

Tuning and Temperament

Class 5: Well-Temperament via Bach

Today's Class

- What is well-temperament? How is it different than meantone?
- Bach: The Well-Tempered Clavier, Books I+II (1722, 1742)
 - Written in all 24 major and minor keys
 - What did Bach's temperament sound like for this work?
 - Competing theories (some more dubious than others)
- Bach according to Werckmeister
- Bach according to Lehman
- Assignment 3

Well-temperament

- Essentially, it is a category of temperaments that allow performance in all keys (i.e. no wolf interval).
- Limited to 12 notes (as opposed to meantone which need not be limited)
- Unequal enough that keys can still have a "mood" (debatable).

Unterricht
Wie durch Anweisung und Hülff
des Monochordi ein Clavier wohl
temperiren und zu stimmen sey / Damit man
in heutiger Manier alle modos fictos
in einer erträglichen und angenehmen har-
moni vernehme ;
Heraus gegeben und zum Drucke befördert von
Andreâ Werckmeister
Hoff-Organisten zu Quedlinburg.
Frankfurth und Leipzig
Verlegt THEODORUS PHIL. CALVISIUS
Buchhändl. in Quedlinburg 1681.

Bach's *Well-Tempered Clavier, Books I+II*

- Preludes and fugues written in all 24 major and minor keys.
- [Víkingur Ólafsson – Bach: Prelude & Fugue in C minor, BWV 847 | WTC Book I](#)
- [Angela Hewitt – Bach Prelude & Fugue in A minor, BWV 889 | WTC Book II](#)

Bach's Well-Temperament according to not-Bach

- Werckmeister
- Lehman
- O'Donnell
- Hill
- Barnes
- Swich
- Louie



Werckmeister (1691)

- Four kinds of temperaments!
- Fifth-based tuning (much like meantone)
- Did not specify whether the comma was syntonic ($\frac{81}{80}$) or Pythagorean ($\frac{531441}{524288}$ or approx. $\frac{74}{73}$).
- Werckmeister III is the best known and most used.
 - Fifths based on D-A, A-E, F \sharp -C \sharp , C \sharp -G \sharp , and F-C are narrow by 1/4 comma
 - The fifth between G \sharp -D \sharp is wide by 1/4 comma
 - Every other fifth is pure.

Werckmeister III Pitches

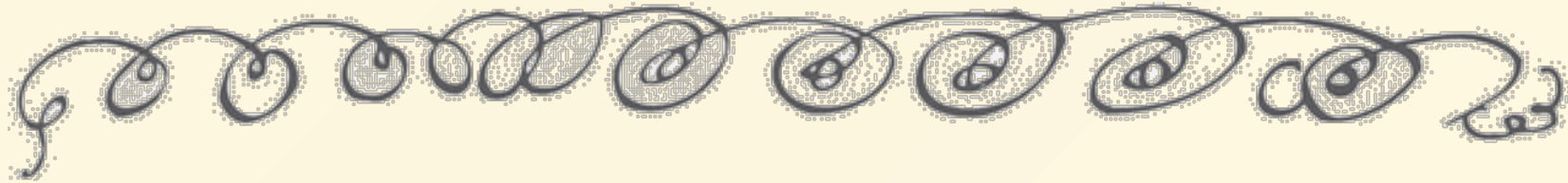
Note	Formula	Cents	Note	Formula	Cents
C	$\frac{1}{1}$	0	F#	$\sqrt{2}$	600
C#	$\frac{8\sqrt[4]{2}}{9}$	96	G	$\frac{3}{2}$	702
D	$\frac{9}{8}$	204	G#	$\frac{128}{81}$	792
Eb	$\frac{8\sqrt{2}}{9}$	300	A	$\sqrt[4]{8}$	900
E	$\frac{8\sqrt{2}}{9}$	396	Bb	$\frac{3}{\sqrt[4]{8}}$	1002
F	$\frac{9\sqrt[4]{2}}{8}$	504	B	$\frac{4\sqrt{2}}{3}$	1098



A little game

Listen to the following excerpts. Say which is "better".

Lehman (2005)



Claimed to have deciphered an anomalous squiggle on the title page of the Well-Tempered Clavier (seen above).

[The title page of the autograph copy of WTC Book I](#)



Procedure:

- 1.) Flip the illustration over and read it backwards.
- 2.) Tune the 5 fifths C – G – D – A – E – B short by $\frac{2}{12}$ of the Pythagorean comma.
- 3.) The fifths B – F# – C# – G# as “pure” ($\frac{3}{2}$)
- 4.) The 3 fifths G# (Ab) – Eb – Bb – F short by $\frac{1}{12}$ of the Pythagorean comma.

Bradley Lehman - Bach: Fugue
in F# minor, on harpsichord

Fugue in Ab Major (BWV 886)
in Five Different
Temperaments



Real Question

Does it actually matter?