

## Chromaticisms or Performance Rules? Evidence from Traditional Singing

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**Background in ethnomusicology.** Chromaticisms in folk tunes are quite frequently discussed in ethnomusicological studies, especially in Eastern Europe. For instance, chromaticisms are abundant in the transcriptions of traditional songs from the region of Lithuania Minor. Therefore it is believed that chromaticisms are characteristic of this region (Čiurlionytė, 1938, 1955, 1969). Samples from this region are often chosen as typical samples of chromaticisms in textbooks on music theory and music encyclopedias (e.g., ME, 2003).

**Background in music cognition.** It is known that small deviations of pitch are systematically applied in vocal performance as markers of emotion and other qualities (Sundberg, 1999). Performance rules for pitch intonation could be derived (Friberg, 1995, etc.). Generally, manifestation of performance rules is observed in traditional vocal music as well, although with certain modifications (Ross and Lehiste, 2001).

**Aims.** We aim to verify the validity of the phenomenon of chromaticism in traditional singing by comparing statistics of nominal chromaticisms found in early transcriptions with pitch performance rules revealed in newer sound recordings of Lithuanian traditional songs.

**Main contribution.** The collection of songs by Christian Bartsch (1886, 1889) is the most representative collection from Lithuania Minor. Statistical analysis of the chromaticisms appearing in the transcriptions was carried out. It was found that two contextual types of chromaticisms manifest most distinctly. First, sharps tend to appear in ascending sequences, whereas flats tend to appear in descending sequences. Second, 'leading tone' tends to be 'gravitated' by the anchor tone, but only if the two tones experience strong interaction. The same two tendencies were observed for the samples recorded later in Southwestern Lithuania (near Lithuania Minor). However, acoustical measurements showed that the differences between two 'chromatic' versions are notably less than semitone of 12 tone equal temperament (12ET), and that they are not stable (the zones of intonation are quite wide). We infer that in this case archaic non-diatonic (quasi-equitonic) musical thinking is actually in operation, and the nominal chromaticisms result from 12ET-biased perception of intervals. It is possible to transfer this conclusion to the Bartsch's transcriptions, i.e., the 'typical chromaticisms' in the transcriptions can be treated as mere pitch deviations, resulting from the performance rules and exaggerated by 12ET-biased perception. In general, the phenomenon of chromatic change in traditional singing becomes questionable.

**Implications.** For ethnomusicology courses: nominal chromaticisms should be reconsidered as mere manifestations of perceptual performance rules, and the transcriptions should be reinterpreted. Music theory courses should avoid (or verify) examples of traditional music as typical examples of chromaticisms. Folk singing practices should avoid exact reproduction of chromaticisms in transcriptions but rather develop skills to master pitch performance rules. A comprehensive account of the phenomena of musical scales and their historical development requires expertise in both the humanities (music history, theory, analysis, ethnomusicology) and the sciences (music psychology, acoustics, statistics).

**Keywords:** Chromaticisms, performance rules, traditional singing

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## **Introduction**

Performance, and especially performance of European professional music, was quite widely studied during several latter decades. As for the aspect of deviation in live performance, mostly microtiming was considered. At least time deviations in the course of performance were studied somewhat more thoroughly than pitch (intonation) deviations. It is understandable: “Because of the specific issues investigated, and for technical reasons, the great majority of empirical work on performance has looked at keyboard performance” (Clarke, 2004: 78). Nevertheless, dependence of intonation on the musical context was noted in quite a few studies (Sundberg, 1982; Fyk, 1994; Gabrielsson, 1999; Burns, 1999; Morrison & Fyk, 2002; Kopiez, 2003; etc.) and several pitch performance rules were derived, as part of KTH (Royal Institute of Technology, Sweden) performance rule system and elsewhere (Friberg, 1991, 1995; Friberg, Bresin, & Sundberg, 2006; Fyk, 1995; etc.). On the other hand, different aspects of chromatic changes in folk tunes are quite frequently discussed in ethnomusicological studies.

The present paper argues, based on analysis of the chromaticisms, and on objective measurements of pitch, that the seeming chromaticisms are merely misinterpretations of quite loose pitch performances. Several pitch performance rules in vocal performance (namely, in Lithuanian traditional solo singing without accompaniment) are revealed.

Initial evaluation of chromaticisms in Bartsch collection was done by Irena Wiśniewska. The rest part of study has been carried out by Rytis Ambrazevičius.

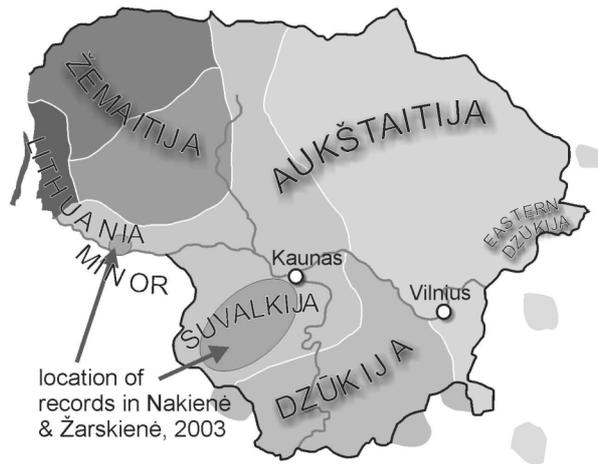
## **Pitch transcriptions: chromaticisms**

### **Samples**

For this study, tunes from a collection compiled by Bartsch (1886, 1889) were selected. This collection contains 453 songs<sup>1</sup> with music transcriptions. It is the largest and the most representative collection of folk songs written down in the region of Lithuania, called Lithuania Minor<sup>2</sup> (see Figure 1). The songs were collected during the 19th century. Obviously, these were aural transcriptions of live performances; the Edison phonograph was not yet available. The layer of folklore discussed had almost totally vanished by the beginning of 20th century, together with the folklore carriers-Lithuanians of Lithuania Minor. Therefore today it is only possible to study the old materials (such as those by Bartsch) and to compare them with newer data coming from the regions neighbouring Lithuania Minor.

From the 453 Bartsch songs, only the items containing chromaticisms were selected, i.e., only the items with at least one scale degree spelled in two chromatic versions

were considered. This set comprised 92 transcriptions. Five of them were excluded from further consideration because the chromaticisms appeared only once in short (sixteenth) intermediate notes or/and these songs were of modern German origin reflecting different musical thinking.



**Figure 1.** Ethnographic regions of Lithuania.

### Chromaticisms of ‘leading tone’

Chromaticisms in the 87 transcriptions split into several types (Table 1). The chromaticisms of ‘sharp leading tone’-type occurred most frequently (1st, 2nd, 4th, 5th, and 6th data rows in Table 1). That is, a note is sharp (neutral) if it appears in strong interaction with a tonal anchor, i.e., if it works as a ‘leading note’, whereas it is neutral (flat) if it appears in a different musical context. Figure 2 shows a typical example of transcription.

Notably, the most frequent case is that of the ‘leading tone’ appearing between the two anchor tones (1st data row in Table 1). The second, fifth and sixth rows also show the gravity towards the anchor tone.

Moderato Pilupėnai, 1846 Bđ.

– Ma - mu - že, mie - go no - riu, Se - no - ji,  
mie - go no - riu. Ne - į - ma - nau kur  
gul - ti Nei kur pa - si - il - sė - ti.

**Figure 2.** Example of transcription containing chromaticisms (Bartschas, 2000: 207). Consider B spelling across the melody.

### Chromaticisms of other types

‘Ascending-descending’ chromaticisms comprise the other frequent type found in the collection under investigation. That is, the note is sharp (neutral) if it appears in ascending sequence, whereas it is neutral (flat) if it appears in descending sequence (3rd data row in Table 1; see Fig. 3). Distinction between this type and the types just discussed (especially between patterns depicted in the 3rd and 4th data rows) is not always simple.

Andantino Apie Širvintą, 1857 B.

Po dar - žu - žį vaikš - čio - jau, Žo - ly - nu -  
žes min - džioj. Da - bar su Die - vu, Ža - lios rū -  
te - lės, Dau - giu jūs ne - lan - ky - siu, Da - //ky(siu).

**Figure 3.** Example of transcription containing chromaticisms (Bartschas, 2000: 136). Consider C spelling across the melody.

**Table 1.** Occurrences of different types of chromaticisms in Bartsch, 1886, 1889.

pattern	occurrence (number of songs)
	46
	28
	12
	7
	4
	3
(#)	3
#, ♯ in the same context	9
other	21

Sometimes notes are spelled differently even in the same melodic contexts (8th data row in Table 1; see Fig. 4). Sometimes Bartsch was unsure about the spelling, so he put the accidentals into brackets (7th data row). The last data row in Table 1 shows more complicated, unresolved or simply other types of chromaticisms not yet discussed. Nevertheless, it is worth mentioning that types opposite to the ones already discussed were not observed. For instance, patterns such as ‘E-F#-G-F-E’ were found, but not ‘E-F-G-F#-E’.



**Figure 4.** Example of transcription containing chromaticisms (Bartschas, 2000: 219). Consider D spelling with syllables *sis* and *vi*.

### Chromaticisms in Lithuanian ethnomusicological studies

The findings of the thorough analysis of chromaticisms in Bartsch collection correlate to the general observations and conclusions made by Čiurlionytė<sup>3</sup> (1955: 25–28, 1969:

236–239). For example, she stated, that chromaticisms are abundant in the folk songs of Lithuania Minor and she listed typical ‘chromatic sequences’ found in this region. We can recognize some of the most frequent patterns from Table 1, in the list (Fig. 5).



**Figure 5.** Chromaticisms characteristic of Lithuania Minor, as concluded by Čiurlionytė (1955: 27).

Čiurlionytė has also noted that chromaticisms are characteristic not exclusively of Lithuania Minor, but also are found in vocal folklore of other Lithuanian ethnographical regions (1955: 25–58, 1969: 236–238). Četkauskaitė found ‘chromatic variability’ in *Dzūkai* (Southern Lithuania; see Fig. 1) songs (1981: 31–35). The notion that chromaticisms are more or less common in Lithuanian traditional singing is still widely accepted. ‘Abundant alterations and chromaticisms’ or ‘chromatic variability of sounds’ are found in the melodies of Lithuania Minor (Vildžiūnienė, 2007: 21; Petrošienė, 2007: 121; etc.). Vildžiūnienė writes about ‘changing mode with homonymous tonal centre and dual third, sixth, second or seventh’ (on features of *Dzūkai* songs; 2007: 9).

## Pitch measurements: performance rules

### Samples

It was already mentioned that it is impossible to collate Bartsch’s transcriptions with (not existing) sound records. Therefore the task was to find sound records as old as possible and made as close as possible to Lithuania Minor. We are lucky that there were sound records made in Suvalkija (Southwestern Lithuania; see Fig. 1) in 1930s. ‘There were no ventures to the countryside area with phonograph apparatus, otherwise, perfect folk singers and musicians used to be invited from their villages to the Folklore Archive [in Kaunas] where their repertoire was registered on shellac discs’ (Nakienė & Žarskienė, 2004: 19). Recently a collection of selected items of this folk music with CD was released (Nakienė & Žarskienė, 2004). The CD contains 42 tracks; 25 monophonic songs and 17 instrumental pieces are included. In the present study, the songs were analyzed.

## Method

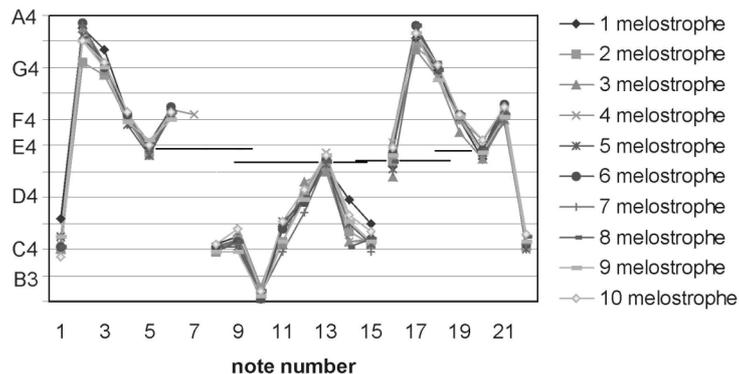
For acoustic measurements, PRAAT<sup>4</sup> software was chosen. Psychoacoustic evaluation of pitches was carried out according to the procedures described earlier (Ambrazevičius, 2005–2006: 66–67):

- (1) Pitches of the quasistationary segments were measured.
- (2) In the case of considerable and irregular intratonal pitch change, pitch of short segments chosen from the track was aurally compared to the pitch of the entire tone. This way is applicable provided more or less stationary short segments are found in the track. Also short segments of monotonically ascending or descending pitch track were accepted for the estimation. In this case the aspect of memory decay in perceptual pitch evaluation was taken into account.
- (3) In cases where it was impossible to evaluate pitch using the methods described, the perceived pitch was aurally collated with generated tones from a 10 cents-grid. This method was also used for the complementary check of the results obtained by the methods (1) and (2).

Pitch tracks (such as these depicted in Fig. 6) then were composed. The repetitions were superimposed.

## Rule of ‘leading tone’

Consider Sample S31<sup>5</sup> (Figs. 6 and 7). From the pitch tracks, it can be seen that scale degrees are intoned differently, depending on their position in the melodic contour. This, certainly, can result from the zonal origin of intonation, errors of measurement, and from the insufficient number of statistical samples. However, if the changes are large enough and systematic, then, most probably, they reflect certain features of the horizontal (temporal) component in the modal thinking or in the physiology of vocal technique.



**Figure 6.** Measured pitch tracks of all melostrophes of Sample S31. Horizontally: row numbers of notes in the melodic contour. Vertically: pitch (log fundamental, A4 = 440 Hz). Horizontal lines denote mean pitches of the third scale degree in different positions in the melodic contour.

The image shows a musical transcription of Sample S31. It consists of two staves of music in 8/8 time. The first staff is in treble clef and contains the melody with lyrics: "Oi gi - i - ria gi - ria, gi - re - le ža - lio - ji,". The second staff is in bass clef and contains a lower melodic line with lyrics: "pil - na d-rab - nų paukš - te(tiu).". The music is written in a key with two flats (B-flat and E-flat).

**Figure 7.** Transcription of Sample S31 according to acoustical measurements.

For example, consider the patterns consisting of the anchor tone and its closest lower neighbour in the musical scale, i.e. a kind of leading tone. In the cases when no strong interaction between the third and the fourth degrees is observed (i.e. when the intermediate tones appear between the two tones in the melodic contour or, e.g., when the two tones are separated by a division in the time structure), the second interval occurring between the third and the fourth degrees tends to be relatively wide. Thus the third is relatively low in this case. On the contrary, when strong interaction between the two scale degrees is characteristic (e.g., when the third appears as an intermediate tone between two anchor fourths in the melodic contour), the second interval tends to be narrowed, i.e., the third is raised. In Sample S31, the discussed difference between the thirds equals 36–50 cents, on average. Here the high third works as something similar (or the prototype) to the leading tone in diatonic thinking and thus strengthens the anchor quality of the fourth.

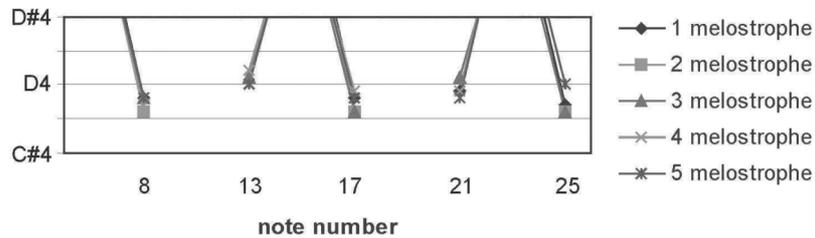
Table 2 presents generalized results for all the vocal tunes from the collection Nakienė & Žarskienė, 2003 with the distinct melodic contexts just discussed. That is, melody contours characteristic of the following features are considered: the patterns of types ‘anchor fourth – third – anchor fourth’ and ‘third in other environment’ occur distinctly and are not obscured by additional counterphenomena, such as abundant short or grace notes. Five contours are found (Samples S7, S25, S31, S39, S41), with a total of 32 melostrophes containing 132 thirds of interest.

The study shows that the third scale degree, in the context of the fourths-anchors is 38 cents sharp, on average, in comparison with the third in other melodic contexts.

In short, we derive the following rule: **a scale degree next to an anchor tone tends to ‘gravitate’ to the anchor tone** if the two tones are found in a pattern of strong interaction.

### **Rule of ascending vs. descending sequences**

Pitch changes can also appear between the occurrences of the same scale degree in ascending and descending sequences. See, for instance, these intonation changes in Sample S28 (Fig. 8).



**Figure 8.** Measured thirds (scale degrees) in ascending and descending sequences, in all melostrophes of Sample S28.

The thirds in the ascending sequences are systematically intoned approximately 28 cents higher than in the descending sequences, on average. This issue in the Sample S28, as well as in the other samples under investigation, can be conditioned by the tendency to widen intervals.

**Table 2. Realizations of the third in different melodic contexts.** Left column; from top to bottom: sample mean (mean pitch interval between the two realizations), standard deviation, size (number of utterances-melostrophes), and confidence coefficient (of population mean being positive).

	<b>‘leading’-‘other’</b>	<b>ascending- descending</b>
$\bar{i}$ , cents	38	27
s, cents	31	26
n	32	19
confidence ( $\mu > 0$ )	>0,99999	>0,999

See the generalized results for all the vocal tunes from Nakienė & Žarskienė, 2003 with the distinct ascending and descending patterns, in Table 2. Four contours are found (Samples S10, S11, S16, S28), with a total of 19 melostrophes containing 90 thirds of interest.

Thus the third scale degree, in the context of the ascending sequences is 27 cents sharp, on average, in comparison with the third in descending sequences.

Thus, we derive the following rule: **the pitches in the ascending sequences tend to be raised, whereas those in the descending sequences tend to be lowered.**

## Discussion

Based on the acoustic measurements we can state that there are no ‘real’ chromaticisms in the vocal performances considered, only pitch performance rules manifesting themselves in different melodic contexts. The difference between ‘chromatic’ versions is considerably less than one semitone. The ‘chromaticisms’ occur due to 12ET-biased perception of peculiar scales. It seems that we can also extrapolate, with a sufficient confidence, this statement to Bartsch melodies. It is worth noting that Bartsch and other song collectors in Lithuania Minor were themselves not always secure of using accidentals; they were complaining about the difficulties arising in transcription of folk music under investigation (Bartschas, 2000: 40–43).

Quite interestingly, the rule of ‘leading tone’ manifests itself more distinctly and, maybe, more frequently than the rule of ascending vs. descending sequences: compare 38 cents in the first case with 27 cents in the second case, as well as the corresponding frequencies of occurrences (Table 2). This is in fair agreement with the results of the analysis of chromaticisms in the transcriptions (Table 1).

It is worth noting that the pitch performance rules discussed were recognized in the performances recorded in other Lithuanian ethnographic regions as well (Ambrazevičius, 2005: 26–27).

Therefore the longevous notion of chromaticisms in Lithuanian traditional vocal performances should be rejected and the phenomena of intonation should be reconsidered based on the objective acoustic measurements. For instance, the examples such as the one displayed in Fig. 9 should not be considered as manifestations of ‘changeable chromaticisms’, but rather as 12ET-biased transcriptions of the performances featuring wide intonational zones and, possibly, some performance rules.

Sol<sup>1</sup>-re<sup>2</sup>Cv  
♩ = 83

1 (m) Voi a-ukš ti a-ukš ti Gi - rios me - de - liai, Ma - ži ma -

no bro - la - liai.

① 2̣-8 3,9 4 ② 4,6,8 ③ 2,3,8,9 4,5 ④ 6,8 ⑤ 2,4,8,9 5,7 ⑥ 2-4,6-9 5 ⑦ 3,6

Figure 9. Example of ‘changeable chromaticisms’ (*Dzūkai* tradition; Četkauskaitė, 1981: 338).

Most probably, the conclusion on pseudochromaticisms can be extrapolated to other vocal traditions in Eastern Europe, first of all, to Eastern Slavs. That is, for example, the statements concerning chromaticisms in Ukrainian and Russian folk songs (such as those provided by Kvitka, 1971 and Rubcov, 1973) should also be revised (Figs. 10 and 11).

41 Andante

42

Ой весна, весна та весняночка, де твоя дочка та паняночка?

Вар.

**Figure 10.** Example of the ‘chromatically different’ versions of the same tune (originally ‘leading cis and diatonic c’; Ukrainian tradition; Kvitka, 1971: 269).

8

9

Вы не ду-йте-ка, да ветерочки буйны-е,  
э-х(ы), не шумите вы, мо-и листья зеленые.

**Figure 11.** Example of ‘changeable chromaticisms’ (originally ‘major-minor lights and shades’; Russian tradition; Rubcov, 1973: 71).

It seems that the pitch scales exploited by Lithuanian folk singers were anchored on two or more (or changing) ‘tonics’, whereas intermediate tones were performed more or less loosely, but with systematic tendencies characteristic of certain melodic contexts. This is in fair agreement with Grainger’s remarks on ‘loosely-knit modal folksong scales’ in Lincolnshire tunes (Grainger, 1908–9: 158–159, according to Powers & Cowdery, 2001: 824), with Alexeyev’s ‘wandering gama-intonation’ in Yakut and Russian vocal performances (1986: 53, etc.), or even with the results of studies of Arom’s group of African scales (e.g., Fürniss, 1997; Arom & Voisin, 1998: 268).

The rules disclosed are somewhat akin to the similar ‘leading tone’ rule (e.g., Friberg, Bresin, & Sundberg, 2006: 151), ‘tonal gravity’ rule (Fyk, 1995), and, possibly, to ‘high sharp’ rule (Friberg, 1991) formulated for Western classical performances. ‘For example, in a leading tone to tonic progression, the leading tone is often played sharper in pitch than is indicated in equal temperament tuning’ (Friberg, Bresin, & Sundberg, 2006: 151). It means that the second between the leading tone and tonic is narrower than 12ET-semitone. In our examples of traditional music, the second

between the ‘leading tone’ (the third) and the tonal anchor (the fourth) is mostly wider than 12ET-semitone, nevertheless it is still narrower than in the case of the third occurring in the different melodic context. Thus the general tendency is the same in the Western classical and in the Lithuanian traditional performances.

Perhaps the most apparent peculiarity of the rule of ascending vs. descending sequences derived here, in comparison with Fyk’s and Friberg’s rules, is that in our case we encounter two (or more) tonal anchors or ‘tonics’.

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<sup>1</sup> All songs discussed in the present study are monophonic, or, at least, the registered performances were monophonic. That is, they were solo performances without accompaniment.

<sup>2</sup> Western part of Lithuania and East Prussia (present day Königsberg/Kaliningrad district) that was part of Germany for several centuries.

<sup>3</sup> Jadvyga Čiurlionytė (1899–1992) is regarded as founder of Lithuanian ethnomusicology.

<sup>4</sup> www.praat.org

<sup>5</sup> The samples are numbered according their running numbers in the collection (Nakienė & Žarskienė, 2003).