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## EarthSong: The Gravity and Levity of Just Intonation

Have you ever sung in a Choir or played in a Band? Do you enjoy listening to songs on the radio, in the grocery store, or from your favorite album? I'm willing to bet the answer to (at least) the latter is a manyfold "yes"! In today's world, Music is played and consumed in Equal Temperament Tuning, and has been since the 18<sup>th</sup> Century. This Tuning System does lots of good, as Instruments can play with each other in all keys without issue. However, it's widely believed that Equal Temperament isn't perfectly in synch with ratios found in Nature; Pure Intervals (occurring naturally) consist of Whole Number Ratios of frequencies. Thus, a Tuning System harnessing the Ratios found in Nature could affect us differently than Equal Temperament (which we are all inevitably accustomed to). Enter: Just Intonation!

Choir Directors have been using Just Intonation to tune their Choirs for decades, claiming improved intonation, heightened bodily sensation while singing, extreme emotional satisfaction, and increased Musical knowledge. Since no instruments are involved when a Choir performs or rehearses (sans Piano or Instruments tuned to Standard/Equal Temperament Tuning), the voices are free to lock into Chords the way Nature intended - or in accordance with Just Intonation. Choirs who tune Chords to Just Intonation "use their aural discernment skills and a physical sensation of resonance to confirm when their notes are in tune, specifically listening for no beats within and between classes of pitch" (Source 1). When Chords are tuned to Equal Temperament, "beats" can be observed, or slight oscillation of the tonal center, which happen in response to the fixed Ratios used in Even/Equal Temperament, as opposed to Ratios found in Nature and Just Intonation. "Beats occur when there are different intonations within, or between, classes of pitch, that is, when different intonations of the same note occur simultaneously. For example, when an equally tempered perfect fifth (700 cents) and a just perfect fifth (701.955001 cents) are sounded together. N.L. Norton states that 'beats are caused by interference between sound waves'" (Source 1). If Chords are tuned based upon the Harmonic Series, as with using Just Intonation, then harmonies are free to ring out - without beats - as they do in Nature.

According to Choral Director and Professor Dr. Andrew Withington, author of "Just Intonation: A Basis for Enhancing Choral Intonation", the most effective way to guarantee/implement Just Intonation is to tune each chord individually, based upon the Harmonic Series. This means an "E" may function slightly differently from Chord to Chord, despite technically being the same note, since its Chord Function is changing (i.e. a note that was the

Third of the Chord - based on the Root Note - has now become the Fifth, as the Chord/Root has effectively changed). In Nature, the overtones of a Root Note, Pitch, or Frequency occur in this exact order...every time: Root, Octave, Fifth, another Octave, a Major Third, followed by another Fifth. It's no surprise that these are the elements within a Major Triad, which is the most famous and recognizable Chord in Music (Source: 2).

It's important to note that the Harmonic Series actually delineates a hierarchy of sorts, or a guideline for optimal intonation (as closely tuned to Nature's specifications as possible). This is best illustrated by an A Capella Choir singing in Just Intonation, or better yet, through a Choir that's tuning to the Harmonic Series (which contains the makings of a Major Triad). Following the information provided by the Harmonic Series, we can: view the Root of a Chord as strong, grounded, and amply represented (given that the Root and Octave sound to us like the same note); the Fifth as strong, supported, and amply represented (due to its prevalence in the Harmonic Series); and the Major Third as very delicate, supported, and cared for (since its presence is quite minimal and delayed in the Harmonic Series). A Choir must be aware of these Natural guidelines, and tune accordingly. Singers must know precisely which member of the Chord they're representing (singing) at any given moment, so that Fifths, Roots, and Octaves can be strong...while Major Thirds (and other Intervals) can be taken care of in a different way, based upon their function in each passing Chord.

When Chords are successfully tuned to Just Intonation - mimicking the Harmonic Series found in Nature - Singers in the Choir, Choir Directors, and Audience Members alike can physically, emotionally, and Spiritually *feel* the difference, as opposed to Chords tuned to Standard/Equal Temperament Tuning. In fact, in order to sing with Just Intonation, "Singers then have to develop and use their aural (listening for the absence of beats in the sound) and sensory (feeling the vibrations of an in-tune sound) skills to verify when Just Intonation is harmonically achieved" (Source 1). The success of this Tuning method depends upon aural integrity (being able to tell when it sounds "right"), and upon physical/emotional sensations in the body and field (being able to tell when it feels "right"). A great resource for easily hearing this aural phenomenon firsthand is <https://youtu.be/6NII4No3s0M>, Source 4).

Singers must be present while implementing this protocol; Beyond knowing exactly which member of the Chord they're singing at any given time (and thus how to treat it harmonically), they must also be able to sense - physically, emotionally, and aurally - when Just Intonation is and isn't achieved, thereby adjusting in real-time depending on what's needed to maintain Just Intonation. In *Choral Conducting: A Symposium*, H. Swan writes "We are still privileged - and obliged - in rehearsal to utilize nature's instincts and phenomena in order to 'tune up' our pitch relationships" (Source 3). Despite higher expectations placed upon Choir Members'

Musicianship when introducing Just Intonation, the extra care is well worth it. Once audiences, Singers, and Directors experience a perfectly tuned Chord (based upon the laws of Nature), none can deny the difference. One Choir Director states "I was initially concerned that Just Intonation would be both inaccessible and simply too difficult for our Singers. However, using it even with only a few of our pieces greatly increased not just the precision of tuning, but generally the amount of listening our Singers were doing" (Source 1).

Richard Strauss said: "The human voice is the most beautiful instrument of all, but it is the most difficult to play". It's likely that Strauss was referring to the challenge of Singing with precise and consistent intonation. Perhaps this obstacle, at times, both undermines and glorifies the artform of Singing. Perhaps it's this obstacle that keeps some souls from using the instrument within their own throats...even though they've been using it (quite a bit!) since birth. The resulting sensation from a Chord tuned in Just Intonation must be experienced first-hand in order to fathom, which is what inspired me to write this paper/present this project...to provide a platform for others to both FEEL and participate in the ethereal, sensory experience of singing - with others, according to the Harmonic Series - in Just Intonation.

There's a system being taught to Choirs, which uses symbols to indicate levels of "Darkness" or "Brightness" (on a spectrum) needed for each pitch, depending on function in the Chord...this essentially determines whether a note will be grounded and strong like a Root or Octave, needs a bit of support while remaining strong like a 5<sup>th</sup>, or requires brightness/lift/softness like a 3<sup>rd</sup>.

...It's far simpler than that to sing EarthSong! The gravity and levity of Just Intonation can be felt easily and immediately, upon tuning a simple Major Triad - Do, Mi, So or 1, 3, 5 - according to each note's placement in the Harmonic Series, or adopting the principles of Just Intonation. Try it for yourself! ☺

#### Sources

- 1.) "Just Intonation: A basis for enhancing Choral Intonation", Andrew Withington, PhD, Choral Journal 2020
- 2.) "Harmonic Series Overview", [www.hubguitar.com](http://www.hubguitar.com) 2019
- 3.) "Choral Conducting: A Symposium" 1973, H. Swan
- 4.) <https://youtu.be/6NII4No3s0M>

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Earthsong: The Gravity and Levity of Just Intonation

After singing in so many wonderful Choirs over the years (particularly in College), I know well the stark difference between Equal Temperament Tuning and Just Intonation. I had an amazing Choir Director while studying for my Bachelor's in Vocal Performance, who tuned our Chamber Choir to Just Intonation, based upon the Harmonic Series. This supplied me with Musicianship, certainly...but it also helped catalyze my Spiritual Awakening. The experience of Singing in perfect resonance with Nature is both physically tangible and totally ineffable. It must be experienced in order to understand. I wanted to delve into this topic, in hopes to provide a safe platform for others to actually participate in building a Major Triad (made of the strongest notes within the Harmonic Series) using Just Intonation, which replicates the Harmonic Series found in Nature. There's nothing like it! The gravity and levity of Just Intonation can be felt easily and immediately upon tuning a simple Major Triad – Do, Mi, So or 1, 3, 5 – according to each note's placement in the Harmonic Series, or adopting Just Intonation. Try it for yourself! 😊