

# 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



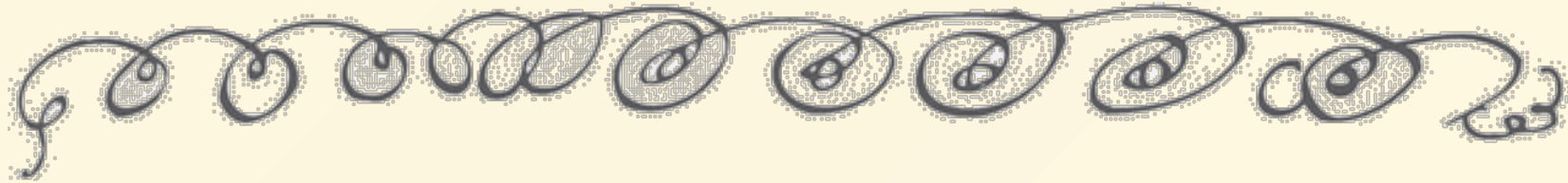


## A little game

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?