



Majorification or something else? A *schottische* through several generations of Hardanger fiddle players

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Older and newer tonal sensitivities

A widespread idea about the tonality of Norwegian folk music is that it is a manifestation of a conflict between the traditional and the modern. One imagines an adaptation of an older “tonal sensitivity” to a more modern way of listening. The modern that became influential was western European art- and popular music, not only with major and minor as the most important keys, but also the piano’s equal-tempered scale. “The folk”, meaning those who sang and played music in the countryside, had different ideas about pitch before they were influenced by the music spread through schools and the church. Several things point to this: not only descriptions by early collectors and archival recordings, but also examinations of old folk music instruments. Reidar Sevåg’s article on the problem of tonality in Norwegian folk music (1974/1993) is based on measurements of fret distances on the board zither *langeleik*. Sevåg’s main conclusion is that instrument makers and *langeleik* players, who were able to move the frets on their instruments, used the octave and the fifth as a fixed framework. Within these frames they placed the frets rather freely, but never so close together that they would produce semitones. Instead they preferred three quarter and whole tones, each with considerable variability. This results in scales quite different from the modern ones found on the piano, guitar, accordion and the modern *langeleik* instruments introduced by the Rudi-family in the region of Valdres in the early 20th century. Especially the third, fourth and seventh on the old zithers differ from what we are used to hearing today.

* [Additional footnotes by the author not present in the original are put in square brackets and marked by his initials. Eds.]

Contact with modern music is believed to have led to players and singers changing their practice, more or less consciously. Ideas about such transitions or adaptations to new musical styles are by no means limited to Norway. In Afro-American music one has tried to explain “blue notes”, meaning the intonation of thirds, fifths and sevenths as “problems” that arose when African slaves had to adapt to western harmony. (see Weisethaunet 2001 for a discussion of this model)

The complete process of adaptation has never been described, but several authors have pointed to elements they think have been influenced. An example is Eivind Groven’s theory of Myllarguten’s (Torgeir Augundson 1801-72, the most famous Hardanger fiddle player) eagerness to learn from new musical styles. He and Leif Sandsdalen (1825-96) are supposed to have influenced a whole school of players in mid-Telemark and Rauland and Vinje in western Telemark. Groven calls their style “based on the major scale” (*durskalstil*) and thinks that it is evident not only in melodic arpeggios of major chords, but also in the way players use double stops to harmonize melodies, especially when they introduce the subdominant in the B_4/G_5 double stop in a D major melody. This differs much from what Groven calls the natural harmonic scale (*naturtoneskalaen*) where the melody either is accompanied by droning open strings or double stops that do not imply major chords. (Groven 1972, 236) According to his theory the natural harmonic style must be older and indigenous. Johan Westman states that “older tonality” most often is defined in a negative way (1998, 2), meaning that it is supposed to be unlike the modern, meaning the major/minor tonality of functional harmony.

In this article I do not test Groven’s or others’ theories, but compare only the intonation in a melody recorded by performers of several generations. I examine if there are differences from one generation to the next in this example and what these differences consist of, and I try to look at possible explanations for how they may come about.

Source problems

When one wants to examine intonation, rhythm – and even form – in older and newer recordings, one faces several issues of source criticism: For one, as Sevåg has pointed out, any type of development could have happened in many different ways, and these ways will be almost impossible to explain from single recordings. But the problem with single recordings is also that one rarely knows if the player played as he or she intended. This I have discussed a lot with my Hardanger fiddle teacher Salve Austenå [b. 1927]. He is highly skeptical towards the idea that I, as a researcher, want to analyze his playing and his music by looking at what he calls “torn away recordings”. I will never be able to know for sure if these were good enough concerning the exact aspect I was interested in. When I tried to quiz him about this, it was not easy to get an answer about these aspects. The overall impression was more important to him, and analyzing or talking about each of these aspects seemed pointless in his perspective. If he had not played with a satisfying tone, he was reluctant to say anything about something else, like, e.g. the rhythm. (Thedens 2001, 89f.)

This is of course even more difficult when using recordings by players who are deceased or cannot comment on the recordings for other reasons. Many archive recordings are made with old players. Collectors were interested in their playing, because they represented the oldest, most authentic, music.

I look at intonation and pitch in recordings in spite of these issues because I know all the performers – with the exception of the oldest one – and have talked to them and in several cases been present when the recordings were made. I also have analyzed Salve Austenå's intonation practice and have concluded that his intonation of both the framework intervals and the more variable steps of the scale is very stable. The pitches belong to the tune or to melodic figures. In some tunes there are several distinct intonations of, e.g. "the third", but Austenå executes these the same way in recordings made decades apart. On the other hand, there are players like Kjetil Løndal (1907-87) who consciously "color" a tune in the moment of performance by varying the intonation of certain notes. (Midtgaard 1991, 48f.)

By comparing these recordings and partly what the performers have said about them, it is possible to interpret what pitches they use, and sometimes why.

The material: *reinlender (schottische)* from Åseral

If the old "tonal sensitivity" exists, it may become most obvious when performing a newer melodic material, like the round dances that became fashionable in the Norwegian countryside over the course of the 19th century. Therefore, I will compare several interpretations of a *schottische* melody. It is not of the most obvious modern major melodies which often consist of many arpeggios, but it still is rather unambiguous when it comes to harmonization, and thus quite different from the older repertoire of walking (*gangar*) and running dances (*springar*) from the region. It stems from the district of Åseral, and fiddle player Gunnar Austegard (1883-1973) is the source. He learned it from a friend from the same district who he was confirmed with in the local church. Sometimes he named the melody after this friend, "Reilenner etter Lars i Kroken".

Austegard recorded this tune for Halvdan Furholt who let the Norwegian Collection of Folk Music (NFS) have a copy (NFS 1-35786). Ånon Egeland writes that it is "from the 1960s". In 1970 he made another recording for dance scholar Egil Bakka. This is kept at the RFF-Center in Trondheim. These two recordings are the direct or indirect source for all the other recordings examined here. The performers who play the *schottische* are Otto Furholt (1921-2005) and his brother Halvdan (b.1931), Vidar Lande (b.1949), the folk big band Chateau Neuf Spelemannslag, and Vegar Vårdal (b. 1975). The latter two use more instruments than just fiddles.

First I look at the differences between the intonation in the tune's first part of all these recordings. This part contains all the melody notes that appear in the tune, and it does not modulate from the tonic, which simplifies the analysis. After

this I expand the analysis to the two latter parts, but only in the recordings that feature the solo fiddle.

The *schottische* was transcribed by Ånon Egeland after the NFS recording. “Reilenner” (*Schottische*) after Gunnar Austegard, Åseral, 1st part:



Fig. 1. “15. Reilenner. Etter Gunnar Austegard, Åseral” (Bakka 1990, 242)

This transcription corresponds well with the expectations many have about an older tonality. Egeland writes three accidentals: $F^{\#}_5$ is valid for both octaves, C_5 only appears in the upper octave and is raised an 1/8 tone. In the upper octave a half-raised G_5 is written, but it is unclear if this is meant to also be in effect for the lower octave. The commentaries to the transcription do not state anything about this, and after the standard conventions this has to be interpreted so that the half-raised $G/G^{\#}$ was standard in both octaves. But Egeland also writes a $G^{\#}_4$ (which is flattened an 1/8 tone) in the end of the first part. Other pitches with accidentals are raised D_5 s in double stops with $F^{\#}_5$ (twice raised an 1/8 tone, twice a 1/4 tone) and real $C^{\#}_5$ s in runs from A_4 up to E_5 .

Thus the transcription shows

- a) a variable seventh in the lower octave,
- b) variable fourths, and
- c) variable thirds.

Considering how often they occur, Egeland could also have written the raised D_5 s with fixed accidentals, but that would have caused problems with the notation of the open D_4 -string which is frequently used as a drone.

Measurement procedure and the cent system

Egeland's transcription is very precise and would have been a sufficient source for my analysis. Still I have used software to assist my ears and to test the transcription. I digitized the recordings, and transposed them so the open second string resembled B_4 , while it is notated as A_4 .^{*1} I opened the sound files in the program *Transcribe!*, which lets one play them at half or quarter speed. In addition it generates a graphic representation of the sound. In the graph one can mark passages and play them in a loop. Thus one can play single tones and even parts of tones so they produce a clear and stable pitch. The program then generates a graphic representation of the loop's tonal spectrum with fundamental(s) and harmonics.

In *Transcribe!* It is also possible to change the pitch of the whole sound file (or the loop one works with) and compare it to reference tones the program produces (the steps of the equal tempered scale). One "tunes" the sound file to these reference tones and when a pitch in the recording is matched to the reference tone, the program gives a reading of how much one has "detuned" it in cents. This reading equals the difference between the recorded and the equal tempered pitch.

The unit cent is used to make the size of intervals clear. A cent is 1/100 of an equal tempered semitone like on a piano or a guitar and is calculated by drawing the 100th root of two. The number two comes from the fact that an octave equals multiplying a frequency by two. By drawing the root one changes logarithmic frequency relations to arithmetic interval sizes. Instead of multiplying and dividing frequencies one can add and subtract cent values and will get numbers for interval sizes instead of frequency fractions. An octave is divided into 1200 cents, and because the equal tempered scale evens out all intervals, each whole tone is 200 cents large, all major thirds are 400, fourths 500, etc.

In the literature on Norwegian folk music and intonation, it is often stated that music has converged to "the tempered system". I have always been skeptical about this claim and would rather assume that neutral or half-raised pitches have been replaced by pure ones, which are the base of our major and minor scales (see Code 2002). Pure intervals are characterized by the fact that the relationship between the pitches can be written as small fractions or relations of small integers. An octave corresponds to the fraction 2/1, a fifth 3/2, a fourth 4/3 and a major third 5/4. In these - purest - intervals more of the harmonics of the involved pitches will concur than in less pure intervals with larger fractions.

Therefore it is useful to remember the cent values for the most important intervals: A fifth with the relationship 3/2 equals 702 cents, a fourth equals an octave minus a fifth (1200-702=498 cents), the major third equals 386 cents, the minor third equals a fifth minus a major third (702-386=316 cents), a major sixth equals an octave minus a minor third (1200-216=884 cents), and a major third can be divided into a large and a small whole tone (9:8=204 cents and 10/9=182 cents). A leading tone in major is the third of the dominant chord (702+386=1088 cents), but then the fractions begin to become more complicated (3/2 multiplied by 5/4

^{*1} [This is the convention for transcribing Hardanger fiddle music, as the solo instrument does not have to refer to any standard pitch. H.-H.T.]

equals 15/8). The further one gets away from the small fractions, the fewer harmonics will concur and the less consonant the intervals will sound. Still all these intervals are nevertheless much more consonant than those in the equal tempered scale. These look simple in cents, but they resemble very complicated fractions. The intervals Sevåg found on the *langeleik* zithers were not based on simple frequency relationships either. The specimen he used as an example in his article has scale steps between 134 cents (small 3/4 tone) and 198 cents (almost an equal tempered whole tone).

It should be obvious then that the aim of the art music of the last two centuries – to be able to play in all keys – comes at quite a price. All thirds, arguably the most important interval in tonal music, are quite out of tune (400-386=14 cents, about 1/7 of a semitone). Fifths and fourths on the other hand, are quite pure with only 2 cents deviance.

My measurement procedure is based on having to decide myself when the pitches in the recording matched the reference tones. In other words: In spite of all the above numbers, it is not the physical sound or the digital files that I measured that is the base of the analysis, but my own perception of the pitches, and I had to practice with the software until the process produced satisfying results. I found places in the graphic representation of the sound that resembled the melody note I wanted to measure. Often I needed several tries to produce a clear signal that could be measured, especially when there were ornaments or double stops. I tuned the tone to the reference tone using both my ears and the graphic representation. In addition I checked with my fiddle on occasion.

Measurements and results

a & b) Gunnar Austegard^{*2}

In Austegard's recording Egeland notated 11 pitches between G_4 and $G^{\#}_5$. My measurements arrive at similar results: The G_4 s in the lower octave are all flat, except for the last one which is just a bit flatter than $G^{\#}_4$ – like Egeland notates. Austegard plays the second considerably flatter than a large whole tone. In the first round of the *schottische* it sinks all the way to neutral. This is probably the only detail Egeland did not transcribe, and in the second round Austegard does use a pitch between a small and a tempered whole tone. Only in upward runs (A_4 - B^b_4 - $C^{\#}_5$ - D_5) are the $C^{\#}_5$ s sharper, almost a major third, again like Egeland notates. The D_5 s are quite sharp, especially when in a double stop with $F^{\#}_5$. Only once does Austegard play a D_5 flatter than the pure fourth and this happens in the run from A_4 to E_5 . The parallel in the repetition has again the sharp D_5 . The sixth Austegard plays slightly flatter than $F^{\#}_5$, both as a melody note and in the double stop with D_5 . Only once does it get very close to a major sixth. The seventh in the upper octave is slightly flatter than $G^{\#}_5$, which is slightly sharper than what Egeland no-

^{*2} [Audio examples 1 and 2: <http://phaidra.univie.ac.at/o:780644>; <http://phaidra.univie.ac.at/o:780645>]

tates. The cent values from the measurements are shown in relation to the pure intervals: leading tone, small and large whole tone under and over the tonic, major third, fourth, fifth^{*3}, major sixth and major seventh:

1 st part	$G/G^{\#}_4$	B_4	$C/C^{\#}_5$	D_5	$F/F^{\#}_5$	$G^{\#}_5$
Austegard NFS	-210- -187/ -151	151-200	340-365/ 385	507-542 (1x 486)	862-889	1078-1084
2 nd round	-183- -158	181-200	363-386	527-546	869-876	-
just intonation	-201/-182/ -113	182/204	316/386	498	883	1088

Table I: Measured values (in cents) compared to just intonation, based on the fundamental A

Of course we must ask if a player would place his fingers the same way in every rendition of a tune. Throughout the first part in this recording the finger placements seem quite stable, with the exceptions Egeland notates. Fortunately we can compare this to the recording from 1970 which is archived at the Center for folk music and dance in Trondheim (RFF). Austegard was old when he made this recording, but with the exception of a slightly shaky start his playing appears to be quite solid.

Differences to the first recording are not large, but they are present. Also here Austegard plays the last seventh in the lower octave sharper than all the others. The second is not quite as flat as in the first recording while the third is played as minor once. The D_5 s all lie above the pure fourth, the exception being one in the run up to E_5 , and this is not the case in the repetition. The sixth $F^{\#}_5$ is slightly flatter in this recording, and the seventh in the upper octave is neutral and thus flatter than in the first recording. It fits Egeland's notation better than the first recording.

	$G_4/G^{\#}_4$	B_4	$C_5/C^{\#}_5$	D_5	$F^{\#}_5$	$G^{\#}_5$
Austegard RFF	-209- -176/ -149	163-199	306/ 347-379	506-538/ 492	840-878	1051
2 nd round	-218- -145	171-201	353-380	506-536	832-876	1047
just intonation	-204/-182/ -113	182/204	316/386	498	883	1088

Table II: Measured values (in cents) compared to just intonation, based on the fundamental A

When hearing what the other performers have recorded, it is striking that all have developed their own versions of measures three and four. One can bemoan that nobody carries the tune on exactly like the source or one can be happy that the tradition does not stifle creativity, but no two of these versions are exactly the same. None of the later performers copy Austegard in detail. They use the tune and play it their own way, even if all but Chateau Neuf Spelemannslag refer to his recordings. All say they play the tune similar to Austegard and praise Egeland's precise transcription, but that does not mean that their goal is to copy note for

^{*3} [Not included in the table. The value is consistently 702 cents, because here the open E string is bowed. H.-H.T.]

note. And the differences between Austegard's two recordings seem to prove them right.

c & d) Otto Furholt

Otto Furholt thinks he learned the *schottische* from his brother's recording of Austegard, but he does not believe he plays it quite like the original. He remembers that Austegard did not play tunes from his older repertoire the same way twice. Therefore Furholt developed his own version of Austegard's "Gråtarslaget" – a tune that he recorded the same day as the *schottische* – and thinks it is similar to the *schottische*. His brother Halvdan remarked that Otto did not quite use bowings like Austegard, but Furholt thinks that he produced useable dance playing on the recording from 1977 (Grappa GRCD 4062).

Furholt is very much interested in "the harmonies" in a tune and believes strongly that one needs musicality in order to harmonize a tune correctly by finding the right notes to accompany the melody. He is proud of finding interesting harmonies for the tunes he has composed himself, and he is critical of players who are not conscious of this. But he also values players who use what he calls the "folk song scale" and names Johannes Dahle (1890-1980) from Tinn and players from Hovin in Telemark as examples. He says he cannot replicate Dahle's tonality in the tunes he learned from him. Ragnhild Furholt writes in a paper from 1984 that Eivind Groven had described Otto's playing as using quite a few neutral intervals, even if they were not as prominent as in Dahle's or Andres Rysstad's (1893-1984, from Setesdal) playing (Furholt 1984, 12).

	$G/G^{\#}_4$	B_4	$C/C^{\#}_5$	D_5	$F^{\#}_5$	$G/G^{\#}_5$
O.Furholt 1977	-189- -171/ -158	192-214	346-386	509-565	844-876	1040-1055
2 nd round	-182- -176	202-215	355-385	514-565	863-880	1050-1067
just intonation	-204/-182/ -113	182/204	386	498	814/883	996/1018/ 1088

Table III: Measured values (in cents) compared to just intonation, based on the fundamental A

In the recording Furholt plays a few sevenths in the lower octave, and they are a bit sharper than G_4 . Like Austegard he raises the last G_4 in the section to neutral. The B_4 s are all close to the tempered one and seem to resemble a fixed finger position that is independent of the direction of the melody. The thirds are all between 20 and 50 cents below the tempered $C^{\#}_5$. The first occurrence in the motive is very stable at 30 cents below. After that it sinks a bit. The sharpest intonation is the major third which occurs once in the upwards run, but is flatter in the repetition (369 cents). The fourth is neutral – and then some – in the melody and mostly so in the double stop with $F^{\#}_5$. But Furholt also plays it slightly above the pure fourth. The sixth he plays neutral in the beginning, but in the repetitions it climbs halfway between neutral and major. The seventh in the upper octave is neutral.

Thus there is little wiggle room when Furholt gets going. The intonation seems to lock in after a “flat” start, but that the third is played slightly different in the beginning of the motive can also be interpreted as a “creeping intonation”, as Johan Westman has called it (Westman 1998:133). Considering the high number of neutral intervals, there is no way to see any majorification in Furholt’s playing.

In addition I have examined a video recording I made in March of 2000.^{*4} The setting was quite informal and Furholt had no chance to prepare much, but said afterwards that “this was roughly ok”, even if he had to stop and think once or twice in the take.

Again he plays the seventh in the lower octave slightly above G_4 and raises the last one, but not quite as far as to neutral. The pattern is almost identical to the first recording. The B_4^b s are again very close together, but more often below the tempered one than above. The third is variable. It is sharper than the tempered one in the beginning before sinking to about 20 cents below it. In the figure $C_5^{\#}-B_4-A_4-C_5^{\#} | B_4-A_4-G_4-B_4$ the second C_5 is always a bit sharper – slightly above the major third, but below the tempered one. The fourth in the melody is always sharper than tempered, but not enough to be called neutral. It is neutral in the double stop with $F_5^{\#}$. The sixth is about the same as in the older recording. The seventh in the upper octave is neutral.

	$G/G_4^{\#}$	B_4	$C/C_5^{\#}$	D_5	$F_5^{\#}$	$G_5^{\#}$
Furholt 2000	-187- -160	184-208	359-394/ 418	510-560	848-872	1040-1058
2 nd round	-163- -147	165-192	362-390	485-538	857-874	-
just intonation	-204/-182/ -113	182/204	386	498	814/883	996/1018/ 1088

Table IV: Measured values (in cents) compared to just intonation, based on the fundamental A

This shows that Furholt plays this 1st part quite stable from recording to recording, the only exception being the D_5 in the melody which is flatter in the newer recording.

e) Halvdan Furholt^{*5}

Halvdan Furholt is probably the player who plays most of tunes from Austegard’s repertoire, and his private recording is the source for almost all versions mentioned here. He recorded the *schottische* for the Agder folk music archive in the year 2000 [read: 1998. H.-H.T.]. He has filled out the melody with sixteenth notes in measures three and four, where he builds a sequence which starts on D_5 .

He plays the seventh in the lower octave slightly above G_4 and raises it to about neutral before the $G_5^{\#}$ version of the opening motive (the last note in measure 8 in the transcription) and before the next section. But Furholt does not follow this pattern in the repetition. The second is close to the tempered one and is

^{*4} [Video example 1: <http://phaidra.univie.ac.at/o:805410>]

^{*5} [Audio example 3: <http://phaidra.univie.ac.at/o:780646>]

slightly variable in the figures with the sixteenth notes, but this does not follow any obvious rule or pattern. The third is flatter than with the other performers. It is neutral, but with large variations in the first round and slightly sharper in the second one. The fourth D_5 was difficult to measure here when I tried to isolate it from the notes before and after. This is a common problem when the player uses ornaments. The fourth is almost pure in the sequences, but sharper in the upward runs and when it sounds together with E_5 which Furholt uses instead of the double stop with D_5 . Once the sixth creeps up to almost neutral. This conforms with the bandwidth of variation in Austegard's first recording. Halvdan Furholt uses the third double stop with $F^\#_5$ only in the melody variant that starts with $G^\#_5$. Otherwise the sixth occurs only as a melody note. Once it sounds 20 cents below the major sixth, but otherwise it stays close to major. The upper seventh stays slightly below the major seventh $G^\#_5$.

	$G/G^\#_4$	B_4	$C/C^\#_5$	D_5	$F^\#_5$	$G^\#_5$
Halvdan Furholt	-186- -160	182-215	325-375	488-542	863-894	1069-1089
2 nd round	-184- -158	163-186	353-388	485-538	876-897	1069-1089
just intonation	-204/-182/ -113	182/204	316/386	498	883	1088

Table V: Measured values (in cents) compared to just intonation, based on the fundamental A

f) Vidar Lande

Vidar Lande also learned the *schottische* from the older recording by Austegard, and claims to play it quite close to the original. Still Reidar Sevåg writes in the accompanying booklet to the CD *UNESCO Collection Musics and Musicians of the World* (Auvidis 8063) that “the striking tonality in Austegard’s was still more surprising as he played with a slightly lowered second finger – a well-known fingering manner among the old-timers – which gave ‘blue (neutral) tones’ where Lande alternates between sharp and flat ones”. (Sevåg 1994:4) Lande chooses a considerably faster tempo than Austegard.

The seventh in the lower octave in Lande’s version is in three of four occurrences even flatter than the minor seventh, and flatter than with any of the other performers. Why it ends up slightly above the tempered seventh in the third occurrence, I have found no explanation for. In the second round of the tune all the G_4 s lie close to the tempered G. Lande often places the seconds below the small whole tone over A_4 . He gets close to the large whole tone once, but stays well below otherwise. An explanation could be that B_4 is the sixth in D -tonality and thus in the vast majority of Hardanger fiddle tunes. It is possible that Lande is so used to this finger placement that he also uses it in an A -tonality. This could also explain Austegard’s intonation of the second, but in his case there is more variation. Lande plays the third as minor throughout. He starts slightly sharper but soon goes to and stays with the minor third. The fourth is pure in the double stop and slightly flatter in the melody. Of the performers we have looked at so far, this is the lowest

placement. The sixth is most often major, but in some cases it is somewhat flatter. The upper seventh occurs only once per round and is a pure $G^{\#}_5$.

	G_4	B_4	$C/C^{\#}_5$	D_5	$F^{\#}_5$	$G^{\#}_5$
Vidar Lande	-227- -204/ -195	163-196	303-328	491-511	864-884	1087
2 nd round	-208- -199	163-186	305-326	486-505	853-887	1091
just intonation	-204/-182	182/204	316	498	883	1088

Table VI: Measured values (in cents) compared to just intonation, based on the fundamental A

g) Chateau Neuf Spelemannslag

With Chateau Neuf Spelemannslag, we leave the solo fiddle recordings. On this recording we have 16 musicians with only three playing Hardanger fiddle. The starting point for these musicians is also quite different from the previous performers. The band members discovered folk music comparatively late in their musical life. Experiencing and learning about folk music took place while studying music at the university of Oslo, where they all started out specializing in other styles of music.

Tonality today is a given topic in lectures and workshops about Norwegian folk music. These musicians are well aware of “those special intervals” and most can produce these pitches on their instruments. Still the band has never prioritized doing so when performing traditional melodies in arrangements for the whole ensemble. E.g. the wind players could produce neutral intervals by using special fingerings, but it would be quite a task to do so in the ensemble and to make it sound effortless and natural.

Thus decisions have to be made about how to intonate the notes of a melody, meaning choosing between sharp and flat varieties. In practice variants may be mixed, e.g. when the fiddle refuses to adjust a melody to the major or minor versions of the majority when they have always played it somewhere in between. In the case of this *schottische*, all the players learned it at the same time, when Lande taught it to them phrase by phrase. Before he visited for this workshop, taped copies of his UNESCO recording were made and given to all the members. The recording examined here is from CNS CD *Curing Norwegian Stiffness*, and the *schottische* was recorded in 2000. It was recorded in a few takes, and as far as I remember, without any overdubs. Between learning and recording the piece, more than three years passed, and the piece was performed at many concerts and really “worn in”.

The measurements concur with what one would expect from this description. The intervals are either small or large and have to a certain degree aligned themselves to the equal tempered scale. The third is played as a C, between minor and tempered – exactly like Vidar Lande does. The leading tone in the upper octave is $G^{\#}_5$ and is played sharp, while G_4 is used in the lower one. The sixths are close to

the major sixth, with some exceptions on the sharp side. CNS does not use any neutral intervals in this part.

	G_4	B_4	$C/C^\#_5$	D_5	$F^\#_5$	$G^\#_5$
CNS (1 st round only)	-209- -201	192-209	303-319	492-505	884-907	1100
just intonation	-204	182/204	316	498	883	1088

Table VII: Measured values (in cents) compared to just intonation, based on the fundamental A

***h) Vegar Vårdal*^{*6}**

Vårdal says he first learned the tune from Egeland's transcriptions. Otto Furholt's version was published on the broadcasting corporation's CD with music from Agder. Then he learned the tune again and transcribed it himself as part of a course in transcription and analysis at the state academy of music. After, he traveled to Trondheim and listened to Austegard's recording from 1970. He thinks that he now plays a mixture of all three versions.

The recording analyzed here was made as a demo for Vårdal's recital at the state academy in December 2001. His Hardanger fiddle is accompanied by Frode Haltli's accordion. Vårdal states that he plays the tune differently here than he would have on his own. He points out that he uses only few "crooked" intervals, plays around with the melody more when he has an accompaniment to lean on, improvises more, "draws at" the rhythm and is "angrier" in his playing style.

The measurements show that playing with an equal tempered instrument has a lot of influence on the fiddler's intonation. Vårdal plays G_4 in the lower octave, intonates the third as major $C^\#_5$, plays the D_5 flatter than tempered, the $F^\#_5$ as a pure major sixth and the seventh in the upper octave sharp.

	G_4	B_4	$C^\#_5$	D_5	$F^\#_5$	$G^\#_5$
Vegar Vårdal (1 st round only)	-205- -203	182-203	379-404/ 361	490-506	865-892	1072
just intonation	-204	182/204	316	498	883	1088

Table VIII: Measured values (in cents) compared to just intonation, based on the fundamental A

The precision these academy trained musicians show in their intonation is impressive, but at certain points Vårdal takes some liberties. This applies to the $C^\#_5$ s and $F^\#_5$ s where he sometimes diverges from the accordion's fixed pitches. Here Vårdal does not follow his playing partner, but intonates somewhat flatter. The software makes this look like both were below the tempered pitch, but in the double stop $D_5/F^\#_5$ the representation of the audio spectrum really shows two

^{*6} [Audio example 4: <http://phaidra.univie.ac.at/o:780647>]

peaks for the sixth. One of these is right on the tempered $F^{\#}_5$, while the other shows that Vårdal fingers this tone some 35 cents flatter. The $C^{\#}_5$ s are slightly flatter than tempered and are close to the pure major third instead. In one occurrence the $C^{\#}_5$ seems to be 39 cents flatter, but this very tone produced a weak signal, and the measurement seems unreliable.

Interpretation

Thus we see a picture of a development towards the tempered, but by ways of pure major/minor intervals and with some surprising choices on the way. Where the older players use neutral thirds and sevenths, those who play together with other instruments have to choose flat or sharp. But where Vårdal chooses $C^{\#}_5$, CNS uses C_5 . What is surprising is that it was their source Vidar Lande who made this choice for them, and he plays even flatter than the tempered C_5 at times! And he is by no means forced to adapt to anyone or the tempered scale. But he exaggerates the low third where his sources play a variable and most often neutral third.

1 st part	$G/G^{\#}_4$	B_4	$C/C^{\#}_5$	D_5	$F/F^{\#}_5$	$G/G^{\#}_5$
Austegard NFS	-210- -187/ -151	151-200	340-365/ 385	507-542 (1x 486)	862-889	1078-1084
Austegard Rff	-209- -176/ -149	163-199	306-379	513-538/ 492	840-878	1051
O. Furholt 1977	-184- -171/ -158	192-214	346-379	509-565	844-877	1040-1055
O. Furholt 2000	-187- -160	184-210	359-394/ 412	510-560	848-872	1040-1058
Halvdan Furholt	-186- -160	182-215	307-375	488-542	863-894	1074-1082
Vidar Lande	-227- -204/ 195	163-196	303-328	491-511	864-884	1087-1090
CNS	-209- -201	193-209	303-319	492-505	884-907	1100
Vårdal	-205- -203	182-203	379-404/ 361	460-506	865-892	1072
just intonation	-204/-182/ -113	182/204	316/386	498	883	966/1018/ 1088
even tempered	-200/-100	200	300/400	500	800/900	1000/1100

Table IX: Comparative chart for the 1st part

The last adaptation to the tempered scale happens only in Vårdal's recording. He obviously aspires to play *together* with Haltli. Even if he deviates in his intonation of the thirds and sixths – and I would guess that he does this consciously – he follows the accordion remarkably well otherwise. Chateau Neuf Spelemannslag does not do this the same way. Even if they use a piano and an electric bass, the melody instruments, i.e. fiddles and winds, seem to aim at just intonation anyhow. This measurement can of course be caused by the fact that so many instruments playing in unison make readings less clear. The tempered accompanying instruments stand in the background and the intonation will be variable between the tempered

and the just. But this is happening *after* a completed majorification, meaning after the choices about pitches had been taken.

It is the process towards Lande's exaggeration of the minor third which is interesting in relation to Sevåg's and Groven's theories. Here we can see that the middle generation, which includes the Furholt brothers, also makes choices in relation to Austegard's playing. They have less variability in the intonation of both the second and the flatter seventh. Where Austegard sometimes takes the seventh as flat as Lande does but then raises it to well over neutral in the end of the part, the brothers intonate between a "small whole tone below" and a slightly flatter than neutral tone. They keep the second close to either a small or large whole tone, while Austegard flattens it to neutral in one and well over the large whole tone in the other recording. This could be explained by Austegard's age and that he might have performed like an old man. He was 87 in 1970 and at least 77 when the first recording was made. He did not have a reputation as a great technical player either and did not have much success on the contest stage. Otto and Halvdan Furholt, on the other hand, are top notch players who both competed in the elite class at national contests. Halvdan did not quite match the rankings of his brother, but he did very well in the senior division after 60 years of age. Otto also kept his playing level and won the senior division several times in the 1990s. This we can take as a guarantee that they would have intonated reliably and more precisely than Austegard when the recordings were made. On the other hand we could also say that Austegard might not have had such precision as a goal and could vary more without breaking the rules for what was acceptable. In this case the brothers' precision would seem like a modern constriction of the tradition.

No matter if this riddle can ever be solved, the brothers also do not agree on how to intonate the other intervals. Halvdan plays the third flatter than Otto does and the sixth and the seventh in the upper octave sharper. They do not choose "sharp or flat" but "sharper and flatter". Halvdan plays close to a major sixth while Otto uses a neutral one. Halvdan plays close to $G^{\#}_5$ while Otto again plays a neutral seventh. Austegard plays his sixth and seventh similar to Halvdan in his first and similar to Otto in his second recording. Both brothers play some intervals like the source, but they deviate in their own ways. Something has happened, but it does not really work to call this a majorification. In any case Otto Furholt plays way too many neutral intervals. Sevåg has used the term "crystallization" and this fits somewhat better as there is less leeway in each single recording. But Otto's two recordings diverge enough so one cannot be sure he intends to play the intervals the same way every time.

With Vidar Lande even more has happened. In addition to the flat C_5 , he plays the upper seventh as a $G^{\#}_5$. It only occurs once, but there is no doubt about what he wants the note to sound like. His fourths also stay very close to the pure fourth. The sixth and the second do not vary less than with Austegard, but the third and the lower seventh are quite special. Lande shows great precision in his intonation and seems to exaggerate the differences between the flat and sharp varieties. Sevåg is right with his description in the liner notes.

If one imagines that those who listen to more modern music and play together with tempered instruments will be most readily influenced by temperament,

then Otto Furholt should be the player who adapted the most. For decades he led a dance music trio in Kristiansand, playing waltzes, polkas and more modern tunes, accompanied by guitar and accordion. But he is the one playing most neutral intervals of all the players after Austegard. Vidar Lande, who to my knowledge has had little contact with other music than traditional fiddle playing, goes furthest in the direction of distinguishing between semi- and whole tones. Except for CNS – who learned the tune from him – he plays the lowest third and has the least variation of the sixth.

2nd part

Before we fall victim to the temptation of deriving theories from only the first part, we had better look at the rest of the tune. Part two and three keep to the same A-tonality as the first part. Here I will only look at the solo fiddle recordings a-f:



The third in this part is closely connected to the fourth and functions like a leading tone to D_5 . The exceptions occur in the half ending in measure 4 and the last figure $C-A-B-G/A$ where the C is more independent. The seventh in the lower octave is clearly a leading tone and only occurs at the end – and in the same melodic figure as in part 1. The seventh in the upper octave does not have this function. It occurs either on the downbeat, is equivalent to the octave which follows, or is the starting point of a downwards movement. The fourth occurs in runs like in part 1, but it also has a closing function in measure 2. The question is if these differences will influence the intonation. Both rounds of this part are included in table X.

Here we can see that the flat sevenths are gone. All intonations are either neutral or close to the small whole tone below the tonic. Also, none of the performers raise it like they did in the first part, but Vidar Lande is again the one who avoids the neutral intonation and stays slightly below $G^\#_4$.

The thirds are slightly sharper throughout than in part 1. All performers play flatter than $C^\#_5$, but Vidar Lande uses different intonations in different melodic figures and comes close to the minor third in the half-cadence. Halvdan Furholt plays this one as neutral while he uses slightly flattened $C^\#_5$ s in all the other occurrences.

2 nd part	$G/G^{\#}_4$	B_4	$C/C^{\#}_5$	D_5	$F/F^{\#}_5$	$G/G^{\#}_5$
Austegard NFS	-193- -164	172-180	347-384	484-534	850-882	1055-1095
Austegard RFF	-157	186	369-408	497-540	848-889	1059-1084
O. Furholt 1977	-157- -143	195-206	369-408	493-506	865-884	1048-1078
O. Furholt 2000	-192- -179	152-194	368-382	485-510	843-860/ 814	1017-1044
Halvdan Furholt	-184- -166	193-206	350-388	483-514	851-984	1026-1078
Vidar Lande	-128- -123	189-206	311/389	476-497	869-882	1049-1094
just intonation	-204/-182/ -113	182/204	316/386	498	814/883	966/1018/ 1088
even tempered	-200/-100	200	300/400	500	800/900	1000/1100

Table X: Comparative chart for the 2nd part

No one plays the fourth D_5 as sharp as in part 1. Austegard comes closest and draws the long note D_5 up to 34 cents above in the second round, while Vidar Lande plays it as a pure d or slightly flatter.

Lande plays the upper seventh more often than the others and varies the intonation more. With Halvdan Furholt there is even more of a difference between the sevenths in upward and those in downward movements.

It is remarkable how large the differences are between Otto Furholt's two recordings from 1977 and 2000. While they were quite similar in the first part, the second part differs in both the thirds, sevenths and also the seconds, which are considerably flatter in the more recent recording, as well as flatter than in the first part.

3rd part

The third part has a range between the seventh and the sixth:



The seventh in the lower octave resembles a standard leading tone to A_4 . The third features here as a melody note, as an upbeat together with the fourth and in the standard closing figure. The fourth is first a long melody note and then a part of the figure in measures two and three. The sixth occurs only once in this figure.

3 rd part	$G/G^{\#}_4$	B_4	$C/C^{\#}_5$	D_5	$F^{\#}_5$
Austegard NFS	-175- -152	197-210	369-386	464-509	882-886
O. Furholt 1977	-168- -155	194-203	372-391	500-519	885-891
O. Furholt 2000	-221- -189	169-186	357-385	481-496/ 505-519	875-887
Halvdan Furholt	-181- -152	197-210	350-394	483-496/ 513-517	872-896
Vidar Lande	-135- -113	202-216	309-319/ 358-386	473-500	870-893
just intonation	-204/-182/ -113	182/204	316/386	498	814 / 883
even tempered	-200/-100	200	300/400	500	900

Table XI: Comparative chart for the 3rd part

All sevenths are played between a neutral and a small whole tone below the tonic. Only Otto Furholt's recording from 2000 features an intonation as flat as in the first part. Again there are large differences between Otto Furholt's two recordings: He plays a neutral G_4 in 1977, a flatter G_4 than anyone else in 2000; large whole tone B_4 in 1977, a small whole tone in 2000, and a sharper third in 1977. His more recent recording also has two different fourths. He plays below D_5 in the upwards movement and above D_5 in the downwards movement. Halvdan Furholt also plays two different fourths. The one in the melody motif is almost pure; the one in the figure is sharp.

Vidar Lande plays the sharpest second – which promptly falsifies my finger placement theory from the first part – and the flattest third and fourth. Again he uses different thirds in different situations: He plays the “motif” with $C^{\#}_5$, and the figures with D_5 with $C^{\#}_5$. Austegard plays none of his sharp fourths here. On the NFS recording he once plays it very flat.

Conclusion

The difference between the parts makes it clear that there is no use in talking about *one* folk song scale or natural harmonic scale. The scale concept is too closely connected to fixed steps, and as we have seen this is not what characterizes the intonation in these examples. Even if we do not leave the a-tonality, we are dealing with different selections of pitches. One could almost speak about different scales in this one little melody, but even that would not grasp all the variability.

The runs are what comes closest to a scale in the *schottische*: in the first part we have the run from A_4 up to E_5 , and in the second part there are two movements from $C^{\#}_5$ to $G^{\#}_5$ or to A_5 . The first occupies all of measure three. The other resembles a string of notes across the motivic structure and without any melodic function. We find it from “one and” in measure four to “two” in measure five. In major the run in the first part should consist of small and large whole tones and one

semitone: 204 + 182 + 112 + 204 cents. But what the fiddle players do is quite different:

- Austegard: three quarter-tone + whole tone (everything from small to large) + semi/three quarter-tone + whole tone
- Otte Furholt 1977: large whole tone + small whole tone + three quarter-tone + small whole tone
- Otto Furholt 2000: small whole tone + small whole tone + three quarter + small whole tone
- Halvdan Furholt: ca. tempered whole tone + small whole tone + three quarter + small whole tone
- Vidar Lande: three quarter + three quarter + small whole tone + large whole tone

Otte Furholt 1977 comes closest to major here, while Austegard – on average – plays the narrowest semitone! All of the players use three quarter-tones in this kind of a run, if not every time and in different places. Lande divides the minor third in two, with the first three quarter-tone being only 10-20 cents larger than the other. Austegard does the same with his major third. In this run there is absolutely no evidence for the development towards a clear difference between semi- and whole tones (from Austegard to Lande) which showed all through the first part! The sharp fourth (up to 538 cents) shows up here and there and the result is a three quarter-tone up to E_5 , but in Lande's playing – and strangely in the first rounds of both of Austegard's recordings – it is flatter and followed by an enlarged semitone.

In a major, the first run from $C^\#_5$ to A_5 would consist of semitone + large whole tone + small whole tone-large whole tone + semitone: 112 + 204 + 182 + 204 + 112 cents. Halvdan Furholt does not play this run in his version. The movement leads from the A_4 - to the E_5 -string and the physical placement of the fingers on the strings only plays a minor role. As described here, the fourths are not as sharp, and the step from $C^\#_5$ to D_5 becomes narrower. With Otto Furholt (1977) it is 118 cents large, while Austegard (NFS) varies this step the most and once used a three quarter-tone of 155 cents. The sixth $F^\#_5$ is slightly flatter than the major sixth in all the versions except Otto Furholt's from 2000 where he plays a neutral sixth. He divides the interval of a third from the sixth to the octave into two steps of almost the same size in both rounds. All other versions clearly distinguish between a whole tone to $G^\#_5$ (187-202 cents) and an enlarged semitone to A_5 (122-137 cents). Except for with Furholt (2000) the distinction between small and large whole tones is much clearer in this run than in the one in the first part. Thus it seems quite "majorized".

The same sequence of tones in the next measure shows the following: Lande's version differs in that he starts with a whole tone from the minor third. He and Otto Furholt (2000) use a flatter seventh, so that there is a three quarter-tone up to the A_5 . The other recordings feature a semitone of ca. 125 cents in this place. Otto Furholt (1977) is consistent from one occurrence to the next. He starts and

ends with semitones, the first even narrower than the latter (112-122 cents). His whole tones are between small and tempered. Also in 2000 he played consistently throughout the recording, but there both $F^{\#}_5$ and $G^{\#}_5$ were neutral so that two three-quarter-tones ensue. Halvdan Furholt plays this movement almost like Austegard. Both start on a neutral $C^{\#}_5$ and play a three-quarter-tone, three whole tones and the slightly wide semitone. Because Halvdan plays his sixths very consistently throughout the whole tune, they are slightly sharper than Austegard's.

There are small differences from the run in the previous measure, but none that all the players agree on. The distinction between semi- and whole tones is clearer than in the first part, but some three quarter-tones still occur. Again it is Otto Furholt (1977) who leans most toward major and keeps the intonation the same as in the previous run. That the same finger placement produces the same intonation even if the same tones have different functions may mean that the intonation is not tied to melodic formulas.

Sevåg is right in that fiddle music does not make it easy to grasp a development when different parts of the melody show so many conflicting tendencies. Does this mean that the parts of the tune have different ages and stem from different sources? There is little that would point to this.

We are dealing with several types of variability here:

- variation of the same tone with the same function in the very same recording;
- variation of the same tone with different function or position;
- variations from recording to recording.

This examination strengthens in many ways what Johan Westman concluded in his master's thesis: tonality in fiddle music cannot be explained by one cause alone. Westman stresses sound and resonance, melodic formulas and the individual players' personal coloring of a tune. In my opinion the intonation practice we have seen in our example may best be explained by choice and interpretation, habits and fixed finger placements, the sound that is achieved on the Hardanger fiddle, and lastly by the playing form the fiddle player was in when the recording was made.

Choice or interpretation of the melody is the best indicator for what kind of code or system a player operates in. We can see signs of this in the recordings of Vidar Lande and Halvdan Furholt. They use different kinds of thirds and fourths according to the direction of the melody. Lande plays C_5 in the motif and $C^{\#}_5$ in playing figures. But also Austegard makes a choice when he raises the leading tone in the first part. Also with the seventh in the upper octave we have seen evidence of choice: If Otto Furholt (2000) interprets the second part differently or just because he is uncertain is difficult to assess. His playing does not sound out of tune to me, in any case, and several of the others play a seventh that is much sharper in part one than in part two (H. Furholt, Austegard NFS). Sevåg's crystallization is a good description and we can see several states of this process here.

Habits or fixed finger placement can be used without regard to a system. The player puts his fingers where they belong and does not need to make choices. This, too, we can see evidence of in our material. Otto Furholt never uses a third that is flatter than neutral, while all the others use at least one minor third. Vidar Lande uses a fixed position for his third finger on the A_4 - and E_5 -strings. He never plays much sharper than a pure fourth over the open string. Halvdan Furholt is the player with the least variation of the placement of the first finger, on both the A_4 - and the E_5 -string! I have tried to explain Vidar Lande's flat second in the first part as a habit from playing in D -tonality, but this does not hold water as he intonates differently in the other parts.

Achieving a good sound may stabilize the intonation of certain tones. It is the sixth which is the most stable of all the pitches. Only Otto Furholt (2000) has a flat sixth in the second part. This may be explained by the resonance that can be achieved by matching the pitch of the resonance string. Austegard grew up before the Hardanger fiddle became popular in his home valley, and the standard violin does not produce this effect. Maybe that is why he is more flexible? The first finger placement on the A_4 -string is more prone to variation. This is a less resonant pitch – unless the fiddle has a resonance string tuned to B_4 which many recent Hardanger fiddles have. I do not know if all of the recorded instruments had one, let alone how they were tuned, but would assume that all but Austegard's did.

Playing form may be of great significance. It looks like the players who played most regularly have less variation in their intonation: Otto Furholt 1977, Halvdan Furholt, Vidar Lande and Vegar Vårdal. Halvdan Furholt has the least variation of his first finger placement on both the top strings. Otto Furholt's more recent recording is quite different from the first, at least in parts two and three. He says that he has hearing problems and has to trust his fingers to hit the right spots after a long life of playing. But I cannot say his recording sounds out of tune in any way and almost all of his intonations are used by the other players, too. Does this mean he has this much leeway? His generation of fiddle players has much important knowledge about how they play the music, and the key to many of the questions posed lies in the combination of measurement, like I have performed here, and the contextual information the players have to share.

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