

## **A misty tuning of just 3 organs – The Nebula Equal Temperament**

*Equal temperament, the status quo of tuning systems in the world, divides the octave into 12 equal steps of 100 cents. Alternate tuning systems, such as Just Intonation, criticize or correct this because intervals are compromised – they fall short of a mathematical or perceptual ideal. The new discovered “misty” or Nebula Equal Temperament based on ancient Platonic notions compromises compromised intervals further to propose at a utopian-scientific solution.*

Let us look at very idea of compromise in tuning systems. Compromises are blamed to cause a lot of things including “action and violence”<sup>1</sup> in our culture and a return to a natural system is mostly called for, to make intervals and consequently society more consonant. The critique of the tuning system is a critic of the status quo with the assumption that there is a truth beyond equal temperament; a truth which has been compromised. Hence, the mere tuning of instruments presets the kind of music that will be played, presets its temperament. The idea that certain temperaments are dangerous to a society is not new: “when modes of music change, the fundamental laws of the State always change with them.”<sup>2</sup>

Interestingly, the history of tuning systems is the history of compromises. Equal temperament emerged as the ‘Great Compromise of 19<sup>th</sup> Century Science’ – the octave divided into 1200 equal cents. The scientific basis for the tuning system is to treat intervals independent of human preference or perception and to insure that all intervals are of equal distance. However, it is in contrast to another discovery of the 19<sup>th</sup> century, the harmonic series. Fourier’s find that all periodic or pitched sound can be expressed as the sum of sine waves at ratios at the power of 2. All natural occurring pitched sound has overtones which have the intervallic relationship to the fundamental expressed by the power of 2. If an order of intervals and a tuning system were to be derived from this (after all is the very nature of sound) we would find however no intervals of either the ‘Great Compromise’ equal temperament or of the ‘pure ratio’ just intonation. Therefore, Tuning systems are; by their very nature and independent of their basis of approach, to be considered compromises. There is no natural order to restore, but there is a mitigation or tension between perceptual and mathematical sound. Perhaps this is the origin of the idea of Wohltemperiert<sup>3</sup>, to find a system where all intervallic relationships sound well.

Let us start to redefine or compromise the tonic or the unison of two pitches. Intervals are thought to exist only if two separate notes can be perceived. If two pitches differ very slightly or are de-tuned, ‘beatings’ occur and we perceive a periodic movement between pitches, but we do not yet perceive two. This effect explains, in part, the fat sounds of a string section, and is used in modern studio production to thicken sounds. Now, let the smallest interval of an equal temperament fall into a nebula region between the perception of 2 pitches and a ‘non-beating’ unison – to compromise a compromised interval further into a forever unresolved perception between one and two pitches - a region between a unison and an interval. Thus, the “Great Compromise” is not obliterated, but in manner of supermodern studio production, fattened up to a “perceptual-quantum-mechanical” equal temperament.

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<sup>1</sup> Kyle Gann “Just Intonation Explained”

<sup>2</sup> Plato “The Republic”

<sup>3</sup> J.S.Bach “The Well-tempered piano”

Depending on the viewpoint: a) The “atom” or the smallest interval of the 12 tone equal temperament, the half-tone or 100 cent, will be split into a Platonic triangle. b) The unison tonic will be triangulated or equal temperament will be tripled.

“In the first place, then, as is evident to all, fire and earth and water and air are bodies. And every sort of body possesses solidity, and every solid must necessarily be contained in planes; and every plane rectilinear figure is composed of triangles;”<sup>4</sup>

For Plato the world is literally made up of triangles, which are arranged in planes. This is an ancient notion and follows in the footsteps of the Pythagorean notion that the world is made up of numbers. If we follow Plato and apply the equilateral triangle to the 100 cent interval of Equal Temperament, we get the division of 100 into 3 equal parts. This is  $100/3$  or 33.333... Rounded to Equal Temperament's cent, this produces a detuning of 33 cents above the tonic and 33 cents below the tonic. The perceptual comparison between the tonic (let say B) and the first interval at +33 cents produces “B and B plus 33”, the nebula of a unison interval.

We can go on and detune in such manner each step of the Equal Temperament, each step is connected to the next via a nebula. The sequence of cents for the first octave is:

0 33 67 100 133 167 200 233 267 300 333 367 400 433 467 500 533 567 600 633 667  
700 733 767 800 833 867 900 933 967 1000 1033 1067 1100 1133 1167 1200

This is a continuous sequence of equal spaced intervals, a Nebulous Equal Temperament. It is derived and practically realized via 3 Equal Temperaments tuned 33 cents apart.

On “just 3 organs” there are 3 organs in Equal Temperament tuned 33 cents apart. The center or green organ remains untouched, and the right or blue organ is tuned 33 cents down and the left or right organ is tuned 33 up.

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<sup>4</sup> Plato “Timaeus”