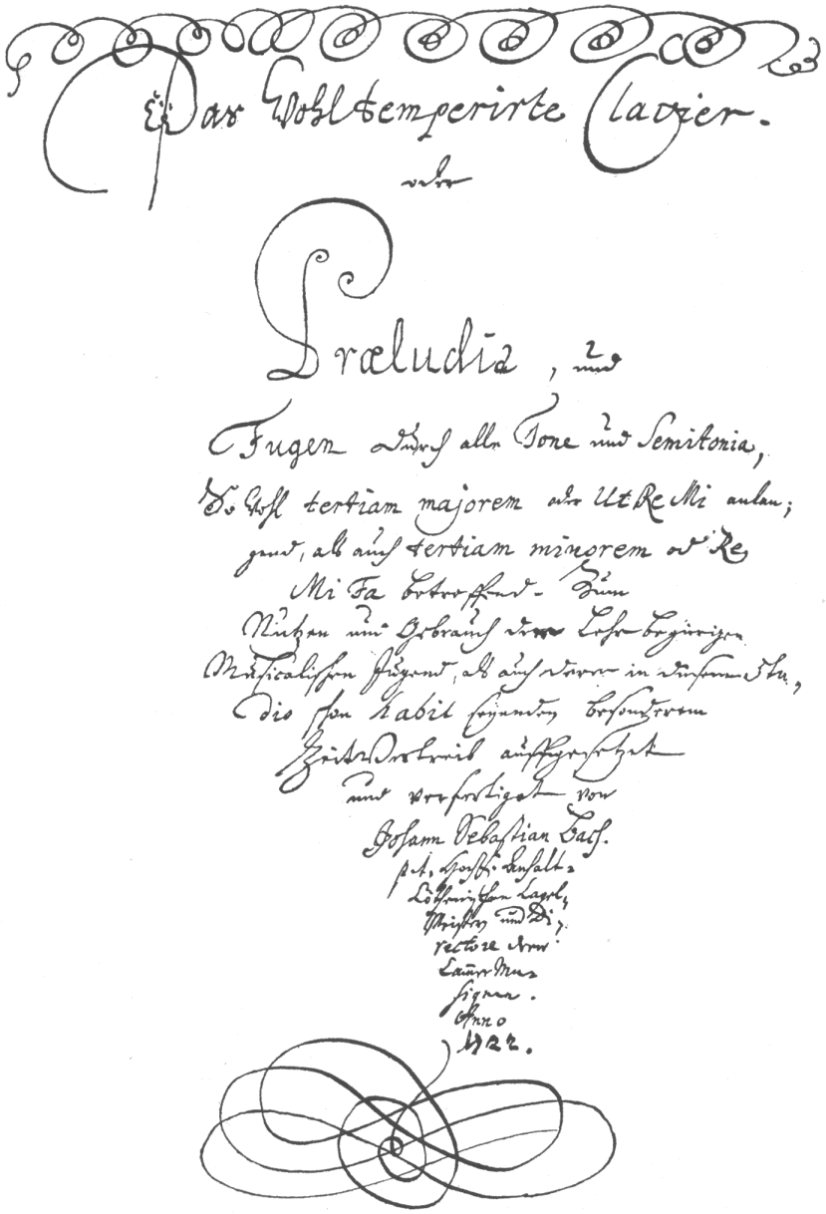
Title page of
***Das wohltemperirte Clavier*,**
1722

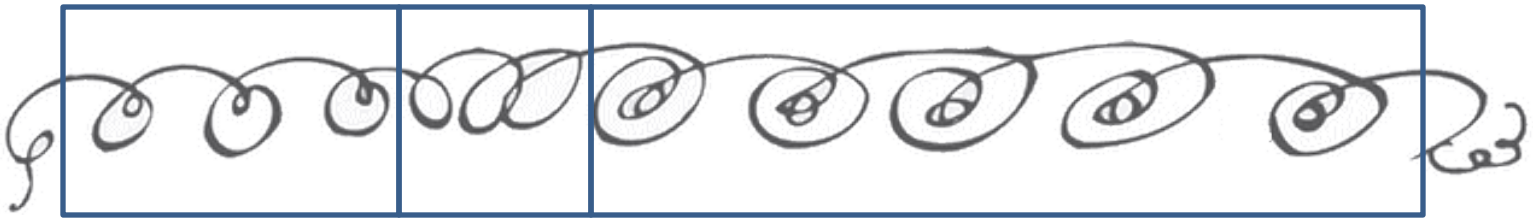
The book is profoundly difficult to play well, and to tune for.

And, its title page contains meaning beyond the words.



Look closely at Bach's drawing
at the top of the page.
Why isn't it symmetrical?

Why does it have three different
types of spirally loops in it?



Within the need to play in all 24 different major and minor scales, using 27 different notes smoothly:

- Tune the harpsichord **by ear** as quickly as possible.
- Make the first half of the notes as normal as possible, coming from everyday practice.
- Install the naturals first, because they are the center of melody and harmony.
- Tuning is done by 5ths and 4ths, checking major 3rds as they become available. 5ths are made deliberately narrow, or 4ths wide, so the major 3rds will turn out nicely.
- The first six notes are the hexachord in the home key, the naturals, C major: C-D-E-F-G-A; that's **F-C-G-D-A-E** when working by 5ths/4ths.
- Fit the remaining notes (B and the sharps) into place carefully, compromising them sharpward so they can also serve well as flats.
- That is: they are *tempered less tightly* by 5ths/4ths than the starting 5ths/4ths were. They are more nearly pure, or perhaps some *are* pure.
- What might such a process **look like** on paper?

My interpretation of Bach's drawing

- It is a practical diagram for tuning. **Fa-Ut-Sol-Re-La-Mi-….**
- Bach was demonstrating with this book a *better* tuning method than equal, and better than any of the other expert or amateur systems around him.
- Bach drew the diagram at the bottom of the page, with the page rotated 180 degrees. It is now at the top of the page, upside-down.
- The loops of the drawing indicate how much to temper each 5th in turn.
- The beginning notes are the naturals, and are done the same way as normally: F-C-G-D-A-E by 5ths, narrowed by the usual amount each.
- The remaining notes are all placed slightly higher than they would have been in that system. This allows them to function well as either sharps or flats.
- E-B-F#-C# are pure, because the loops of the drawing are empty.
- The final notes C#-G#-D#-A# are fit into position using average 5ths, only very slightly tempered.

My interpretation of Bach's drawing

- The adjustments are all practical motions of the wrist, not a pretext for calculations. The tuner works hands-on at the harpsichord, and doesn't need to know any mathematics.
- From the point where the 5th would be sounding as pure, the tuner nudges the upper note flatward (turning the tuning pin counter-clockwise) by 2, 0, or 1 nudge of the wrist. "About that much."
- The point is to make all 24 major and minor scales (and music in them) playable and beautiful, with a healthy variety of character and with no obviously "out-of-tune" problems.
- The same temperament can be left in place to play the entire book, with all 27 of the different notes it asks for.
- The temperament is not tied to any specific frequency or pitch. The starting C, F, or A can be any convenient tension for the given instrument, and all the rest is derived from there by mechanical motions.

Adjusting the regular 1/6 comma temperament to become “Bach/Lehman” (Bach’s own practice?)

- Leave most of the naturals where they were: F, C, G, D, A, and E.
- Raise the B, F#, C#, and G# (the sharps all get sharper).
- Lower the Bb and Eb (the flats get flatter) to become a better A# and D#.
- The spiral of 5ths meets itself nearly enough to sound like a circle of 5ths on a standard keyboard with 12 key levers per octave.