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BÜCHEL PERFORMANCE AND THE IDEA OF A 'NATURAL' HARMONY IN ALPINE MUSIC

The *büchel* is a shorter, trumpet-shaped variant of the alphorn and exists primarily in the Alpine region of Central Switzerland and in the neighboring areas. The origin of the name is not clear. A possible etymological root is the Latin *bucina*; a long, folded metal trumpet that was used in the Roman military (Cross, 2013:3). Several traditional trumpets and horns with similar names exist in different regions. Such instruments often served ceremonial purposes rather than musical entertainment. In the Alpine region, shepherd's horns were hypothetically used for the communication across valleys and as a tool for calling cattle. In comparison to the alphorn, the *büchel* always remained relatively unpopular and almost disappeared in recent decades. The instrument has never achieved a status within the cultural heritage as the alphorn did with its role for tourism (Jones, 2018). A wooden trumpet without holes or valves, various notes on the *büchel* can only be produced by overblowing. The resulting scale (ex. 1), the harmonic series, is also referred to as the "natural scale" (Hir, 2017a:10). Among other languages, German uses this term ("Naturtonreihe").¹

From 2015–2018, we were able to conduct research on alphorn music and its relation to Alpine yodeling (Ammann et al., 2019), thereby discovering source material for *büchel* music. Since 2019, in the temporary absence of further academic studies into the alphorn, my focus as a performer is on the application of research to the development and dissemination of *büchel* music.² Inevitably, there are tensions between a critical investigation of sources and theories and their uses for practical purposes. For example, when using a historical notation for performance, I am not primarily concerned whether that notation was originally meant to be played on this instrument; as performers, we wish to extend our repertoire and add interesting pieces, regardless of their provenience.

With a small number of players who are reviving the instrument today, searching for historical sources and creating new music, questions about the possibilities of multipart performances emerge. The questions I try to answer with the present research are practical: In the absence of reliable source material, how do we organize multipart playing? What consequences does the specific 'natural scale' have for polyphonic *büchel* music?

I examine the forms of multipart organization in *büchel* tunes, their relation to vocal music, and question the plausibility of current hypotheses from my perspective as a practitioner. Considerations include limitations posed by the instrument, actual tunings of historic instruments – which may strongly deviate from the ideal of the harmonic series – and comparisons with the written source material.

¹ Following, I accordingly use the term 'natural scale' for scales based on the harmonic series and 'natural trumpets' for trumpets without valves or holes for pitch alteration. In notations, and when referring to specific notes on the natural scale, I follow the convention of starting the harmonic series with the note C.

² www.buechelbox.ch, 15.08.2021.

“Natural” Sounds, Scales, and the Alpine Environment

Recently, the idea that folk song in the Alpine region relates to these characteristics of wooden horns again catches the attention of scholars and composers. To this day, some observers mix the instrument’s musical expression with an imagination of mountain regions as spaces where people live in close touch with nature (Heel, 2020:10). Historically, there is an obvious mixing of ‘natural’ aspects in music, namely the ‘natural’ harmonies produced by overblowing instruments, and the living conditions of the traditional musicians in the mountain regions of the Alps. An exemplary description was delivered by the German musician Ludwig Köhler (1820–1886) in his treatise on *the melody of language*: “With natural peoples, namely mountain dwellers, whose frugal senses keep the worry away (but the pure joy of nature with themselves), this indulgence in sound [German: Tonschwelgerei] without words appears so rooted, that it obtained a certain manner and form. Yodeling is such a kind of indulgence in sound, especially tuned by the clear mountain air [...] Since the harmonies: tonic and dominant [...] are in the closest relationship with each other because of their ratio of fifths, this is also the reason why such natural (yodeling) songs predominantly move on the grounds of those harmonies” (Köhler, 1853:32, translated from the German by the author).

The idea behind this statement is that people, who from the view of the urban spectator live in close touch with nature, have a particularly ‘natural’ way of singing. This view suited the longing of some intellectuals to see rural areas and their folk culture as a refuge from an increasingly unpleasant urban life. “It is an elementary traction that lures our overeducated times to folk poetry. It is the same traction that pushes us out of the sultriness and the deafening noise of the city into the quiet, fresh green countryside in summer so that we can gain new strength and new life in the bosom of nature”, wrote the Austrian folklorist Josef Eduard Wackernell (1850–1929) in 1890 (translation from the German by the author).

With this background in the romantic imagination of the mountains, the connections between fresh air, a frugal lifestyle, and natural tone scales, a certain skepticism is warranted. We can easily compare the tendency described by Wackernell to our contemporary focus on ecological issues, the boom of outdoor activities.

Nonetheless, the hypothesis that the tonal scale of Alpine horns, such as the *büchel*, influenced folk music in general deserves attention. In recent years, the musicologist Aindrias Hirt has formulated this hypothesis for the entirety of European folk song: “Hence the problem with folk/pastoral music classification: very few trained art musicians in the last few hundred years have researched the properties of natural instruments, and even if they have read of the natural scale and perhaps done theoretical work with it, they have never actual [sic] heard it. Therefore, they speculate that folk music is based on the ecclesiastic modes when in fact the tunes are all ending on specific pitches which correlate to the natural scale. Those pitches may very well be of the natural scale, not exclusively the diatonic scale” (Hirt, 2017b:21). Hirt takes this argument further and states that there was a reciprocal development of the natural scale declining over time while the diatonic scale became dominant.

It is certainly plausible that scales other than diatonic modes existed. According to my state of research in the Alpine region, these may well be of many different varieties and not necessarily linked to the natural scale. Instead, an analysis of yodeling recordings made in 1936 in the Central

Swiss Muotatal valley showed the presence of a scale based on neutral³ intervals (Wey, 2020). While the harmonic series hypothesis is certainly important for the study of shepherd's trumpets and horns, the study of the evolvement of scales in my view benefits from a broader picture. A spread of the diatonic scale through the establishing of choirs and singing in schools inevitably happened throughout the 19th century. However, there is no way to prove which scales existed before they were replaced by diatonic scales. Diverse, local traditions supposedly existed, all of these – including those based on the harmonic series – would be replaced gradually. I assume that there are ‘unknown unknowns’, scales and modes that are neither known nor are we aware of this missing knowledge. The development assumed here is depicted in figure 1.

Cyclical and Radial Scales

Büchel music is shaped by the specifications of the natural scale. Therefore, the question arises how this scale differs theoretically from the diatonic tone scale. The notes played on natural trumpets are each an integer multiple of a fundamental frequency, starting with the interval of an octave. Higher notes are closer together than lower notes. The basic, structural difference between this scale and the diatonic scales is, to quote composer the Heiner Ruland (1934–2017), the “cyclical” versus “radial” characters of the scales. Diatonic scales are examples for a cyclical structure, whereas the natural scale is radial. The core element of the cyclical scale is repetition. Each octave includes the same degrees. In contrast, the radial scale continues in one direction with ever-new intervals, based on frequency relations (1:2, 2:3, 3:4, 4:5, ...). There are no repetitive patterns; each new interval between two neighboring notes is unique. Ruland describes the difference between the two models: On a cyclical scale, there are always the same intervals and consonance relationships to the other tones: every tone has for example a pure fifth above it (Ruland, 1988:76). In contrast, the radial scale (e.g. of the alhorn) creates always different intervals from tone to tone: different seconds, different thirds, etc. (Ruland, 1988:77). Ruland, who composed numerous works based on the harmonic series, provides sketches of his models of cyclical and radial scales (fig. 2). The following table summarizes the differences between the two types of scales.

Cyclical scale – e.g. diatonic scale	Radial scale – e.g. harmonic series
Instruments which are tuned by their makers or performers	Instruments played by overblowing without options to alter the pitch
Allows for the transposition of melodies (Hirt 2017:73)	No exact transpositions are possible (exception: one octave upwards)
Repeats the scale after each octave	No repetitive patterns along the scale
Tuning according to the crafting of the instrument	Tuning approximating the harmonic series (frequencies in relations of 1:2, 2:3, 3:4, ...)

Because of the limited notes playable, the options for multipart playing are limited too. The upper bound of the playable scale depends on the skills of the player; however, a range up to harmonic 12 is common. The 10-note range from harmonic 3 to 12 spans two octaves. In the lower of

³ Neutral intervals are located in the middle between minor and major intervals, a neutral second for example has 150 cents (between a minor second of 100 cents and a major second of 200 cents).

these, only a major triad (g-c'-e'-g') can be produced. In the upper octave, a slightly lowered b'-flat plus a tetrachord of c''-d''-e''-f''⁴ leads to the upper g''. Example 1 details the scale, detailing the deviation of each note from equal temperament. Except for harmonics 7 and 11, the differences are very small, some of them below the threshold for our hearing. With the described scale, the *büchel* is predisposed to produce major chords – this precondition of trumpets and horns without valves has certainly helped the idea of the major triad as a 'natural' fundament for traditional music in the Alpine region.

Natural Trumpets Do Not Necessarily Produce the Exact Harmonic Series

With the theoretical groundwork laid out, it remains questionable how exactly the natural scale sounded on actual instruments, particularly in the period before the assumed rise of the diatonic scale. Recent developments in the construction of instruments have led to a near-perfect intonation of the harmonic series. However, by blowing into an ordinary tube, we can easily demonstrate that the different tones deviate from this ideal. For example, the difference between the first two harmonics is rarely a perfect octave.

The music-archeological analysis of historical instruments could reveal the practical tunings of natural trumpets. As a short digression, I refer to an analysis I conducted from recordings of two of the oldest conserved trumpets, the ancient Egyptian copper and silver trumpets from the tomb of Tutankhamun. The British military musician James Tappern made the only recordings in 1939 (Finn, 2011). The analysis of Tappern's recordings showed that the distance between harmonics 2 and 4 is about three quartertones smaller than an octave. This may have been irrelevant to the original performers, since these instruments served ceremonial purposes and possibly produced only one tone. More research on music-archaeological artifacts could give us a picture of how historical instruments actually sounded; the problem hereby is that current guidelines for preserving artifacts rarely allow for the playing of such instruments. An acoustical study of Swiss alphorns from the 19th and early 20th centuries also showed considerable deviations in their intonation in the lower register (Amman et al. 2019:166). It follows from this observation that in practice the deviations from the harmonic series can often be greater than the small differences that exist between the intonation of the natural scale and the intonation of the diatonic scale.

The development in instrument making led to a standardization of alphorns and *büchels* in the first half of the 20th century (fig. 2; Wey and Kammermann 2020:80). Alphorn makers followed the ideal of the harmonic series and developed instruments suited for consonant multipart playing. However, before ensemble performances became popular, the exact intonation remained irrelevant. The same applies to the fundamental tuning. For the use as a solo instrument, functioning as a tool for signaling or communication, the fundamental frequency did not need to correspond with any normative tuning. Multipart performances only became popular in the 1970s, when alphorn players started to form groups of three and more players (Wey & Kammermann 2020:83).

Options for Multipart Büchel Music

Recently, we compiled and published a collection of 47 *büchel* pieces (Streiff & Wey 2020). Among these, and other, historical sources, I identify three basic types of relationships between the

⁴ The f'' in this case is sharpened by a quarter note (see ex. 1).

first and the second voice. All of them are start from a single solo melody – the way the instrument was traditionally played – but differ in the execution of the second part.

The first type can be illustrated with one of the earliest multipart notations from the Swiss Alpine region. Example 2 shows a notation of a yodel melody (ca. 1800) with a double drone accompaniment in the bass register. In the present notation, we adapted the melody for the performance on natural trumpets by transposing bars 6–11 one octave higher. Originally, the melody was most likely sung, the accompaniment could be vocal as well as instrumental. The original notation⁵ shows one melodic part accompanied by a drone with the tempo designation “langsam” (slowly) and the text “imer der gleiche Baß, wie die Leyer [...]” (always the same bass, like the hurdy-gurdy [...]) (Fink-Mennel, 2011:167). Notably, the distance between harmonics 1 and 2 (the drones this case) is greater than one octave on many natural trumpets. The drone accompaniment therefore will not sound as consonant as the notation suggests.

The second type is the most common form today. In general, a second voice can be added either below and above the lead voice or by crossing the two parts. In the lower register, however, the number of available notes decreases and in the high register the execution becomes technically more demanding. An addition in the lower register often leads to a tune moving in distances of thirds, fifths, and sixths in the same rhythm as the melody (ex. 3, written by Balthasar Streiff 2020).⁶ This option comes closer to idiomatic horn music. At the same time, it corresponds with the way the second voice is set in many yodeling tunes. Multipart yodeling in the Swiss Alps often combines a leading voice with one or two accompanying melodies, which follow in intervals of thirds or sixths to the lead voice. In addition, members of a choir sing long bass notes.

As a third type, instead of following the first voice with the same rhythm, it is possible to accompany it with slow-paced movements in the lower register. This type of accompaniment is suitable for improvisation, because one can follow the first voice without knowing the exact rhythmic and melodic sequence. The accompaniment does not have to coincide rhythmically with the main voice but may adapt with a slight delay. In between, short passages are left to the solo player. Example 4 depicts a transcription from the original performance of a duet by two *büchel* players in this form (recorded and transcribed by André Wey 2001).

These three forms do not form an exhaustive list. The examples show the possibilities of polyphony using duets, but a third or even a fourth voice can be added according to the same principles. It should be mentioned that playing in unison is another possibility. Thereby, microtonal deviations in intonation contribute to a rougher and unstable sound. Another possibility is for the players to alternate with solo motives. This way of playing picks up the idea that the instrument could be used for communication between two or more people.

Conclusions

The common designation of the harmonic series as a ‘natural tone scale’ has been associated with the imagination of the Alpine landscape as a particularly natural retreat. Although this association remains questionable in practice, it has an influence on the perception of music for *büchel*.

⁵ The original notation is attributed either to Johann Gottfried Ebel (1764–1830) or to Johann Nepomuk Hautle (1765–1826).

⁶ Recording: <http://y2u.be/wxQJHYINHnM>, 20.07.2020.

The number of notes playable on the *büchel* is limited, yet it leaves diverse options for multipart performances. There is no transposition of motifs and no complex harmonic progression in a classical sense. The properties of the radial scale automatically make a lower voice simpler, because it is necessarily based on fewer notes. In addition, the restriction to the notes depicted in example 1 leads to relatively austere options for melodic and harmonic progressions. For example, a classical harmonic scheme (I – IV – V) cannot be reproduced in its entirety. At the same time, the manifold intervals inside the radial scale inhibit any consistency of chords based on different pitches. However, the audible difference between the natural scale and a major diatonic scale is in many cases irrelevant. Among the pieces surveyed, three forms of multipart playing emerge: (1) An accompaniment with low drone notes, (2) a second voice that performs intervals of thirds, fifths and sixths below the first voice in the same rhythm, and (3) a relatively simple second voice pacing slowly with notes corresponding to the lead voice.

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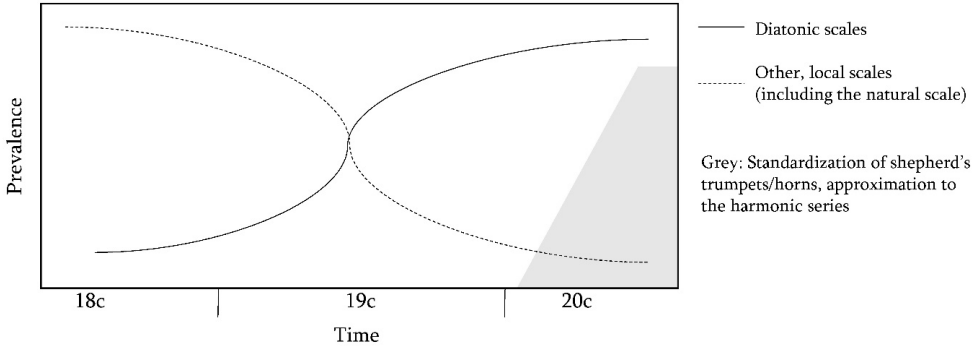
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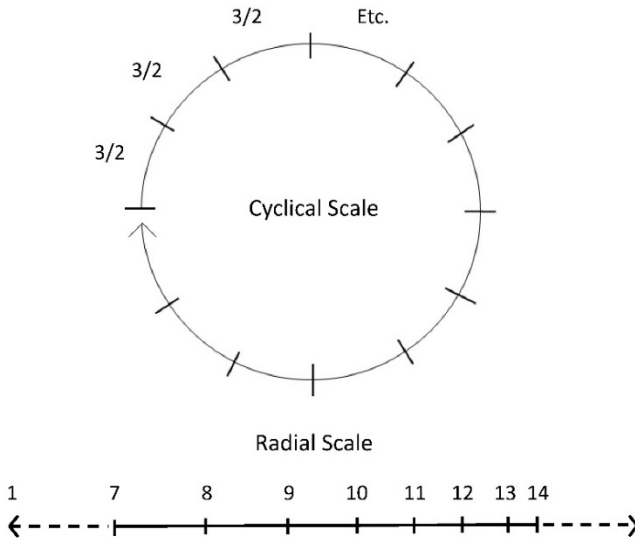
სურათი 1. შემოთავაზებული ტონალური ცვლილებები ალპურ რეგიონში. დროთა განმავლობაში ხაზები და მათი შებრუნების წერტილები ჰიპოთეტური რჩება.

Figure 1. Suggested changes of tonalities in the Alpine region. The lines over time and their turning points remain speculative.



სურათი 2. ციკლური და რადიალური წყობები რულანდის მიხედვით (1988: 76). ტერმინი „3/2“ ციკლური წყობის გრაფიკულ გამოსახულებაზე აღნიშნავს სიხშირეების თანაფარდობას კვინტებში. ციფრები რადიალურ შკალაზე კი აღნიშნავენ ობერტონებს. რულანდი ფოკუსირებულია ოქტავაზე მეშვიდე და მეთოთხმეტე ობერტონს შორის, რომელიც ჰექსატონიკურ ბგერათრიგს მოიცავს შვიდი განსხვავებული სეკუნდით.

Figure 2. Design of cyclical and radial scales after Ruland (1988:76). The term “3/2” in the cyclical scale graphic refers to the frequency ratios of fifths. The numbers on the radial scale designate harmonics. Ruland focuses the octave between harmonics 7 and 14, which is comprised of a heptatonic scale with seven different seconds.



მაგალითი 1. ბუჩელის მუსიკის ბგერათრიგი. ციფრები მიუთითებენ ცალკეული ნოტების გადახრაზე თანაბარი ტემპერაციიდან. მაღალი ან დაბალი ნოტები ამ ბგერათრიგის მიღმა იშვიათად გამოიყენება.

Example 1. The scale on which *büchel* music is based. The numbers indicate the deviation of the particular notes from equal temperament. Notes outside this scale, both higher and lower, are rarely used.



მაგალითი 2. რუჯუსერი (ca. 1800) ბუნებრივ საყვირებზე შესრულებისათვის ადაპტირებული ვარიანტი.

Example 2. *Ruguser* (ca. 1800) adapted for the performance on natural trumpets.

მაგალითი 3. ორნაწილიანი *Büchelgsätzli*. მეორე ხმა დაწერილია ბალთაზარ შტრეიფის მიერ (2020).

Example 3. *Büchelgsätzli* with two parts. 2nd voice composed by Balthasar Streiff (2020).

მაგალითი 4. ორნაწილიანი *Büchelgsätzli*. საველე ჩანაწერი მუოტათალიდან. ნოტირებუ-
ლია ანდრე ვეის მიერ (2001).

Example 4. *Büchelgsätzli* with two parts. Field recording from Muotathal and transcription by
André Wey (2001).

