

9. Tuning

The issue of tuning in early music today requires flexibility and patience. First and foremost, one cannot dismiss the inevitable background of equal temperament that influences all living Western musicians. Training your ear to hear alternate tuning systems is essential to performing Baroque music at a high level, but does not erase the comfort of equal temperament for many players and audience members.

Second, know the peculiarities of any instrument or tendencies of each player in your group. Perhaps a specific note is always sharp due to an instrument characteristic, or a group of instruments will rise in pitch by the second act, or maybe a specific tuning system seems to be working for everyone else but sounds terrible for your cadenza. *Stay flexible.* Tune with the group and adjust your harp accordingly. Giovanni de' Bardi noted:

...It is necessary to take great care in combining these instruments, for not all of them are tuned according to the same tuning, the viol and lute being tuned according to the tuning of Aristoxenus [equal temperament], the harp and *gravicembalo* making their modulations with other intervals [mean-tone temperament]. And more than once I have felt like laughing when I saw musicians struggling to put a lute or viol into proper tune with a keyboard instrument, for aside from the octave these instruments have few strings in common that are in unison, a circumstance that may detract from their usefulness, since until now this highly important matter has gone unnoticed or, if noticed, unremedied.¹⁰⁰

Learning to tune various temperaments by ear takes patience. You must practice tuning in the same way that you practice scales: consistently. Put your tuner away. Make sure that your surroundings are quiet. Relax. Trust your ears and know that you can ultimately tune your harp better by ear than with an electronic tuner.

¹⁰⁰ De' Bardi, 107.

The most important thing to understand about the Western scale is that the circle of fifths is not, in reality, a circle. If you begin on C and tune perfect fifths until you reach B# [C G D A E B F# C# G# D# A# E# B#], B# does *not* equal C. The interval that you hear between C and B# is called the **comma**, a whopping 23.5 cents in this case. Temperaments differ in how the comma is distributed throughout the scale.

Below are instructions on how to tune by ear focusing on perfect intervals or slight variations of perfect intervals. Develop an awareness of **beats** and your tuning skills will improve dramatically. Beats are the acoustic result of two different sound wave frequencies when activated simultaneously. If an interval is out of tune, you will hear a constant “wah, wah, wah” when the interval is plucked. Skilled tuners can time beats as accurately as an electronic tuner. Try separating intervals by an octave when tuning by ear in order to hear the beats more clearly (a tenth instead of a third, for example). Intervals that are perfectly in tune --in other words, intervals that do not create beats-- are described as “perfect” (fourths and fifths) or “pure” (thirds and octaves). Also, bear in mind that pedals and levers are equally tempered. Engaging the mechanism may skew other tuning systems slightly.

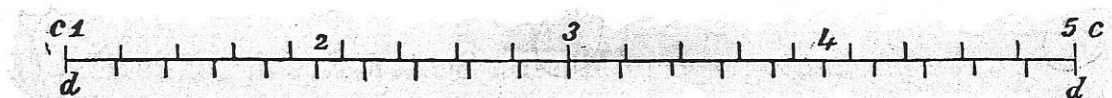


Figure 63. Diagram of beats¹⁰¹

¹⁰¹ Hermann Helmholtz, *On the Sensations of Tone* (Longmans & Co., 1885; reprint, New York: Dover Publications, Inc., 1954), 165.

Equal temperament

This temperament is based on twelve identical fifths and twelve equal semitones. The comma is distributed evenly throughout the scale so that no one interval is terribly out of tune, but yet nothing is perfectly in tune either. Equal temperament features enharmonic equivalents. Tuning instructions for equal temperament: tune each interval pure first, than adjust the interval as instructed. Tune consecutive 5ths a hair narrow (700 cents versus 702 cents).

Begin: **C G D A E B [F# C# G# D#]**

Continue: **C F [Bb Eb Ab]**

All of the fifths need to be identical. When finished tuning, confirm that the major thirds are wide but not unbearable, and that the enharmonics are equivalent (i.e. D#=E-flat or G#=A-flat).

Equal temperament is suitable for a large variety of repertoire, including music of the late Baroque and settings where you are working with a mix of period and modern instruments. Also, consider using equal temperament at a first rehearsal where the temperament has not yet been decided.

$\frac{1}{4}$ comma mean-tone temperament

This temperament features pure thirds and octaves. The comma is concentrated in the fifths. Tuning instructions for $\frac{1}{4}$ comma mean-tone temperament: tune each interval pure first, than adjust the interval as instructed. Begin tuning $\frac{1}{4}$ mean-tone temperament by tuning consecutive 5ths as narrow as is bearable. When you have finished tuning the E (see * below), begin to check that the thirds and tenths are pure: E and C, for example.

Begin: **C G D A *E(C) B(G) [F#(D) C#(A) G#(E) D#(B)]**

Continue: **C F(A) B \flat (D) E \flat (G) A \flat (C)**

$\frac{1}{4}$ comma mean-tone tuning is suitable for most early Baroque music. It is especially effective on double and triple row instruments.

Just intonation

Just intonation features pure thirds, fifths and octaves, concentrating the comma in a single interval. This interval is known as the “wolf.” Tuning instructions for just intonation: tune each interval pure first, and then adjust the interval as instructed. To tune just intonation, begin by tuning a C major triad: **CEG**. From the G, tune a G major triad: **GBD**. Returning to the C, tune an F major triad: **FAC**. Multi-row harps can now tune minor triads, as above: **CE \flat G**, **GB \flat D**, **FA \flat C**. Returning to the B, tune a B major triad: **BD#F#**. Returning to the E, tune a G#: **EG#**. Returning to the A, tune a C#: **AC#**. Notice that the wolf is concentrated between the C# and the D \flat . Just intonation is suitable when working with brass and vocal ensembles.

Pythagorean tuning

Pythagorean tuning features pure fifths and octaves with wide thirds, and it concentrates the comma in a single interval. You will find this wolf interval between the C and B# in this case. Pythagorean tuning is ideal for a student first learning to tune by ear because the intervals are easy to hear. Tuning instructions for Pythagorean tuning: tune each interval pure first, and then adjust the interval as instructed. Tune consecutive pure fifths, confirming that the fourths are also perfect.

Begin: C G D A E B [F# C# G# D#]

Continue: C F [B \flat E \flat A \flat]

Pythagorean tuning is especially suitable for Celtic folk music.

All of the above tunings attempt to distribute the comma in a way that allows the sweetness of truly tuned chords to resonate, particularly in the resolution of dissonance. The strategic placement of the comma can also add poignancy to a dissonant chord. Composers of the Baroque era were acutely aware of the idiosyncrasies of each of these tuning systems, and they composed with these idiosyncrasies in mind.

Equal	¼ comma	Just	Pythagorean	
B#	0			
C	0	0	0	0
C#	100	76	114	114
D b	100	117	90	90
D	200	193	204	204
D#	300	269	296	318
E b	300	310	294	294
E	400	386	408	408
F b	400	427	406	384
E#	500			
F	500	503	498	498
F#	600	579	612	612
G b	600	620	610	588
G	700	697	702	702
G#	800	773	794	816
A b	800	814	792	792
A	900	890	906	906
A#	1000	966	998	1020
B b	1000	1007	996	996
B	1100	1083	1110	1110
B b	1100	1124	1108	1086

Figure 64. Cent comparison for the above tunings

Be sure to discuss tuning and temperament with other members of the ensemble prior to the first rehearsal. It is not uncommon for early music groups to perform at $A = 392, 415, 430,$ or 440 . Prepare your harp in advance, so that the instrument is not adjusting during rehearsals. Note that some keyboards can transpose to a new pitch center by simply sliding the keyboard to the designated position. This makes the advance determination of pitch imperative for harpists, who may need to allow a full week for the instrument to adjust. If you are asked to tune your harp at Restoration pitch ($A = 465$), be sure to check with your instrument maker in order to determine whether or not the harp can withstand the extra tension and stress that this pitch will place on the body and strings of the instrument. And remember that harpists must constantly correct their tuning in rehearsals and performances. Do not be thwarted by humidity or extreme temperatures.

Multi-row harpists have a few special concerns when addressing tuning. Be sure to note the prevailing key of your passages in a large composition and tune the outer rows accordingly. Try to select your continuo playing so that you are not tuned in too remote a key for your solo passages: a cadenza in A and continuo work in $E\flat$, for example. In general, set the tuning of the harp at the beginning of the performance and keep the tuning fixed or closely related for the duration. If your enharmonics are not equivalent, especially when using mean-tone tuning, be sure to practice with the harp in the correct tuning so that you are fully aware of the placement of your accidentals.

Tune slightly higher than the oboe's A in order to match string players: $A = 442$ vs. 440 . Winds and brass tend to play at $A = 440$. You may also wish to stretch the top octaves of the harp, tuning them slightly sharp. Tune the bass notes slightly sharp for soft

passages and flat for loud passages. When playing with an organ, tune strictly to that instrument, even if your instrument is not in tune with itself as a result. Compromise and sweeten any exposed solo passages, but not at the expense of being out of tune with the organist. When preparing for an exposed passage with any another individual instrument, tune the specific passage prior to performance. Fretted instruments require special attention. Experiment in rehearsals with the intonation between the harp and fretted instrument. The harp MUST adjust to the tuning of the fretted instrument as necessary.

Suggested Readings:

Helmholtz, Hermann. *On the Sensations of Tone*. Longmans & Co., 1885; reprint, New York: Dover Publications, Inc., 1954.

Jorgensen, Owen. *Tuning the Historical Temperaments by Ear*. Marquette, Michigan: The Northern Michigan University Press, 1977.

Tittle, Martin B. *A Performer's Guide Through Historical Keyboard Tunings*. Ann Arbor, Michigan: Anderson Press, 1978, revised 1987.