultures and occurs very frequently in Georgian music. For many people (e.g. for me), the feeling of singing with another voice in a pure fifth can have a very strong physical component, e.g. goose bumps, or trigger strong emotions.
- 5) Another exercise that builds on the previous one is to pay particular attention to the last three notes, or rather the intervals. The bass and upper voice perform equal melodic movements but in opposite directions. This is a very exciting part of the song for several reasons. Firstly, the bass leaves the hitherto constant sustained note and moves down a whole step, moving from the open vowel to a syllable of the text, the same as the upper voice. This movement creates a harmonic fifth, i.e. a very consonant interval. Now the upper voice and bass change direction again in opposite directions and move towards each other. The result is a minor third, which then becomes a prime in the last step, the sense of movement of both voices is maintained. This means that both voices meet on the same note. Despite its simplicity, this type

of final phrase (final cadence) has a strong effect. The actual exercise consists of trying to intonate these three harmonies cleanly and to perceive the different sensory impressions.

Some of the exercises, e.g. practicing interval recognition, can also be done alone with the help of an instrument if necessary. I sometimes use an electronic keyboard, which I operate as an organ, and then listen to the output using headphones.

Exercise sheet 2 Iavnana

I got to know the second song - *Iavnana* - shown in Fig. 2, through Tamar Buadze.

Iavnana

Kakheti

♩ = 80

Top

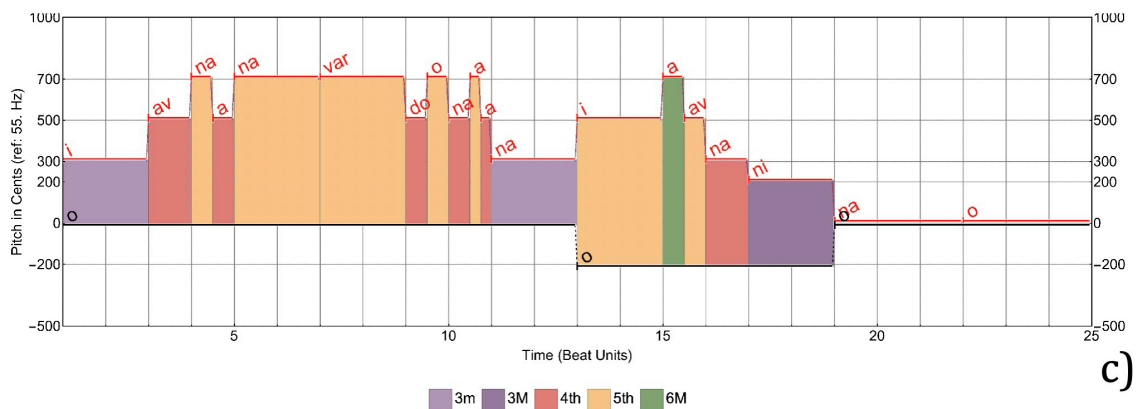
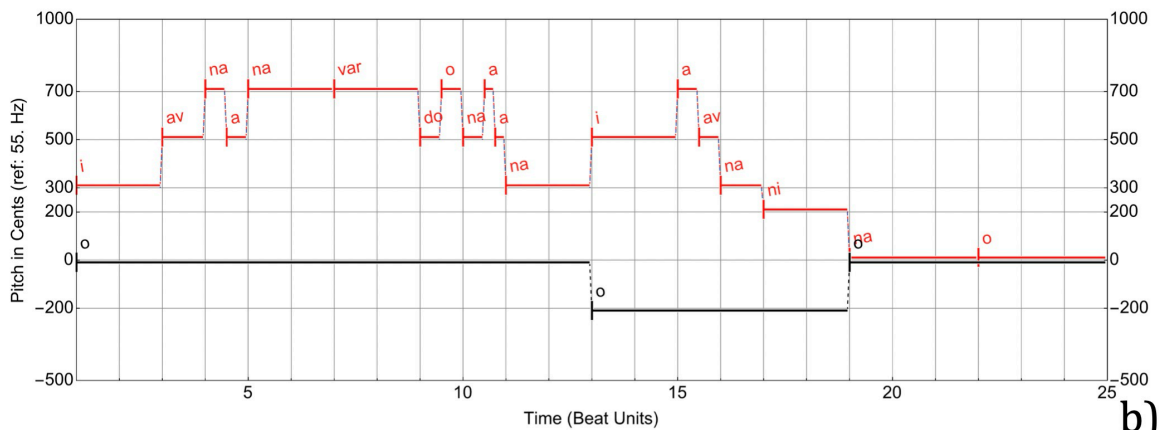
p

i av na a na var do o na a ana i a av na ni na o
 e gre tkbi i lad u dar de la a aad ram da a ga dzi na o
 i a gu un dis ma ra an shi i i a i a av na ni na o
 shig ghvi i i no da la li bchvisoo o i a av na ni na o
 shig al vi is khe a mo su la a a a i a av na ni na o
 nor chi i i a da rto sa shli soo o i a av na ni na o
 zed bul bu u li she mom dja ra a a a i a av na ni na o
 ga sa pr e nad prta sa shli so o o o i a av na ni na o

Bass

o o o o

a)



- | | |
|---|---|
| 1. i av na a na var do o na a ana i a av na ni na o | 5. shig al vi is khe a mo su la a a a i a av na ni na o |
| 2. e gre tkbi i lad u dar de la a aad ram da a ga dzi na o | 6. nor chi i i a da rto sa shli soo o i a av na ni na o |
| 3. i a gu un dis ma ra an shi i i a i a av na ni na o | 7. zed bul bu u li she mom dja ra a a a i a av na ni na o |
| 4. shig ghvi i i no da la li bchvi so o o i a av na ni na o | 8. ga sa pr e nad prta sa shli so o o o i a av na ni na o |

Fig. 2 Score (a), melodygram (b) and Harmonygram (c) of the song *Iavnana*.

It already has five different intervals and is also melodically somewhat livelier than *Nanina*. On beat 13, the bass voice moves down a melodic step (a major second). The harmonic interval to the upper voice changes from a minor third to a fifth. This is the reverse of what

happens in the song *Nanina* in the final cadence, where the fifth changes to a minor third. Here, however, the end of the verse has not yet been reached, it is only being prepared, so to speak. First, the range is briefly extended once again to a major sixth, before this then changes via a perfect fifth, which is followed by a fourth, via a major third into the final unison of the two voices. All of this can be seen at a glance in the Harmonygram in Fig. 2c). The lowering of the bass voice shortly before the end of a song or verse, and the subsequent gradual rise in pitch up to the last note (the so-called *finalis*), where all the voices then often (but not always) come together in unison, is very typical of the final cadence of a Georgian song. After a certain time, you can more or less sense when this has to happen.

The sequence of the individual exercises can be similar to the first song. Again, it can be very helpful to sing as slowly as possible and to make sure that one always hears the other voices and the overall sound very clearly. I also think it is important to make sure that the temporal pitch changes are as synchronized as possible for all singers. This means that none of the voices should only follow its own internal timing, but that one makes sure that the whole group is together. It always helps me a lot to pay attention to the breathing and lip movements of my fellow singers. One can practice all of this very well with the first two songs. If one succeeds - although both songs are very simple - this can become a very nice sound experience and a good training for harmonic perception.

Exercise sheet 3 Batonebo

The third song (Fig. 3) - *Batonebo* - was comes from Nana Mzhavanadze, who learned it from her grandmother. It is the first three-part song in the collection of examples.

Batonebo

Guria

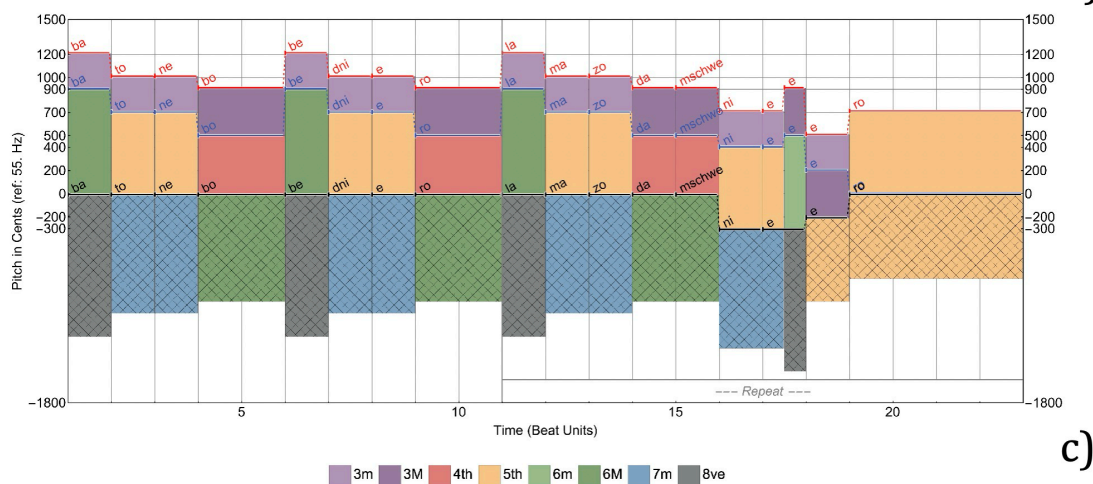
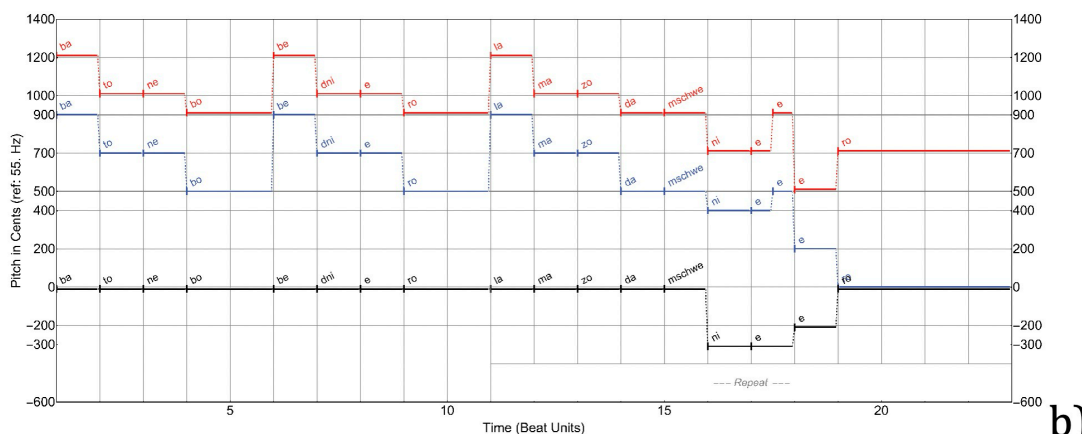
Top

Middle

Bass

ba to ne bo be dni e ro la ma zo da mschwe ni e e e ro
 sche nsa mo su lsa a gza sa i a da wa rdi pe ni i i a
 ro gortskbi lad mo o brdzandi i sa tkbi lad tsa a brdzaa a ndi

a)



1. ba to ne bo be dni e ro ||: la ma zo da mschwe ni e e e ro :||
2. sche nsa mo su lsa a gza sa ||: i a da wa rdi pe ni i i a :||
3. ro gorts tkbi lad mo o brdza ndi ||: i sa tkbi lad tsa a brdza a a ndi :||
4. ba to ne bo be dni e ro la ma zo da mschwe ni e e e ro

Fig. 3 Score (a), melodygram (b) and Harmonygram (c) of the song *Batonebo*.

In this song, too, one can recognize at first glance that the bass voice (in black signature) sings a constant sustained note, a drone, for almost the entire course of a verse and, similar

to the first song *Nanina*, makes a leap downwards in order to then immediately approach the last note, the so-called finalis, in two steps of different sizes. However, if you compare the bass lines of the two songs more closely, you can see that they are slightly different in the two songs. In *Nanina*, the downward leap is 400 cents, while the size of the two subsequent upward steps is 200 cents each. This means that both the downward and upward movements are in whole tone steps. In the *Batonebo* shown here, the downward movement is written as a minor third (300 cents), while the upward movement is written as a sequence of a minor second (100 cents) and a major second (200 cents).

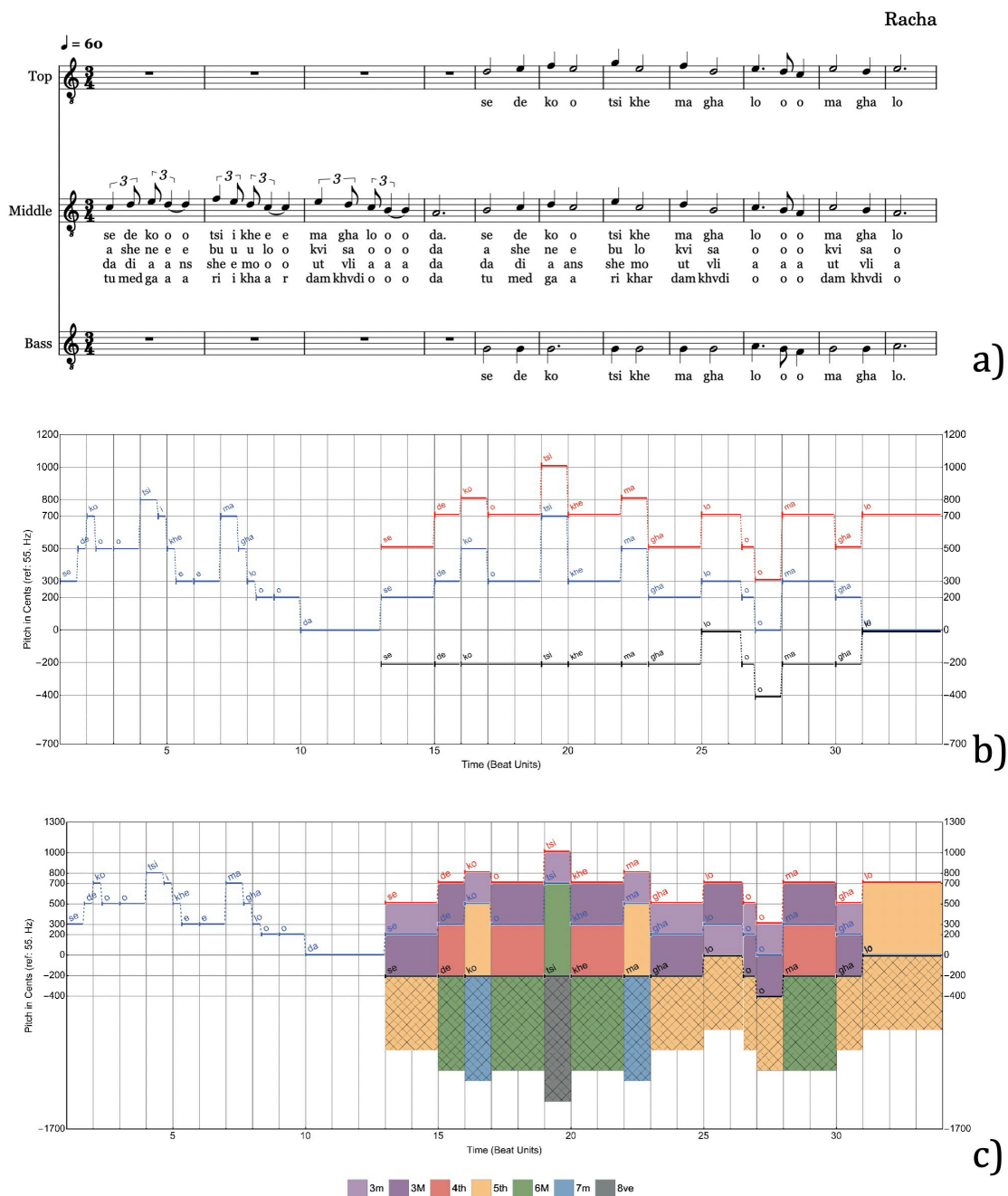
A sensible way for me to approach this song and its three-part harmony is to first sing all the individual parts one after the other and then try out different combinations of two parts:

- 1) Combination bass-upper voice: In the Harmonygram in Fig. 3 c), one can see very clearly from the interval columns hanging below the bass line that the interval between the bass voice and the highest voice runs through the sequence 8→7m→6M (octave → minor seventh → major sixth) three times in succession before the verse ends with the sequence 7m→8→5 (minor seventh → octave→ fifth). How could this sequence be described in terms of tension and relaxation?
- 2) Then do the same exercise with the combination of middle voice and bass voice. Which interval sequence results from this? The answer should be very easy to deduce from the Harmonygram.
- 3) Finally, the combination of the two middle voices. You can ask yourself the same questions again: a) What sequence of intervals arises and b) how could this be described in terms of tension and relaxation?
- 4) Finally, the same exercise with all three voices.

Exercise sheet 4 Sedeko

The next song (fig. 4), *Sedeko*, is again a three-part song, as are all subsequent ones. Like many traditional Georgian songs, it begins with a monophonic "introductory part", which sets the volume, the tempo and also the character of the song and to which the polyphonic part responds in a certain way.

Sedeko



1. se de ko o tsi i khe e ma gha lo o da se de ko o tsi khe ma gha lo o o ma gha lo
2. a she ne e e bu u lo o kvi sa o o da a she ne e bu lo kvi sa o o o kvi sa o
3. da di a ans she e mo o ut vli a a da da di a ans she mo ut vli a a a ut vli a
4. tu med ga a ri i kha ar dam khvdi o o o da tu med ga a ri khar dam khvdi o o o dam khvdi o

Fig. 4 Score (a), melodygram (b) and Harmonygram (c) of the song *Sedeko*.

The interval legend in Fig. 3c) shows that 7 different harmonic intervals occur in this song. Since this is now a three-part song, the harmonic diagram in Fig. 3c) is somewhat more complex than in the two-part songs, but it is still very easy to read.

If we first concentrate on the two upper voices, we can see that their harmonic distance up to the penultimate note is in two different shades of violet. The light violet corresponds to a minor third, the darker one to a major third. This means that the middle and upper voices are almost exclusively in parallel thirds, a very common, comparatively easy to sing polyphonic voice leading in folk music. As in the first two songs, the bass voice is the voice with the least melodic movement. At beat 25, all three voices take a step upwards, which immediately leads into a two-step downward movement, which in turn is followed by a one-step upward movement. During this short sequence, all three voices run more or less in parallel, which creates a very interesting sound. This is followed by the final cadence consisting of a chord sequence with three chords. The range ("ambitus") of the chords in the final cadence initially decreases from the first to the second (as in the first two songs). In the last chord, however, all three voices do not come together in unison, as in the first two songs, but only the bass and middle voice. The top voice ends a fifth above. This is another way of finishing a Georgian song, which also occurs frequently.

If you look at the interval columns arranged under the bass melody, which correspond to the interval between the bass and highest voice, you can see that the fifth is the most frequently occurring interval, followed by a major sixth. However, minor sevenths also occur twice and once even an octave. Between the bass and middle voice, there is less harmonic movement. Only thirds, fourths and fifths alternate here.

One of my first questions when singing new songs with monophonic intro parts is often, how can I easily find the starting note of my own voice? As a bass singer, this is very easy with *Sedeko*, because the bass part simply starts one step below the last note of the monophonic part. As a singer of the upper voice, I would try to memorize the tone from the intro part itself, namely from where it occurs five times, namely at the syllables *de, o, o, khe,* and *gha*.

One exercise with the song *Sedeko* can consist of the middle voice singing the intro part at different pitches and with different dynamics while the other two voices practice hitting the correct pitches and character without having to think. It can be helpful to sing only up to the first note of the polyphonic part and then hold this first chord for as long as possible. While holding the chord, one can try to hear or feel whether the upper voice and bass hit the harmonic fifth cleanly.

Exercise sheet 5 Elia Lrde

A song that is very good for practicing singing parallel fifths is *Elia Lrde* (Fig. 5) from Svaneti. It is my favorite song for illustrating the concept of the Harmonygram. The transcription used here is based on a version taught by Frank Kane in his workshops and - as far as I know - learned from Islam Pilpani from Latali.

Elia Lrde

Svaneti

$\text{♩} = 90$

Top
Middle
Bass

lu ri me i a vo so li a vo
e lia lr de i lu ri me i a vo so o li a vo
lu ri me i a vo so li a vo

7
T
M
B

so li da a ma a ki ri a vo le si a vo kra si
so li da a ma a ki ri a vo le e si a vo kra si
so li da ma a ki ri a vo le si a vo kra si

13
T
M
B

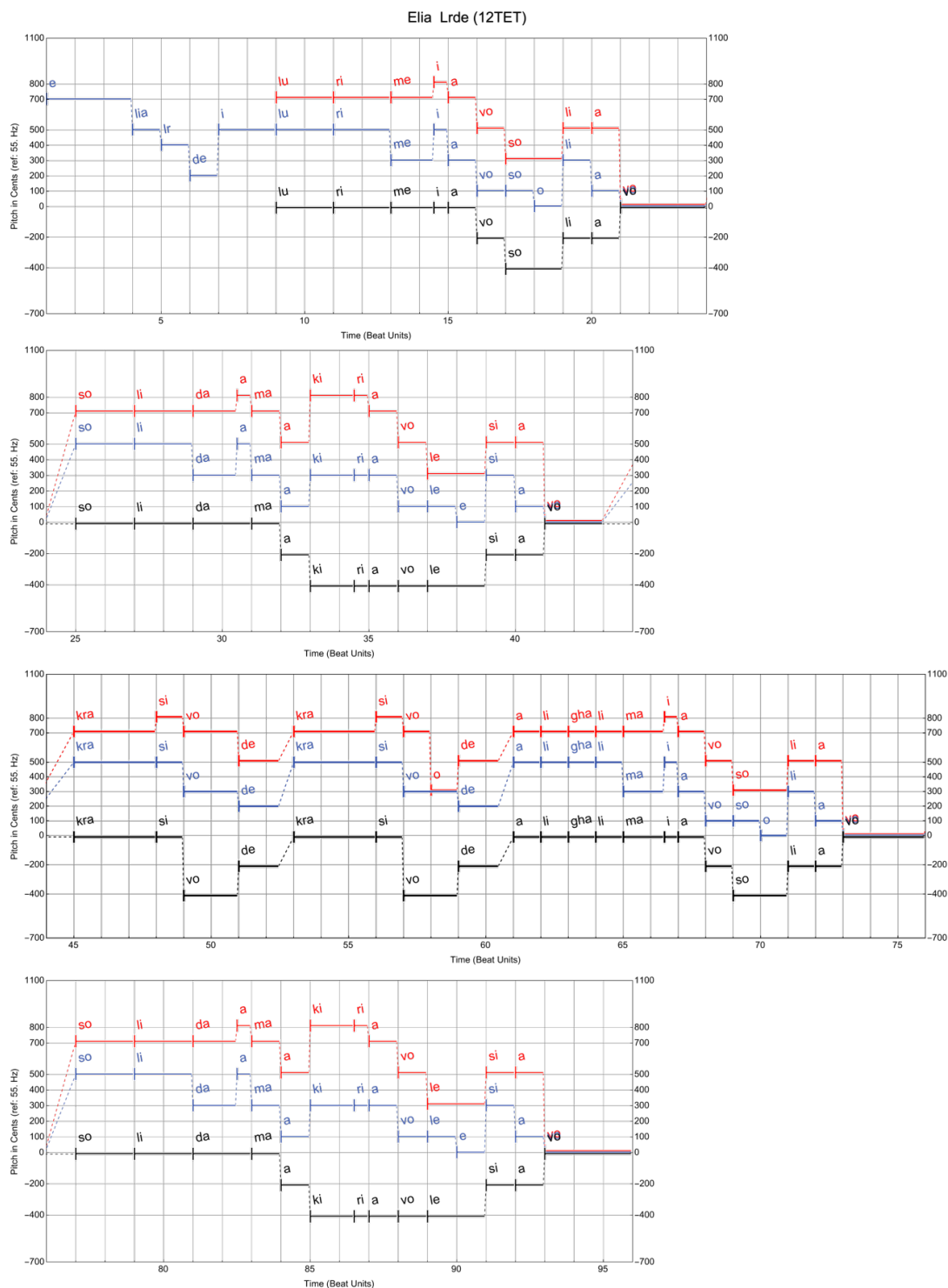
vo de kra si vo o de a li gha li ma i a vo so li a
vo de kra si vo de a li gha li ma i a vo so o li a
vo de kra si vo de a li gha li ma i a vo so li a

19
T
M
B

vo so li da a ma a ki ri a vo le si a vo
vo so li da a ma a ki ri a vo le e si a vo
vo so li da ma a ki ri a vo le si a vo

Fig. 5 Sheet music of the song *Elia Lrde*.

This version is very similar to the version I recorded myself in 2015 with Islam Pilpani, Gigo Changeliani and Murad Pirtskhelani in Lakhushdi¹.



e lia lr de i lu ri me i a vo so o li a vo so li da a ma a ki ri a vo le e si a vo kra si vo de
 kra si vo de a li gha li ma i a vo so o li a vo so li da a ma a ki ri a vo le e si a vo

Fig. 6 Melodygram of the song *Elia Lrde*.

¹ <https://www.uni-potsdam.de/de/soundscapelab/computational-ethnomusicology/the-benefit-of-body-vibration-recordings/towards-new-field-recording-strategies>

As part of a 3-month field experiment in 2016, which Nana Mzhavanadze and myself carried out together, we were able to make three further recordings of this song in different locations and with different singers. These can be viewed and listened to on the GVM project website² (GVM-IDS: 30, 31, 32). In the second recording (GVM-ID 31), the volume of the individual voices can be changed individually using a specially developed web-based audio-video interface, while simultaneously viewing the video track of the three singers³. To get into the mood for the exercises described below, it is advisable to listen to at least some of these recordings and let the sound of the individual voices and the overall sound sink in and compare them with the notes in Fig. 5 (if you can read music) and the melodygram in Fig. 6. The important aspects to perceive are not that the individual performances differ slightly but the overall character of the sound. When I listen to this song, it has a strange and yet archaically familiar effect on me. When singing the bass part, on the other hand, I often get the feeling of a very strong connection, especially with the upper voice.

A look at the color distribution in the Harmonygram in Fig. 7 offers a very simple and plausible explanation against the background of the acoustic relationships. The harmonic interval between the bass voice and the highest voice is almost always a fifth. Again, this fifth (☺), which forms the harmonic framework of this and some other Georgian songs, is only interrupted from time to time for a very short chord sequence with larger intervals, up to the octave. The acoustic impression created by the fifth-parallel voice leading is practically always present. For several centuries now, fifth-parallel voice leading has been considered a bad style in composed Western music, which is often explained by the fact that the voices cannot be distinguished very well due to the great tonal similarity, i.e. the high degree of blending of the overtones of the sounds.

However, this is possibly precisely the reason why it is so much fun to sing in parallel fifths and why this creates a very strong entrainment with the other voices. Even more extreme than in *Elia Lrde* is the use of parallel fifths in the laments of the Svans, the so-called Zär (in Svan language) or Zari (in Georgian). If you are interested in more details, I recommend the freely accessible papers by Nana Mzhavanadze and myself in the journal *Musicologist* from 2020 and 2021 (Mzhavanadze and Scherbaum, 2020, 2020b, 2021; Scherbaum and Mzhavanadze, 2020, 2021).

² <https://www.audiolabs-erlangen.de/resources/MIR/2017-GeorgianMusic-Scherbaum>

³ <https://www.audiolabs-erlangen.de/resources/MIR/GVMPlayer/>

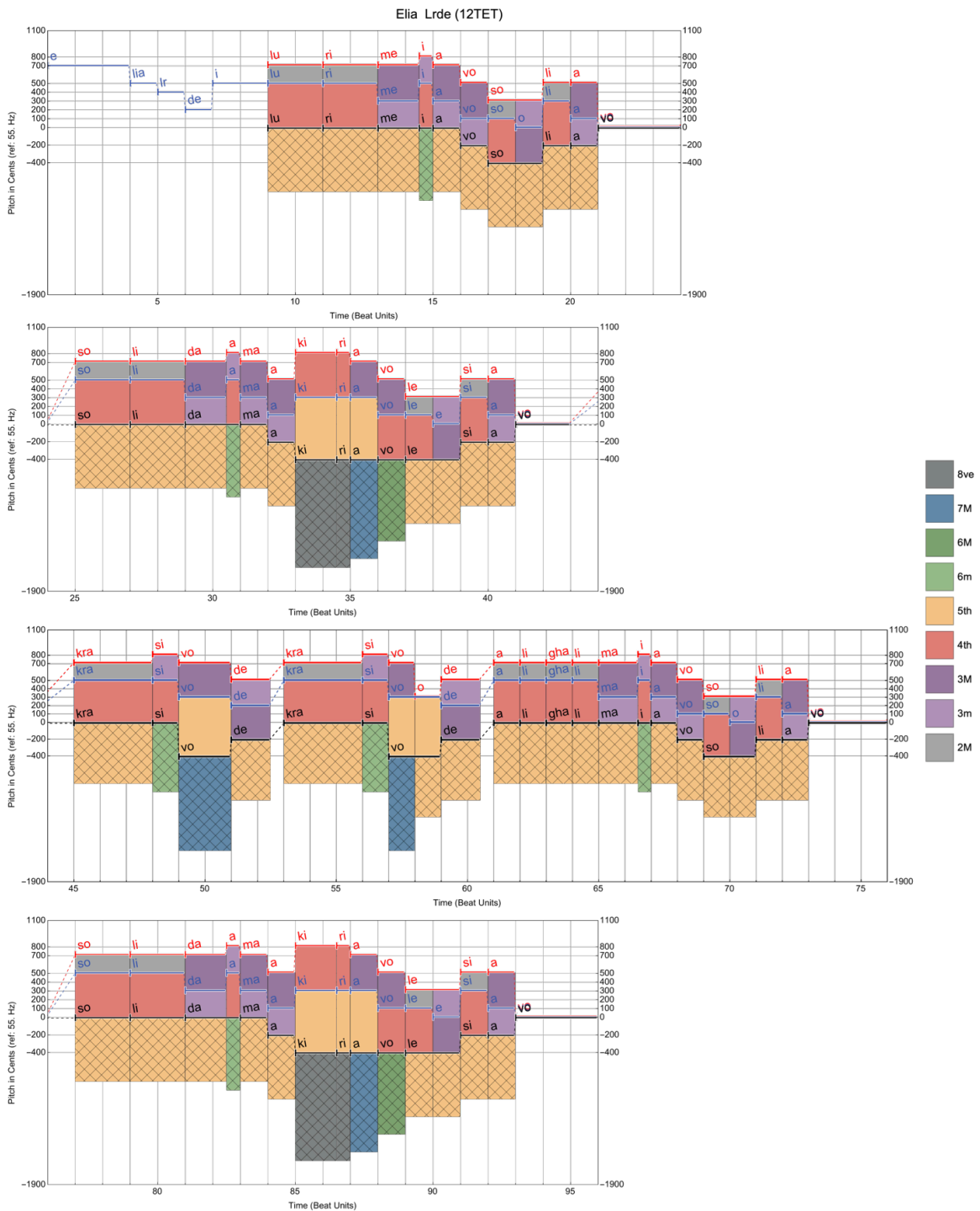


Fig. 7 Harmonygram of the song *Elia Lrde*.

The first exercise with *Elia Lrde* is to sing only the two marginal parts. The first note of the polyphonic part of the upper voice is very easy to pick up from the introductory part, as it corresponds to its first note. The first note of the bass is exactly a fifth below, or a fourth below the last note of the introductory part. You should give yourself enough time to find the starting notes when singing the marginal parts, because once you have hit the fifth well, you can try to feel how easy it is to continue singing in parallel fifths.

If you look at the melodygram in Fig. 6 and the Harmonygram in Fig. 7, you can see that the middle voice oscillates back and forth between the two outer voices. Again and again, and this also leaves a very special sound impression, all three voices come together in unison. These passages are always a good opportunity for all three voices to check their own pitches and correct them if necessary. After these unison passages and also at the beginning of the polyphonic part, a very special sound appears, which is formed by a fifth (between the outer voices), a fourth (between the bass and middle voice) and a major second (between the middle and upper voice) sounding at the same time. This so-called 1-4-5 (tonic-fourth-fifth) chord is very popular in traditional Georgian music and is often described as "typically Georgian". The harmonic major second that occurs between the middle and upper voice (an interval that is perceived as very dissonant) results in a very interesting tonal mixture of consonance (due to the fifth) and dissonance (due to the second). The interpretation of the fourth as consonant or dissonant is not clear and has also changed over time, which is why I do not want to go into this any further here.

If we now concentrate once again on the harmonic intervals not yet mentioned between the bass and middle voices and between the middle and upper voices, the Harmonygram in Fig. 7 shows us that these are supposed to be the minor and major thirds. However, these are precisely the intervals that are central to our Western understanding of music and that decide whether we call a chord a minor or major chord. So if we believe the Harmonygrams and therefore the notes (because the Harmonygrams were calculated from them), we should hear a whole series of minor and some major chords in the audio recordings. It is a nice listening exercise to listen to the above-mentioned recordings again.

For more than 10 years now, I have been fascinated by the question of the character of these sounds, which were initially very strange to me and yet very moving. For this reason I have analyzed the harmonic intervals of all our field recordings. The result for the very first recording of Elia Lrde showed that there are no major or minor thirds in the entire song, but that the thirds are all in between in terms of size, which is often referred to as neutral thirds (Scherbaum, 2016). The same applies to the other non-pure intervals such as sixths, sevenths, etc. An examination of the second version by Elia Lrde (GVM 31) also shows the same picture (Fig. 8).

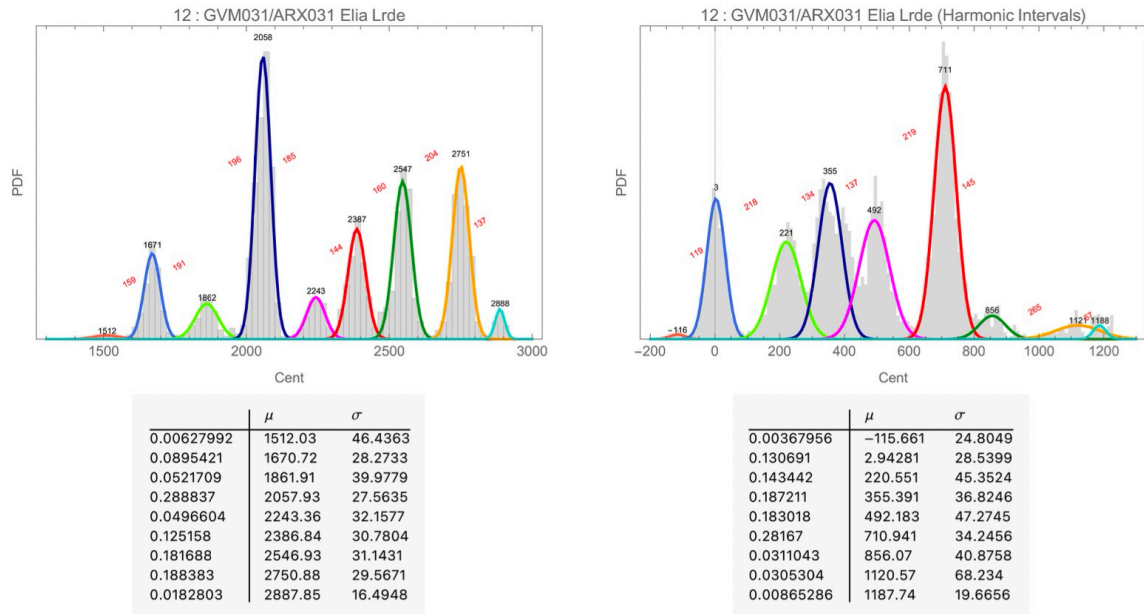


Fig. 8 Distribution of the pitch distribution (left) and harmonic intervals (right) occurring in the audio recordings of the song Elia Lrde (GVM-ID31). The distribution of harmonic thirds in the song (dark blue curve on the right) has its mean value at 355 cents, which lies almost exactly between a minor third (300 cents) and a major third (400 cents).

The analyses of all (over 200) field recordings from 2016 also provide a similar result (Fig. 9).

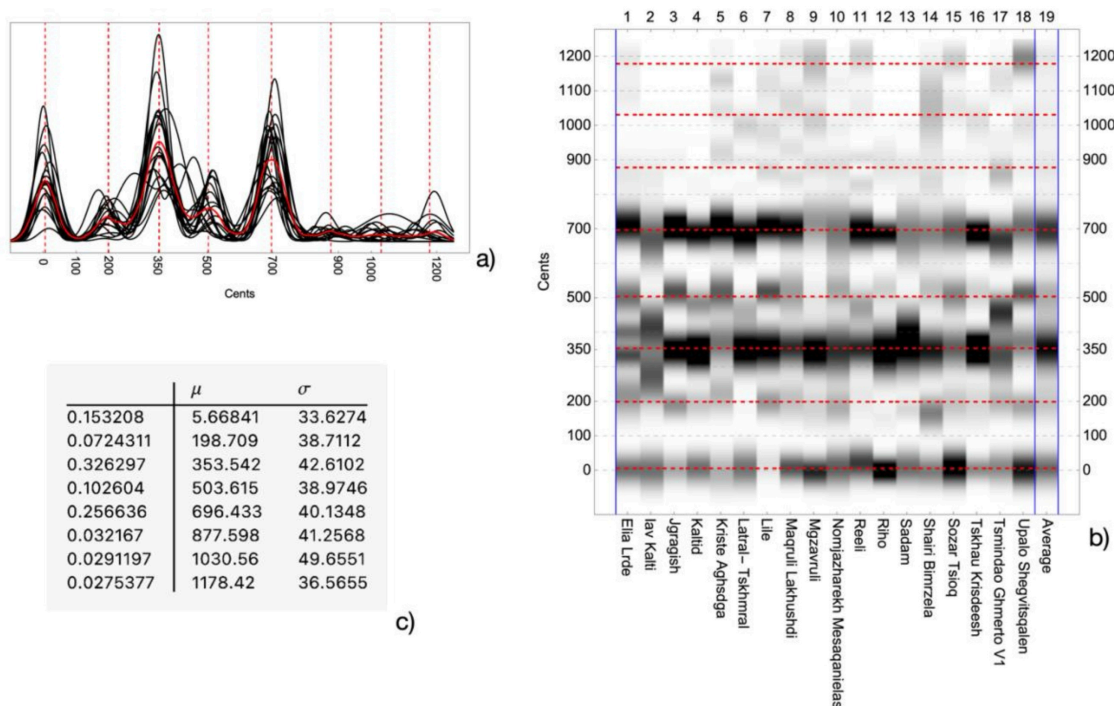


Fig. 9 Harmonic interval distribution of all 18 recordings with the ensemble of Swaneti singers referred to in Scherbaum et al., 2022) as the Lakhushdi-B group. Here, too, it can be seen that the harmonic thirds are neither minor nor major, but were mostly sung as so-called neutral thirds.

The same applies to the studies of more than a hundred historical recordings of the master singer Artem Erkomaishvili from 1966 (Rosenzweig et al., 2020; Scherbaum et al. 2020).

The analysis of all the recordings I have been involved in, or to which I have had access, indicates that the model on which our Western notation system is based on does not apply to traditional Georgian music and, strictly speaking, leads to a distortion of the original performance practice.

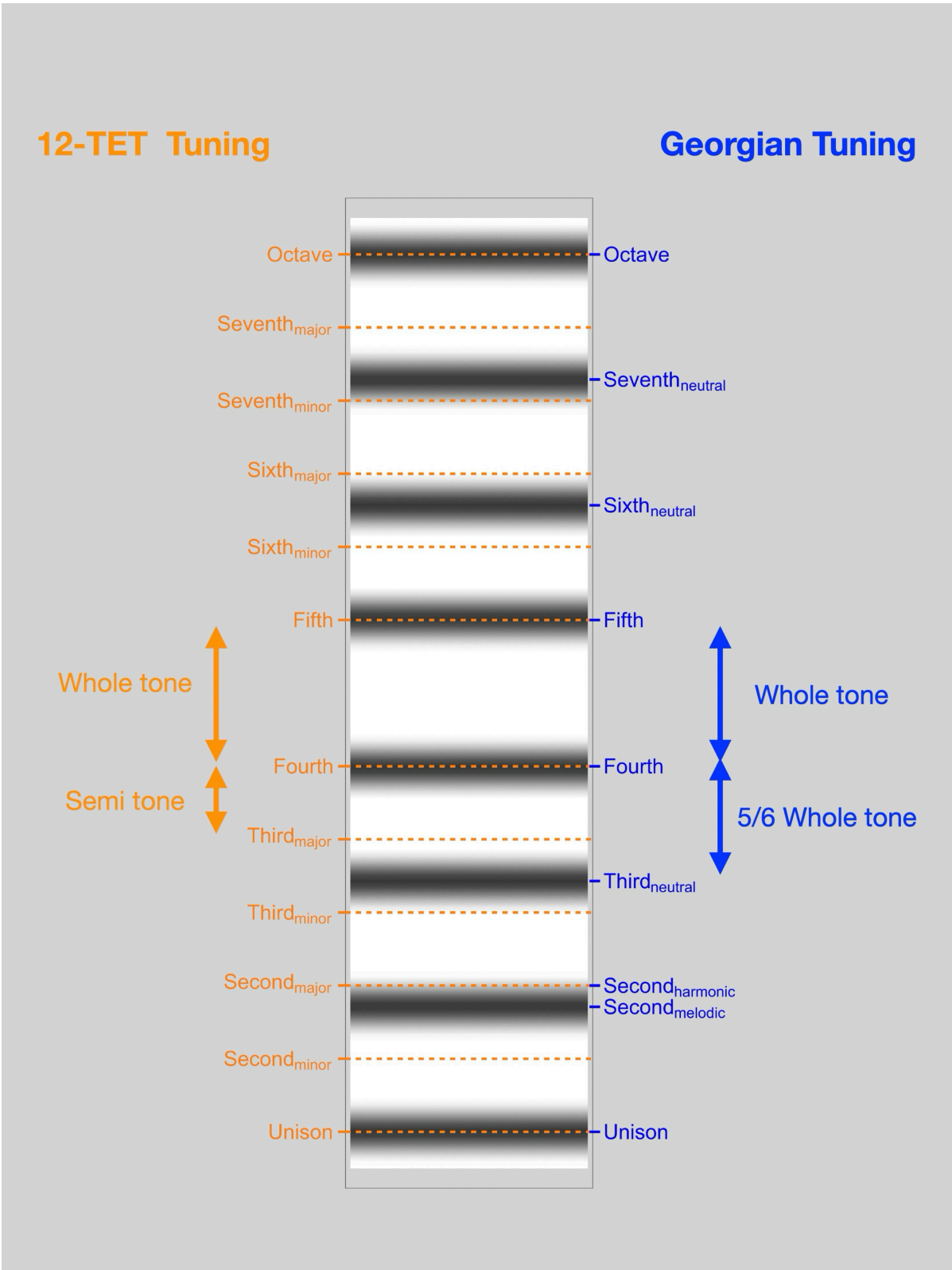


Fig. 10 Comparison of the key elements of the Western tempered pitch system (orange markers) with the key features of the observed pitch systems in traditional Georgian vocal music based on the work of Scherbaum et al. (2020, 2022) (blue markers). The generic synoptic pitch distribution, shown in the center as a density plot, was created by combining the key elements of the average scale models derived from the Erkomaishvili dataset (Rosenzweig et al., 2020; Scherbaum et al. 2020) with the average voicing systems determined for all ensembles from Svaneti (Scherbaum et al., 2022).

For some teachers of Georgian music, this is one of the reasons for not using Western notation in lessons. In the version presented so far, which is based on the so-called equal

temperament (12-TET tuning), the distortion of the harmonic intervals naturally also occurs for the Harmonygrams. However, and this is the good news, this distortion - in contrast to score notation - can be easily corrected if you know how the actual scale system is structured, which we now believe we know thanks to the numerous acoustic analyses.

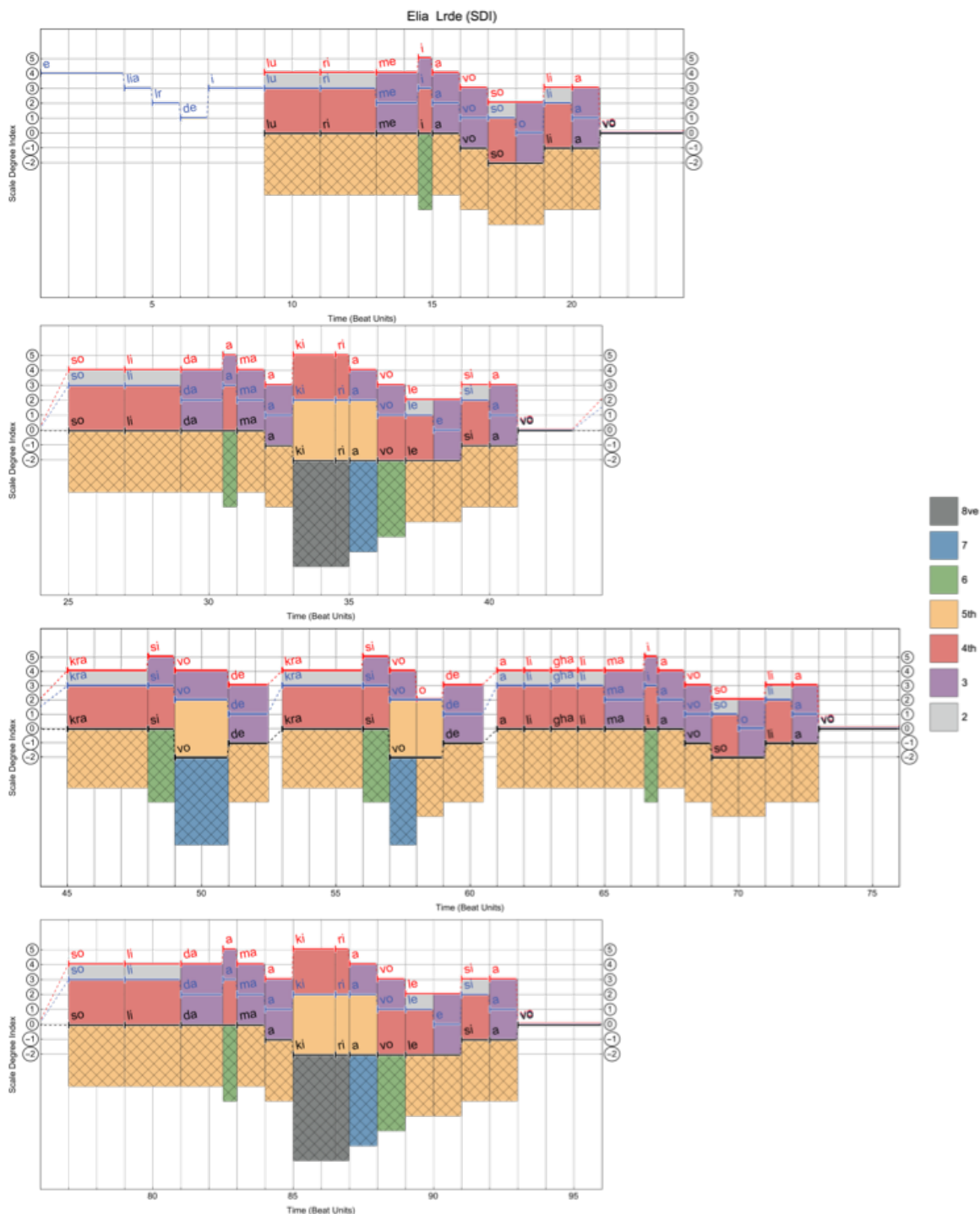


Fig. 11 Harmonygram of the song *Elia Lrde* in SDI notation.

If you do not know the true tuning system precisely, but can at least assign each note to a specific scale degree, the Harmonygram representation can at least be converted into a scale-independent representation, namely as a scale degree index (Scale Degree Index or

SDI), and you are, so to speak, on neutral terrain (and no longer in the major and minor system).

The SDI notation has certain similarities with the Solfege system, in which the scale degrees are given names (*Do, Re, Mi, Fa, ...*). If you assign the scale degree 0 to *Do* (and all variations derived from it by semitone augmentation or diminution, i.e. *Do#* and *Dob*), degree 1 to all notes derived from *Re*, etc., you get the scale degree indices. All tones below the starting tone *Do* are labeled with negative numbers. The SDI system is scale-independent in that no distinction is made between intervals that are a semitone apart and those that are a whole tone apart. The semitone difference between *Fa* and *Mi* in SDI notation is just as large, namely $4-3 = 1$, as the whole tone difference between *Mi* and *Re* ($3-2 = 1$).

Fig. 11 now shows the Harmonygram representation of *Elia Lrde* in SDI notation, as can be seen above the top panel. The difference to Fig. 7 is, firstly, that the vertical cent scale has been replaced by an equidistant scale in which the scale steps are represented by the elliptically outlined numerical values and, secondly, that the major and minor intervals marked by upper and lower case letters have been replaced by neutral intervals marked with a capital N. As a consequence, all thirds now have the same color. If you want to sing from this mode of representation, you must already know the corresponding scale. In this case, the Harmonygram can still be completely sufficient as a reminder.

If you know the tuning system, each scale step can be converted back into an absolute pitch. An example of this is shown in Part A, but I won't go into it in detail here. What I wanted to achieve with the discussion of this example was simply to remind you that the use of the Western 5-line staff notation has considerable consequences for the way we learn these songs and thus also for the way they are handed down to posterity. One practical consequence for me, for example, is not to give too much weight to the question of whether a minor or major third occurs at a particular point in a song and to regard any kind of notation as a useful mnemonic device, following the mathematician George Box's motto "All models are wrong, some are useful!" and to concentrate on the useful aspects.

One of the useful aspects of the Harmonygram representation, in whatever form of notation, is, for example, to recognize similar structural elements, such as chord progressions, at a glance. In Figs. 7 and 11 you can quickly see that the chord progression for beats 33-43 is identical to that for beats 85-95, and that for beats 45-51 is identical to that for beats 53-58, although not all of them are of the same length. It is also very easy to see that the chord sequence at beats 29-33 is repeated identically twice, namely at beats 65-69 and 81-85.

In addition to the above-mentioned exercises on the intonation of the first chord and singing the marginal voices, I find singing different 2-part combinations of Elia Lrde's voices very interesting. You can ask yourself, for example, what you lose from the song by leaving out one part and what difference it makes which one you choose? This quickly leads to exciting questions, such as how this song could have been created? Was it in three voices from the beginning or did it develop from a monophonic melody by adding another and then another voice? Do you find musical arguments in favor of one idea or the other during this experimentation? Does this have an effect on the hierarchy of voices, or the question of which voice leads and which follows? Perhaps there is no hierarchy at all. This in turn has an impact on how you rehearse. Just try it out!

As a final remark on *Elia Lrde*, I would like to point out that listening to different 2-part combinations of voices can be done very nicely with the web interface mentioned above⁴.

⁴ <https://www.audiolabs-erlangen.de/resources/MIR/GVMPlayer/>

Exercise sheet 6 Batonebo Sabodisho

For this song, for which the sheet music, melodygram and Harmonygram are shown in Figs. 12 -14, there is also a version of all parts sung by Nana Mzhavanadze during the Covid period, which can be viewed and listened to via the web interface⁵ .

⁵ https://www.audiolabs-erlangen.de/resources/MIR/GVMPlayer/MID_0.html

Batonebo Sabodisho

Guria

$\text{♩} = 50$

The sheet music is arranged in three systems, each with three staves for Tenor (T), Middle (M), and Bass (B). The key signature has two flats (Bb and Eb), and the time signature is common time (C). The first system (measures 1-5) includes a tempo marking of quarter note = 50. The second system (measures 6-10) includes a 3/4 time signature change. The third system (measures 11-15) continues the melody.

System 1 (Measures 1-5):

Tenor: ba to ne e bo mo u o khet mo u o khet ba to ne e bo
tet rickhvaa ri da thkis jo gi morbis ci kan maikh tu e u na

Middle: ba to ne e bo mo u u o khet mo u u o khet ba to ne e bo
tet rickhvaa ri da thkiis jo gi mor biis ci kan maikh tu u u na

Bass: ba to ne bo mo u o khet mo u o khet ba to ne e bo
tet rickhva ri da thkis jo gi morbis ci kan maikh tu u ba

System 2 (Measures 6-10):

T: la ma zi ba to ne bi a i a da a var di pe ni a
ga u khar dat ba to ne bsa da uc ba at pi ri ib ru na

M: la ma zi ba to ne bi a i a da var di pe ni a
ga u khar dat ba to ne bsa da uc bat pi ri ib ru na

B: la ma zi ba to ne bi a a i a da a var di pe ni a
ga u khar dat ba to ne bo o da uc ba at pi ri ib ru na

System 3 (Measures 11-15):

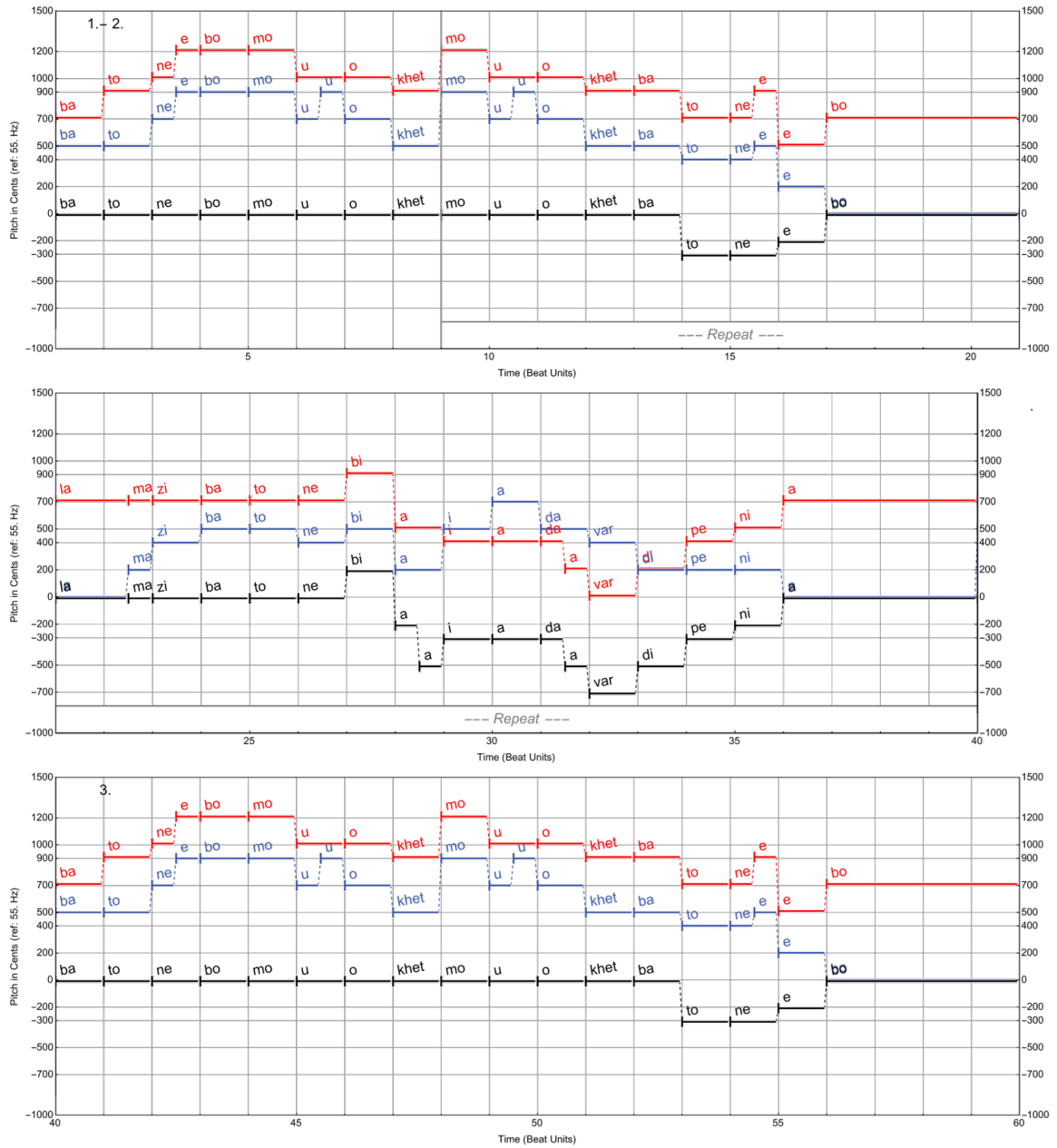
T: ba to ne e bo mo u o khet mo u o khet ba to ne e e bo

M: ba to ne e bo mo u u o khet mo u u o khet ba to ne e e bo

B: ba to ne bo mo u o khet mo u o khet ba to ne e bo

Fig. 12 Sheet music of the song *Batonebo Sabodisho*.

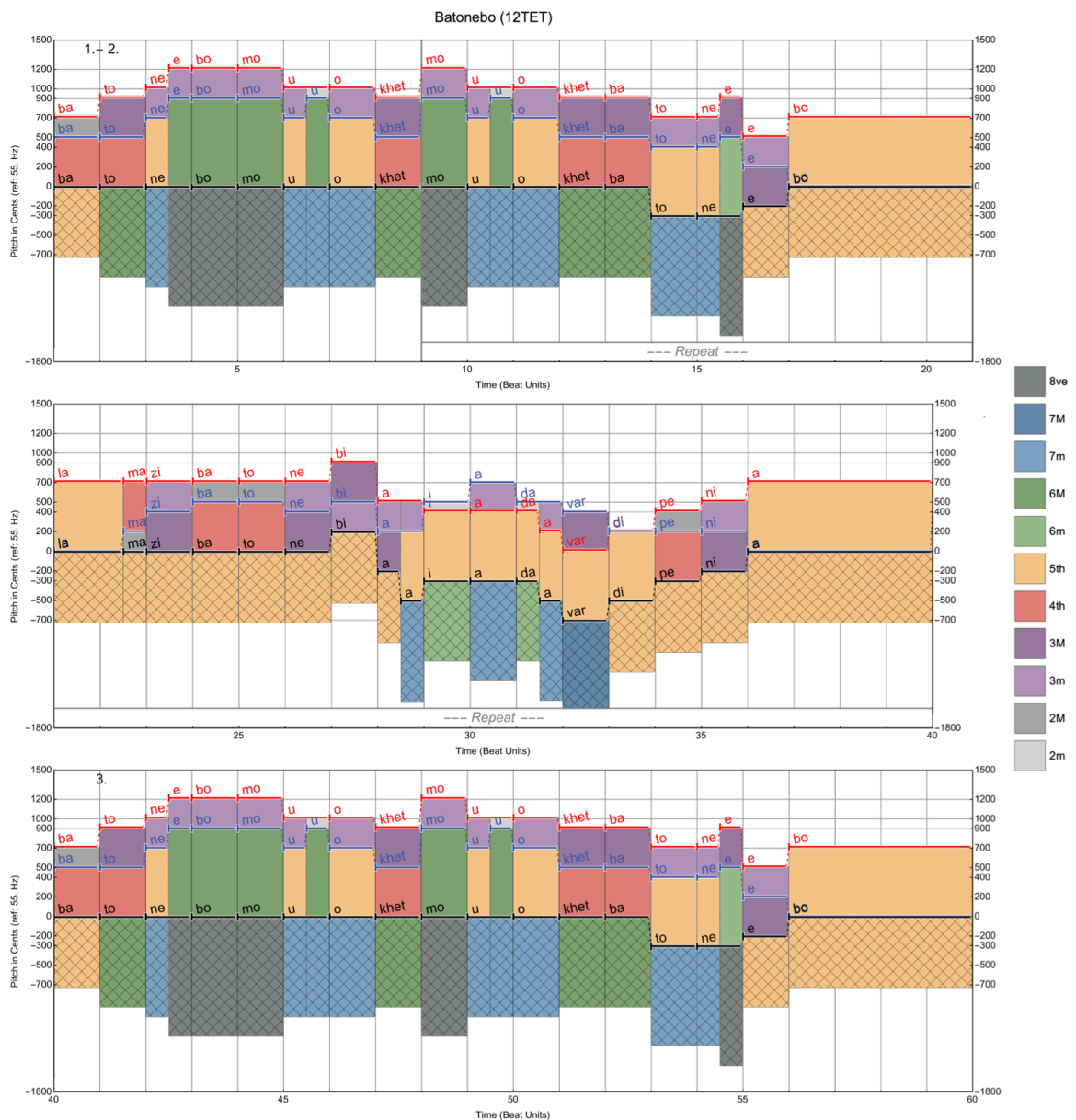
Batonebo (12TET)



1. ba to ne e bo mo u u o khet ||: mo u u o khet ba to ne e e bo :||
 2. tet ri ckhva a ri da thki is jo gi ||: mor bi is ci kan ma ikh tu u u na :||: ga u khar dat ba to ne bsa da uc bat pi ri ib ru na :||

3. ba to ne e bo mo u u o khet mo u u o khet ba to ne e e bo

Fig. 13 Melodygram of the song *Batonebo Sabodisho*.



1. ba to ne e bo mo u u o khet ||: mo u u o khet ba to ne e e bo :||: la ma zi ba to ne bi a i a da var di pe ni a :||
 2. tet ri kхва a ri da thki is jo gi ||: mor bi is ci kan ma ikh tu u u na :||: ga u khar dat ba to ne bsa da uc bat pi ri ib ru na :||

3. ba to ne e bo mo u u o khet mo u u o khet ba to ne e e bo

Fig. 14 Harmonygram of the song *Batonebo Sabodisho*.

In this song there is a very typical element for the Gurian region, namely the crossing of the middle and upper voices in the middle section (lamazi batonebia...). For me, the special magic of this part lies in the fact that you can hear a fifth-parallel voice leading between the bass and upper voice the whole time, which is replaced twice (for half a beat at bar 28.5 and for a whole beat at bar 33) by a fifth between the bass and middle voice. At the beginning of the middle section (from beat 21 - 27), the bass and upper voice form a constant harmonic framework. I imagine this as two guard rails between which the middle voice (starting from the lowest note of this framework) moves towards the highest, changing the "harmonic color" with each step. You can understand this very well in the Harmonygram.

When, after a downward, upward, downward movement, as if it had to take a run-up, the middle voice finally rises above the upper voice (in the syllable sequence: i-a da var-di), this creates a great deal of musical tension for me. You can see in the Harmonygram that the bass and middle voice form a minor seventh at this point, which also explains the feeling of tension from our familiar understanding of consonance/dissonance. This tension is then continuously reduced by the downward movement of the middle voice until the middle and upper voices come together again at beat 33. The middle voice then continues to move downwards to the starting note of the middle section, while the upper voice moves to the fifth above it, which is also the starting note of the middle section. For me, this part always gives me goosebumps.

What I would like to illustrate with this short - very personal - description is that the Harmonygram representation enables me to access this song from a perspective that goes beyond the purely acoustic and has its own aesthetics.

As far as the tool character of the Harmonygram representation as a pure aid to orientation when singing is concerned, I would like to make one more comment. For singers, it can be confusing at first if, as a singer in the middle voice, you find yourself above the upper voice in terms of pitch, which of course also applies to the upper voice, which otherwise usually perceives itself as the highest voice. What I find very helpful in this context is to remember the point at which the two voices come together again. There you can check whether you have reached the same common note again or correct your pitch if necessary. A look at the Harmonygram quickly shows that this happens at beat 33, at the syllable *di*. After that, each of the two upper voices is back in its usual terrain.

As a little exercise at the end, I can think of the question of the relationship between Batonebo songs 3 and 6. A look at the two Harmonygrams should quickly clarify this question.

Exercise sheet 7 Dideba

The song *Dideba*, shown in Fig. 15 - 17, is another song in which voice crossings occur.

Dideba

$\text{♩} = 100$

Top
di de ba i a tschwens sche kre e e e ba a a sa

Middle
de ba i a tschwens sche kre e e e ba a a sa

Bass
ba i a tschwens sche kre ba a sa

2

T
da ghme ert sa a a vtcho o ovt ga a a a u u mar tschos

M
da ghmert sa a vtcho o ovt ga a u u u u ma a ar tschos

B
da ghmert sa vtcho o ovt ga u u ma ar tschos

3

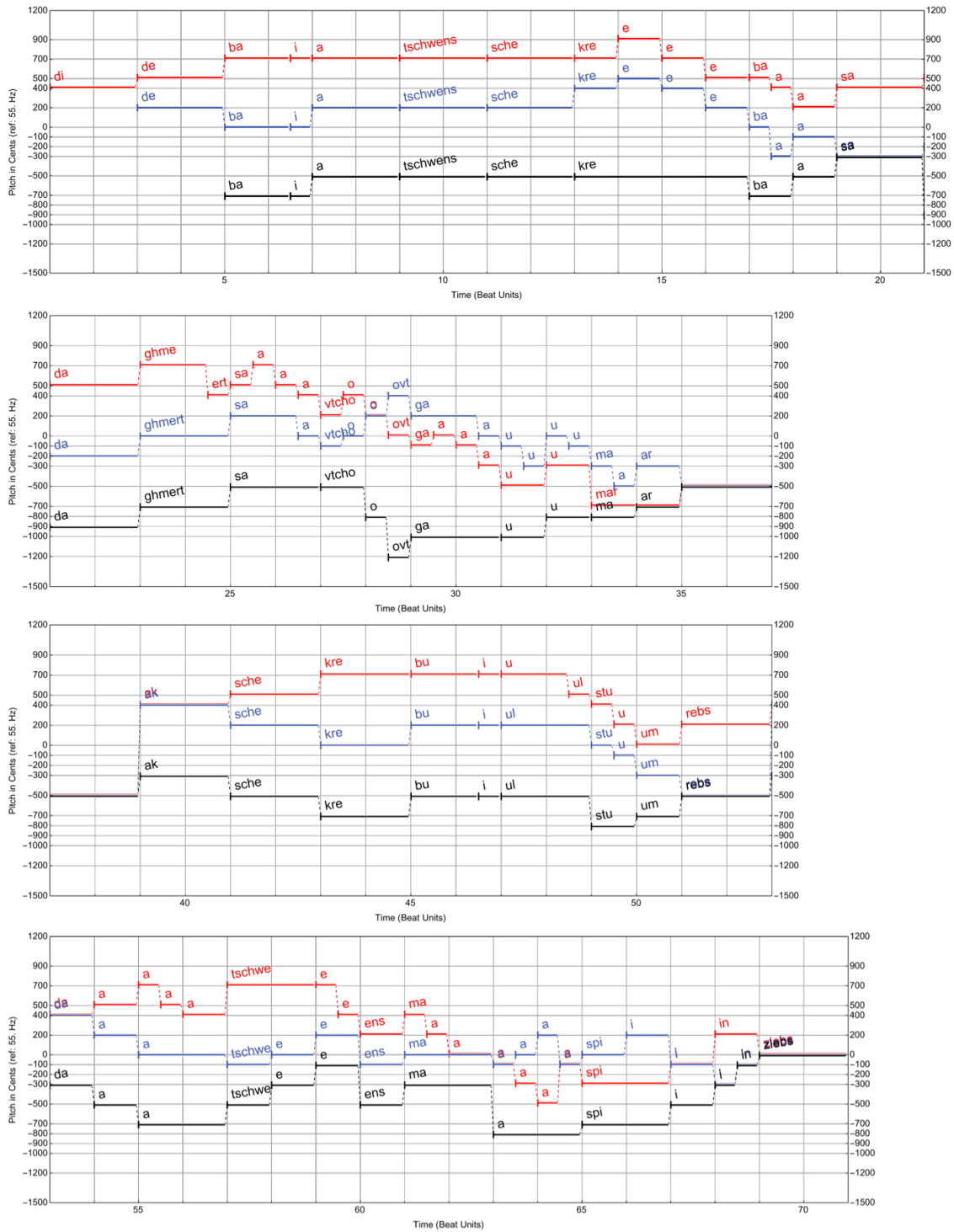
T
ak sche kre bu i u ulstuumrebs da a a atschwe eensmaa a a a a spi i in zlebs

M
ak sche kre bu i ul stuumrebs da a a tschwee e ensma a a a spi i i in zlebs

B
ak sche kre bu i ul stu umrebs da a a tschwee e ensma a spi i i in zlebs

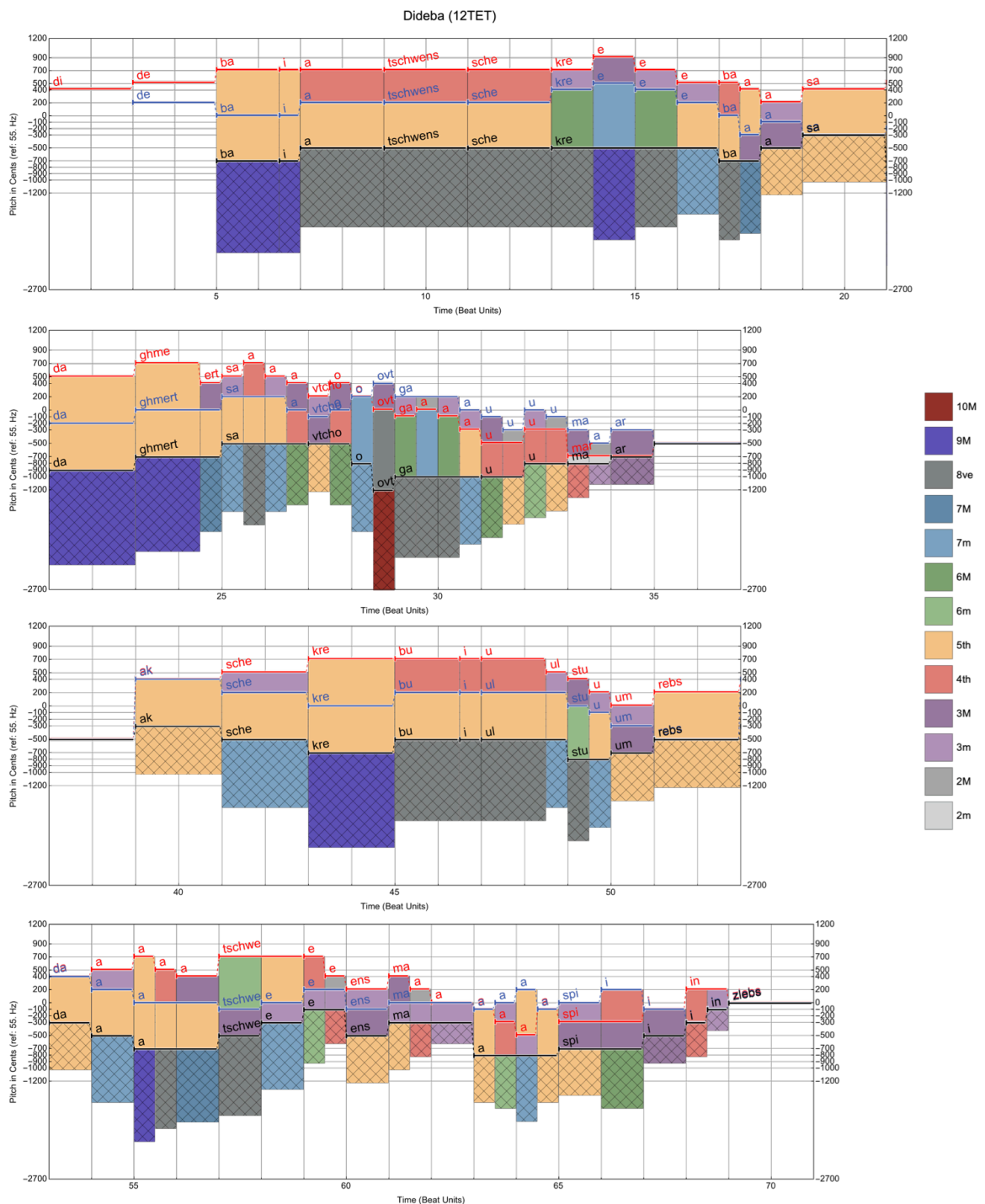
Fig. 15 Sheet music of the song *Dideba*.

Dideba (12TET)



di de ba i a tschwens sche kre e e e ba a a sa da ghmert sa a vtcho o o ovt ga a u u u u ma a ar tschos
 ak sche kre bu i ul stu u um rebs da a a tschwe e e ens ma a a a spi i i in zlebs

Fig. 16 Melodygram of the song *Dideba*.



di de ba i a tschwens sche kre e e e ba a a sa da ghmert sa a vtcho o o ovt ga a a u u u ma a ar tschos ak sche kre bu i ul stu u um rebs da a a tschwe e e ens ma a a a a spi i i in zlebs
Fig. 17 Harmonygram of the song *Dideba*.

Here, too, a glance at the Harmonygram in Fig. 17 shows that the sand color, which represents the fifth, makes up a large part of the interval inventory. Right at the beginning of the polyphonic part, there is even a vertical stacking of two fifths in the version used here, i.e. the interval between the lowest and highest voice becomes a major ninth, which has a very special sound character. In this song, the three voices enter one after the other, which raises the question for the middle voice and the bass voice, which enter later, of how to obtain their starting pitches easily. This is comparatively easy for the middle voice, as it

starts a whole tone below the starting note of the upper voice (the same interval as the first two notes in *Yesterday* by the Beatles). But the bass? For me, the easiest way to hear the bass entry note is to try to memorize the pitch of the second note of the upper voice (at the syllable *de*) and simply enter an octave lower. There may be other mnemonic devices for everyone. As a bass singer, however, I can quickly realize whether I'm right, because after the starting note comes a longer sequence on the same pitch, in which the bass voice is exactly one octave below the upper voice. During that part it is fairly easy to correct one's pitch if necessary. I find the beginning of the 2nd phrase particularly beautiful for the bass part, in which the bass and middle voice gradually ascend in parallel fifths. In the first two steps, even the upper voice is still there with parallel fifths to the middle voice, i.e. fifths in abundance. Something similar happens at the beginning of the second phrase, but then as a downward movement, followed by an upward movement. Always parallel to the middle voice. In this song, there are always places where I, as a bass singer, can sense whether I am still in harmony with the other voices, namely when the bass voice is either involved in an octave with another voice or in a fifth. For me, these are the clues that I draw from a Harmonygram and whose positions in the song I try to remember, if possible without looking at the Harmonygram.

Exercise sheet 8 Dghres Saghvroman Madlman

The version of this song shown in Fig. 18 -20 comes from the Shemokmedi Monastery near Ozurgeti. The sheet music comes from a YouTube video of the Anchiskati Choir⁶.

Dghres Saghvroman Madlman

Guria

♩ = 72

Top
dghres saghvromanmadlmanqovladtsmidi sa su u li i sa a a manschem kri ib na tschwen

Middle
dghres saghvromanmadlmanqovladtsmidi sa su u li i sa a a a manschem kri ib na a tschwen

Bass
dghres saghvromanmadlmanqovladtsmidi sa su u li sa manschemkrib na a tschwen

3
T
qo vel ta gvi pqri i es dschwa a ri sche ni da vit qvit

M
qo vel ta gvi pqri i i es dschwa a ri sche ni da vit qvit

B.
qo vel ta gvi pqri i es dschwa ri sche ni da vit qvit

4
T
kur tche ul ars mo ma va litschwenda sa a che e e li ta u u pli sa

M
kur tche ul ars mo ma va litschwenda sa a che e e e li ta u u pli i sa

B.
kur tche ul ars mo ma va litschwenda sa che li ta u pli i sa

5
T
ta o o sa a na a a ma a gha a al ta a schi i na

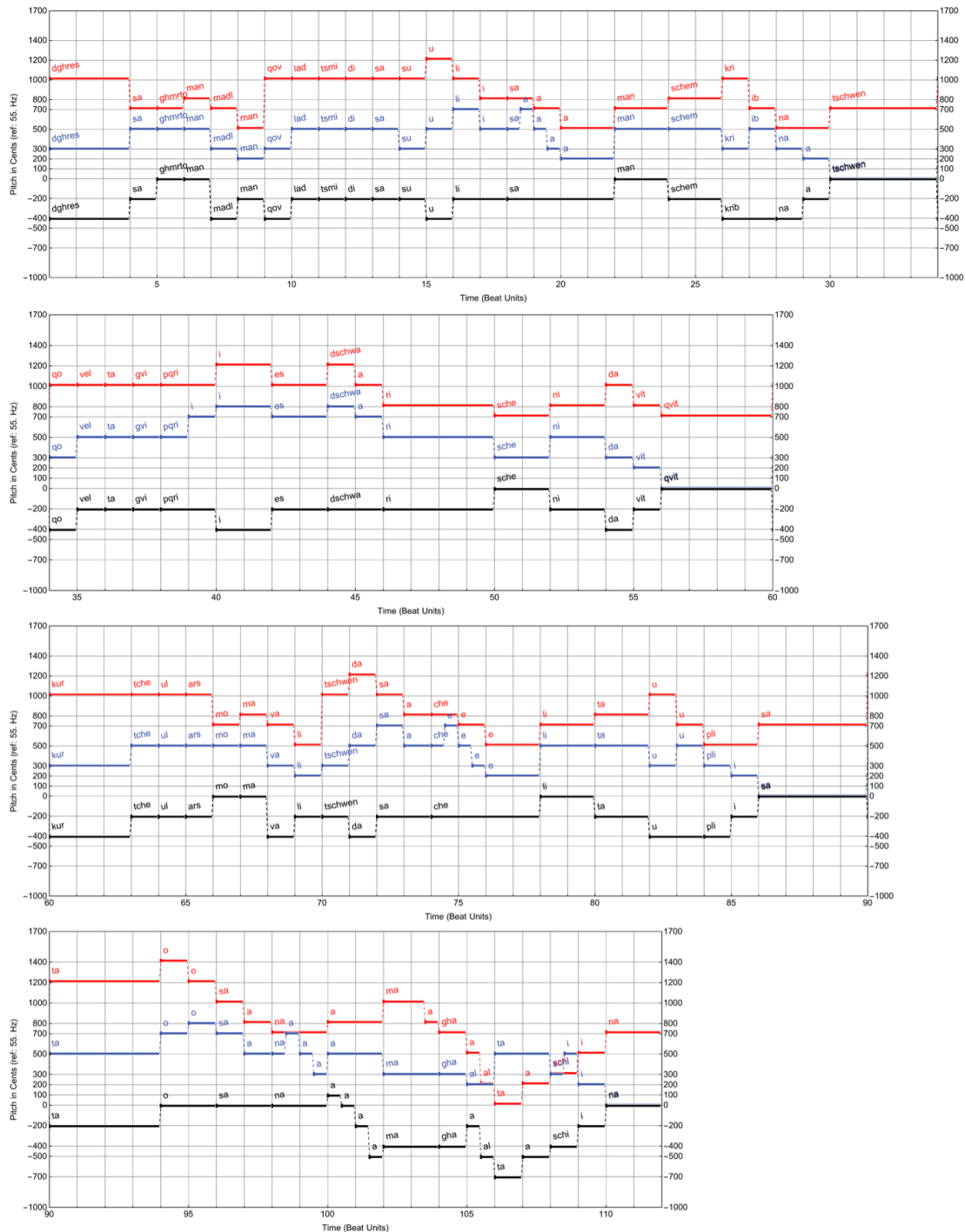
M
ta o o sa a na a a a a ma gha al ta schi i i na

B.
ta o sa na a a a ma gha a al ta a schi i na

Fig. 18 Sheet music of the song *Dghres Saghvroman Madlman*.

⁶ <https://www.youtube.com/watch?v=wJ4fSwtivUs>

Dghres Saghtoman Madlman (12TET)



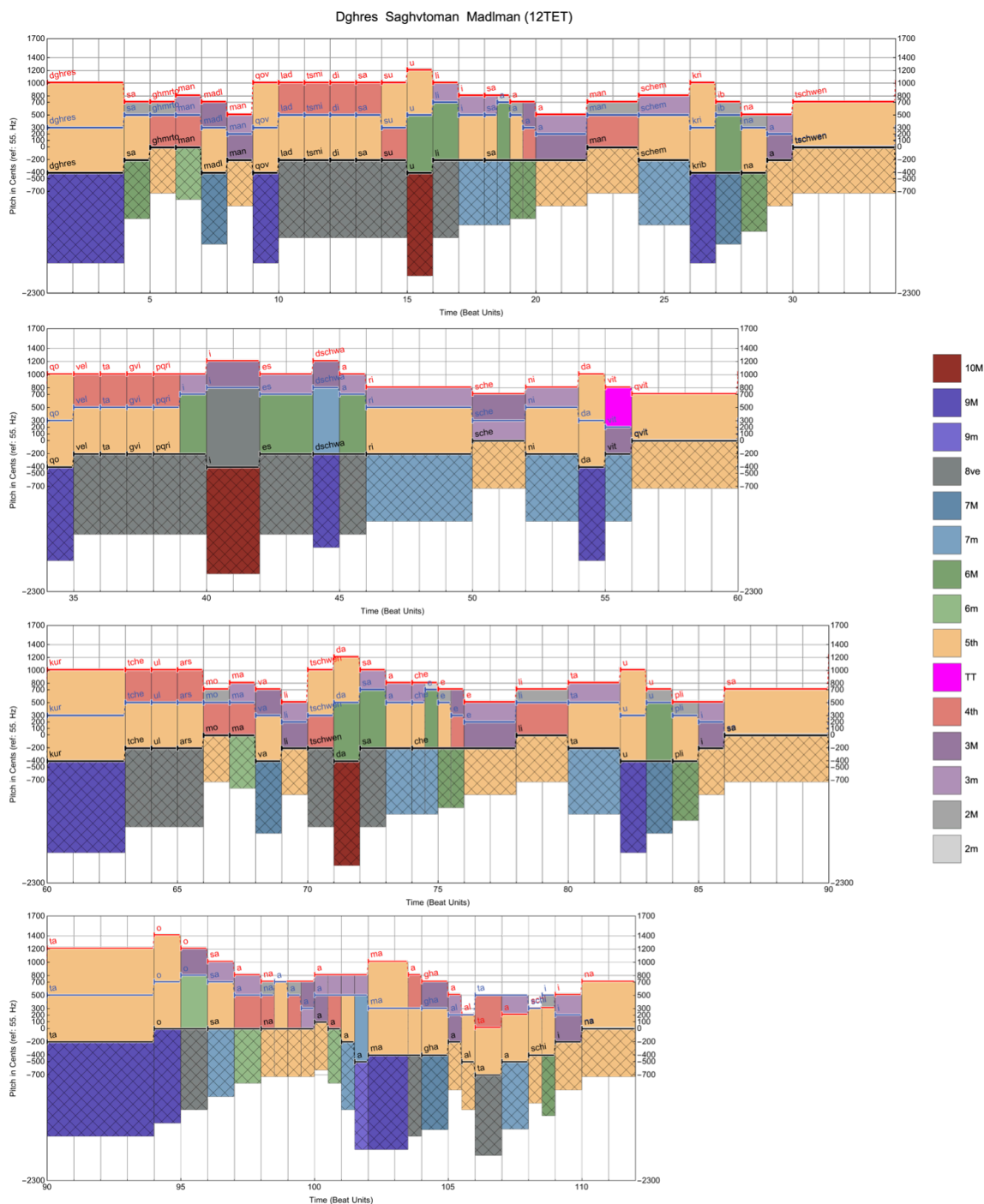
dghres sa ghmrto man madl man qov lad tsmi di sa su u li i sa a a a a man schem kri ib na a tschwen
 qo vel ta gvi pqri i i es dschwa a ri sche ni da vit qvit kur tche ul ars mo ma va li tschwen da sa a che e e e li
 ta u u pli i sa ta o sa a na a a a ma gha al ta schi i i na

Fig. 19 Melodygram of the song *Dghres Saghtoman Madlman*.

At the beginning of the song, the upper, middle and bass voices are each a fifth apart, which in itself can generate goosebumps⁷. When listening to the song, you can hear very clearly that the song is divided into individual phrases, each with its own arc of tension. Each

⁷ There are also versions of this song in which the starting pitch of the bass voice is an octave below the top voice.

phrase starts with a 1-5-9 chord and ends on a long 1-1-5 chord in which the middle and bass voices come together on the prime and the upper voice is a fifth above it.



dghres sa ghmrto man madl man qov lad tsmi di sa su u li i sa a a a man schem kri ib na a tschwen
 qo vel ta gvi pqri i i es dschwa a ri sche ni da vit qvit kur tche ul ars mo ma va li tschwen da sa a che e e e li
 ta u u pli i sa ta o sa a na a a a ma gha al ta schi i i na

Fig. 20 Harmonygram of the song *Dghres Saghtoman Madlman*.

The Harmonygram of this song (Fig. 20) shows that Harmonygrams can also be very useful for the structural analysis of a song. You can recognize very quickly - simply by the visual patterns - which parts of the song are repeated exactly or in a slightly different form.

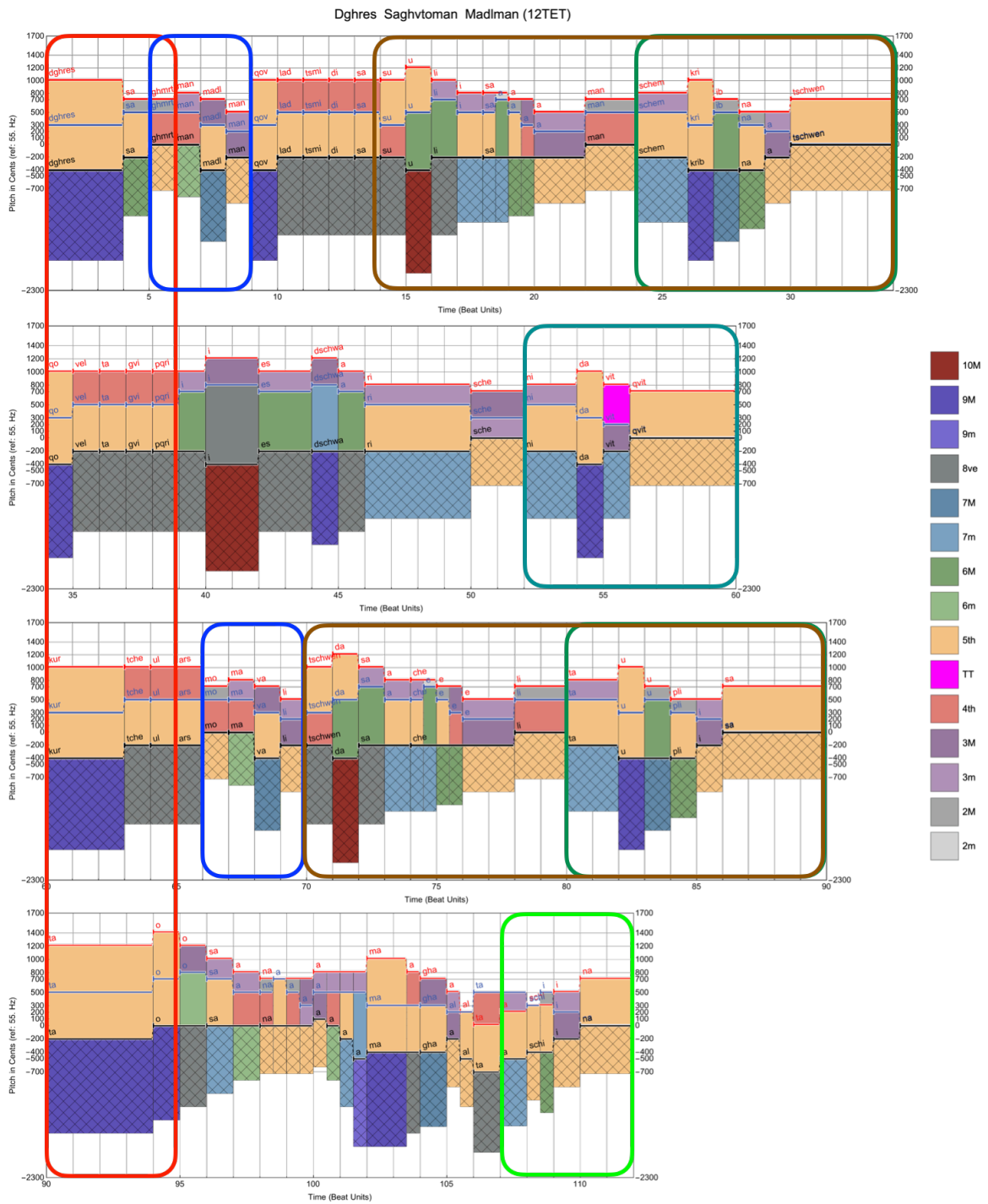


Fig. 21 Harmonygram of the song *Dghres Saghvroman Madlman* with marked areas in which similar or identical chord sequences occur.

All phrases in Fig. 21 begin with identical chords of two stacked fifths. The first 3 phrases have very similar cadences, but they differ from the final cadence. The chord progressions for beats 13 - 33 are identical to those for beats 69 - 89, as are those for beats 5 - 9 with those for beats 66 - 70.

One question that has always puzzled me is what relationships exist between the individual voices of a Georgian song. Is there a hierarchy? In other words, are all voices equal or is one voice a kind of leading voice that is accompanied by the other two voices, e.g. in that they

only provide the harmonic framework on which the main voice can then develop comparatively more freely? It is often said that the top voice is the leading voice in church music and the middle voice in folk music. But does this correspond to what the music is telling us?

- 1) What can you tell from the audio recording in this respect? For me, the audio recording emphasizes the upper voice, but this may be due to the timbre. Since I first wanted to know in which tonal system the recording was sung, I carried out a scale analysis with Melodyne. This shows a completely normal equal temperament (Western) tuning with the usual semitones, as they are also shown in the sheet music.
- 2) When singing, I have the feeling that the middle part is the easiest to sing in terms of the text ("Today the grace of the Holy Spirit has gathered us together, and we all take up your cross and say: Blessed is he who comes in the name of the Lord; Hosanna in the highest").
- 3) What can be recognized from the Harmonygram? Here I see a perfect fifth-parallel movement of the upper voice and bass, especially in the final cadence over 5 chords. This can already be recognized in the melodygram in the parallel movement of the black and red voices. For me, this is a very strong argument in favor of these two voices being accompaniment parts. This is also supported by the fact that the upper and bass voices sometimes make mirror-image vertical movements, i.e. when the upper voice goes up, the bass voice goes down (e.g. beats 15, 40).

Why could this be important for singing? As a bass singer, I always try to stay a little behind the lead voice, which I only accompany, and to do justice to my role as an accompanying voice in terms of volume. That's why it's important for me to know whether I'm accompanying or whether my voice has equal rights and if I'm accompanying, then who? Based on the above arguments, it seems to me that the middle voice is the main voice, to which I pay particular attention in terms of volume and time. This means that I try never to sing earlier and never louder. Together with the upper voice, I have the task of providing the harmonic framework, which primarily consists of providing the ninths, octaves and fifths. When I succeed, *Dghres Saghvroman Madlman* is a real goosebump song for me.