

## **"Tuning: Containing the Perfection of Eighteenth-Century Temperament, the Lost Art of Nineteenth-Century Temperament and the Science of Equal Temperament"**

by Owen H. Jorgensen

A quote from the book:

*In July 1799 [Thomas Young](#) submitted his paper "Outlines of Experiments and Inquiries Respecting Sound and Light" to the Royal Society...within this paper there was a section titled: "Of the Temperament of musical Intervals." In the first two sentences, Young explained that temperament is necessary. He wrote: "It would have been extremely convenient for practical musicians ...if three times the ratio of 4 to 5, or four times that of 5 to 6, had been equal to the ratio of 1 to 2. As it happens to be otherwise, it has been much disputed in what intervals the imperfections should be placed." How could one explain the necessity of [temperament](#) more simply? Young's second sentence is the basis of all temperament history.*

Explanation: the ratio of a [just intonation](#) (JI) major third (386.31 cents) is 5:4. 3 adjacent JI major thirds equal a ratio of 125:64 (1158.93 cents). The ratio of a JI minor third (315.64 cents) is 6:5. 4 adjacent JI minor thirds equal a ratio of 1296:625 (1262.56 cents). Neither of them equal ratio 2:1 (1200 cents), unless you "temper", somehow, those thirds!

This summer I have taken the time to study this monumental tome by Owen H. Jorgensen. It is an outstanding book recounting the evolution of tuning systems in the Western world from the 14th to the 20th century.

I have no idea how long it took the author to assemble it, it is extremely well-researched and must contain the work of a lifetime.

Jorgensen divides tuning systems into six categories: [Pythagorean](#), regular and modified [meantone](#) temperaments, [well-temperaments](#), quasi-equal and [equal](#) temperaments.

It is interesting to notice that this modern nomenclature of tuning systems was devised a long time after those systems had been in use. During the "meantone" era that temperament was simply called the "ordinary" method of tuning keyboard instruments. Even though each tuner tuned differently, the principles were the same. When "well-temperaments" appeared, "meantone" ones became "the old method" of tuning and these ones were simply referred to as "the new method" of tuning.

Jorgensen calls the twelve-tone equal temperament (12tET) of the octave an "atonal" tuning system because it does not have a tonal center and should only be used to play music written for it (late 19th and 20th century music).

Up until late 19th century, music was composed taking into consideration the key it was written in because each one had a different "color" due to micro-differences of the 12 intervals inside one octave, so, well-temperaments, for example, were "tonal" ones.

Well-temperaments are considered "unrestrictive" because allow [modulations](#) to any key. Previously, during the "meantone" era, only around 8 major and relative minor keys sounded in tune, hiding imperfections to the remaining (major and minor) keys that were seldom used because of "wolf" intervals, therefore these temperaments are called "restrictive" (not allowing modulations to all keys).

The first keyboard using the usual note layout of 7 white and 5 black keys was built in 1361 in Halberstadt, Germany. That is why this note layout is often referred to as "Halberstadt keyboard". Therefore, the keyboard we all know and love is a remnant of an ancient time when tuning systems were "tonal". The C major diatonic scale with all its white keys was the main tonality of these tuning systems. According to Jorgensen, the correct keyboard for the "atonal" 12tET would be a keyboard with a "six-six" design where every other key is a black one without interruption. Many other [keyboard designs](#) have been tried out, during the centuries, but so far none of them has ever caught on.

It has always been a matter of debate, as explained by Thomas Young, which intervals could bear temperament without sounding awful. The Pythagorean tuning system had just fifths but very wide major thirds. Most meantone major thirds were just but there were a few "wolf" thirds (diminished fourths). [Well-temperaments](#) had narrow fifths and slightly large major thirds arranged in an order that usually had the major third C-E as the smallest one (and so the closest in size to the "ideal" just intonation interval). As you moved around the [circle of fifths](#), major thirds increased in width up to Gb-Bb (F#-A#) that was the largest one. In so doing, each key was different: the [diatonic](#) scale of C major was described as "completely pure", keys with a few accidentals sounded closer to 12tET and were described as "uplifting" and "bright", keys with more accidentals could sound "triumphant" (major ones) or "gloomy" and "horrible" (minor ones)! All these "[key characteristics](#)" were lost with the advent of 12tET meaning that all keys, now, sound equally good (or bad!).

According to Jorgensen, 12tET is the hardest temperament to achieve on a keyboard instrument (not so on fretted ones) and that is why it was not obtained in practice (even if theorized for a long time) until the beginning of the 20th century when scientific and technological advances made tuners able to tune it in the "theoretically correct manner". This is the main thesis of the book. Therefore, Jorgensen states that previous tuning systems not only were a stylistic and artistic choice but a practical necessity too.

Reading this book, it looks clear to me that Western musicians, growing up accustomed to a single tuning system (12tET), have lost the sensibility to hear and appreciate minute pitch variations. Jorgensen, for example, reports that [George Frederick Handel](#) devised a temperament having pitch variations as small as 0.9384 cents (the twenty-fifth part of a [Pythagorean comma](#)) and that he tuned melodically (listening to notes one after another) and not harmonically (more notes at the same time). I dare to say that even people with perfect pitch lack the sensibility, taste and appreciation for such small pitch variations because they are not part of their musical upbringing.

This fascinating book is highly recommended if you can find it. I found it a few years ago on [amazon.com](#) at a "reasonable" price. It had been discarded by a public library in Queens, NY and was in the hands of a book reseller. A friend of mine, Howard Moscovitz, bought it for me because they did not ship internationally and then shipped it to Italy. Thanks Howard! The binding was not perfect but another friend of mine, here in Florence, Carlo Saitta, fixed it for me and for free too. Thanks Carlo!

I suggest reading "[The End of Common Practice](#)" by David B. Doty for further considerations about other aspects that helped the advent of 12tET. His considerations seem, to me, although for different reasons, close to those expressed by Jorgensen.