Pitch in High Definition

A Theory of Western Microtonal Music

Luke Anthony Villavicencio

Abstract

In the rather short history of microtonality in western music, compositions have leaned towards atonality. This makes plenty of sense due to the influences of Ivan Wyschnegradsky and the climate of contemporary music in the late 19th century, but there is still a need for a more conclusive theory. I form a theory of microtonal harmony melding concepts like just-intonation and microtonal planes to explain the need for more than just atonal dissonance. When one combines the microtonal composition methods of Charles Ives, Ivan Wyschnegradsky, and Ben Johnston, we can get closer to a full theory of microtonal music than just one of these composers could. Utilizing 24-TET as a playing field, I demonstrate the harmonious properties of adhering to the harmonic series when there is a need for consonance and then abandoning that when there is a need for dissonance, as well as how useful 12-TET theory is, despite there being many more harmonic choices. Additionally, the justly intonated intervals proposed by the 7th and 11th overtones allow for pivoting between microtonal planes. While the linking of these concepts insinuates a much larger paper, I've attempted to make the theory as concise as possible.

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"The harmony of to-day, and not for long; for all signs presage a revolution, and a next step toward that eternal harmony… the gradation of the octave is infinite, and let us strive to draw a little nearer to infinitude."

- Ferruccio Busoni (1907, p. 30)

When I was a little kid, I had extremely poor eyesight, though I was none the wiser. I went to school, made friends; I completely enjoyed myself without knowing that the world was not being presented to me as sharpened as a creator might have intended. It was not until I reached the second grade that my family and I had learned that I was not seeing as clearly as I had thought. When you go through life only knowing images in a resolution of, say, 480 pixels, colors and shapes still have the potential of beauty; mountains have their white peaks, flowers

still gently blow in the wind, the sun still paints the sky with its rising and setting, but there is truly nothing like the beauty of the world in high definition. This ideology is something that I take into my usage of microtonality.

After having dipped my toes into the oppor*tune* (pun intended) world of altered tunings and different divisions of the octave, the tendency towards atonality became immediately clear to me. When popular composers in the field, such as Ivan Wyschnegradsky, take much influence from Schoenberg, Berg, and Webern, this makes some sense. Russian musicologist Leonid Sabaneev confirms this in his article titled *Vyschnegradsky's Tonal System,* "Vyschnegradsky knows this, and regards it as a positive quality, since he believes that the trend of music in general is towards the atonal." In hindsight, this opinion is rather misplaced as atonal music has remained as a concept reserved for music intellectuals many decades later. When we consider how 12 tone music theory evolved, we can denote that the timelines of 12-TET theory and microtonal theory are mirrors of each other in this way. 12-TET theory started off by developing a tonal theory across centuries where, in many of those centuries, consonance was the goal and some of the dissonant intervals were associated with the devil. As those centuries passed, the western world slowly made their way into chromaticism, eventually arriving at the more contemporary pieces by the aforementioned atonal composers. It was in this time that microtonality really began to find some ground[1], so there is no question as to why microtonal music would lean this way. Now I personally enjoy this mixing of complicated concepts such as atonality and microtonality, but the music that this combination creates is most definitely jarring

[1] There existed some composers who had used quarter-tones/microtonality before this such as Fronmental Halevey (1799–1862), Vincente Luisitano (1520–1561), and Nicola Vicentino (1511–1576) among others.

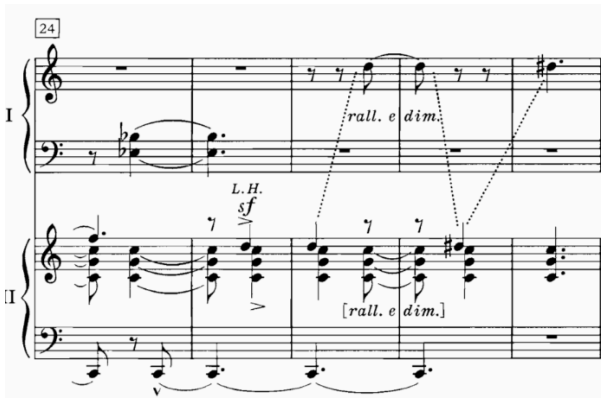
to the general public. There is also absolutely no need for Wyschnegradsky's thoughts of the atonal being inevitable in the realm of microtonality. One of my composition professors at SUNY Fredonia, Dr. Andrew Martin Smith, would always remind me as I worked on my research-related pieces that if I was presenting a complicated concept, to complement that concept with simplicity to aid in the ease of understanding. This advice does not apply to every situation, but is a value that I believe could help the world of microtonality; complimenting complex microtonal ideas with tonality as something to hold on to.

The traditional definition of "tonal music" is music that has a hierarchy of pitches all relating in some way to a tonic or pitch center. One hears the word "tonic" and may automatically assume we are talking about the twelve-tone equal tempered scale, but this is simply not the case. I actually prefer the slightly different definition that composer and writer Ben Johnston posits in his article Maximum Clarity (1996), "Tonality can be defined as a system of pitches related to each other by a set of interval relations *that can be followed by the ear."* [2] Specifically the mention of aural recognition is an important distinction that adds to the modernity of this definition. Having given a standard definition as well as one from a famous composer, we can ask how this can be applied to microtonal scales and divisions? The answer may not initially seem like an obvious one as there are numerous different microtonal scales, tunings, and octave divisions; there is no way one theory could in some way apply to them all, right? Well, if we take a step back to look at the bigger picture, entertaining different aspects of each existing theory, we can form a quilt theory, of sorts, getting closer to an answer than just one theory could alone.

[2] My own italics.

Microtonal Planes

Charles Ives is not often thought of as a microtonalist; as far as we know, he only ever wrote one set of pieces that include a form of microtonality. These *Three Quarter-tone Pieces* stand out in a big way from many other pieces of the like as they lack any quarter-tone accidentals. The set of pieces, published in 1925, consisted of two pianos tuned a quarter-tone apart. Since one of the instruments was tuned completely to a different tonal standard, he could effectively notate that piano as a transposed part. Compare this form of notation to that of Ivan Wyschnegradsky and Alois Hába, and we can see the *complex* concept of quarter-tones being presented in a *simpler* way. Microtonal accidentals are not quite flawed, but the composers that use them tend to forget (or refuse) to acknowledge the pertinence of 12 tone theory within a piece that utilized quarter-tones, for example. Western music has not maintained this chromatic scale for no reason, and we can use what others have dedicated their lives to as a ground to stand on. This method that Ives uses not only has a particular ease of comprehension, but it allows one to have a great sense of familiarity and comfort in a new dimension of pitch.



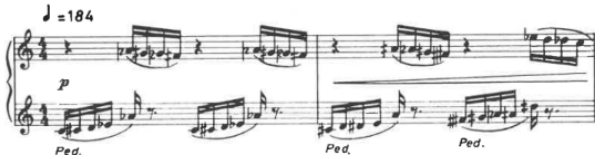


Figure. 1 Charles Ives "Three Quarter-tone Pieces." mm. 24–28 / Figure 2 Ivan Wyschnegradsky "24 Preludes." I, mm. 1–2

In the excerpts above, we can see how each composer dictates quarter-tonal movement and how each has its benefits. This particular version[3] of *24 Preludes* by Wyschnegradsky use the quarter-tone accidentals to dictate its ultrachromatic motives, while the Ives *Three Quarter-tone Pieces* shows similar movement with dotted lines going between the pianos. In the Ives example, you need not know new symbols or accidentals as you can understand that the top staff is slightly sharper than the bottom staff and so this makes the music easier to read and understand, especially for musicians who are new to the concept. While the comprehension of the piece is simpler, in a way, it does not sacrifice its complexity and intellectual appeal. Both Charles Ives and Ivan Wyschnegradsky successfully took a complex concept and combined them with simple notation, hence their fame in the field of microtonality.

The use of microtonal planes is not limited to 24-TET; this notation technique can come into use any time one multiplies the twelve pitches of the western chromatic scale to form a larger division of the octave while maintaining the multiple of twelve, as the whole purpose of this system is to continue to use standard western notation. For example, take a look at my piece

[3] There is a separate version of Wyschnegradsky's preludes that is notated like Ives' pieces, though I find that these two show the dichotomy of these two notation systems.

Degradation; this piece has three guitars each tuned a third of a semitone away from each other effectively placing the piece in 36-TET. Despite this complex idea, it is complemented by the simple concept of standard 12-TET notation with only a mere mention of the tunings of the guitars at the beginning. In doing this, performers needed no new information in order to play these parts.

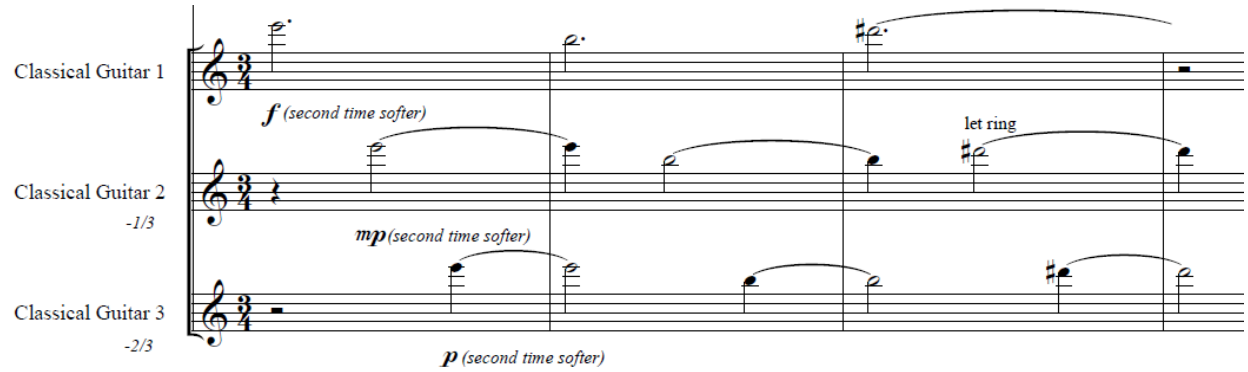


Figure 3 Luke Anthony Villavicencio "Degradation." mm. 1–4

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Consonance via Acoustics

In order to tackle the methods by which we can achieve consonance within microtonal scales and divisions of the octave, we need to first understand why certain 12-TET intervals sound as consonant as they do. The perfect fifth and perfect octave are just that: perfect—no beating between frequencies, no tension, just two pitches sounding in harmony, in a more standard use of the word. This is due to the nearness of these pitches to the harmonic series, or the hierarchy of pitches that sound above a fundamental note one may play on their instrument. In the figure below, you can see that both C and G adhere the closest to the overtones. On the other hand, the eleventh harmonic drifts forty-nine cents out of tune from the harmonic series. If what we would call a just-intonated F# were played next to a 12-TET F#, the pitches would sound approximately a quarter step apart (50 cents).

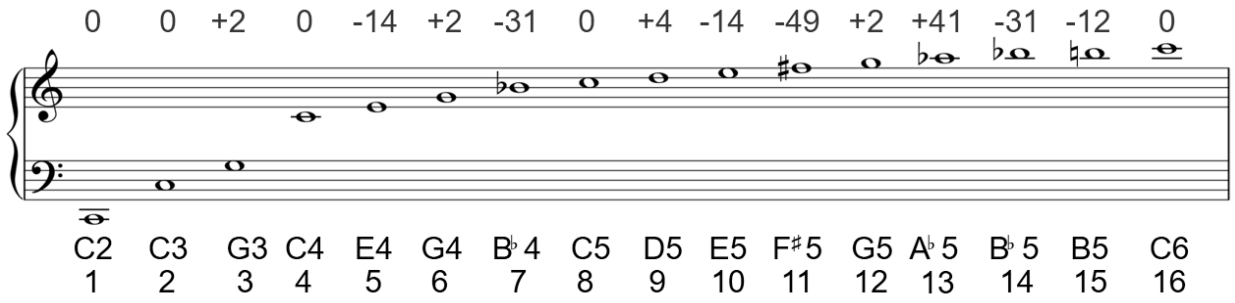

Figure 4 Harmonic series showing pitch deviations

If you have ever heard a barbershop quartet performance, you have likely heard the pleasing sound of their harmonies; the intervals sound clean, for lack of a better word. This is because these performers adhere to the harmonic series, effectively singing in just-intonation in order to sing chords that almost "ring" like church bells. While I am not one to utilize just-intonation in my compositions, it was as I was listening to Ben Johnston's *String Quartet No. 9* that it occurred to me that these concepts could be used to make chords of a more microtonal nature "ring" similarly to these barbershop quartets. To demonstrate I will simply apply this to 24-TET.

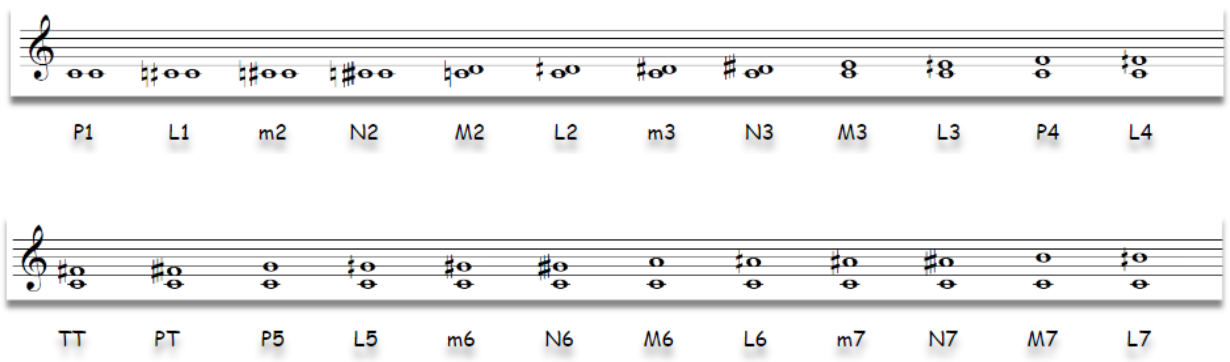

Figure 5 Quarter-tone Intervals

For the sake of continuity, I have taken the 24-TET intervals, initially named by Wyschnegradsky, and renamed them in accordance with titles commonly found in twelve tone theory; leading intervals (L) which always precede the changing of the integer, neutral intervals (N) which are always in between major and minor intervals, and finally the prime tone (PT) as a leading tone is another name for the major seventh interval and this prime tone is the thirteenth interval in this sequence, hence "prime." Now I previously mentioned how above the fundamental of C, the eleventh harmonic is forty-nine cents flat—since this is practically a

quarter step flat, this pitch functions much better as a leading fourth (L4) rather than the tritone. We can do something similar with the thirteenth harmonic and round it up nine cents so it is a full quarter-step sharp giving us the interval on a neutral sixth (N6). Though these two intervals were touched upon in the appendix of Ivan Wyschnegradsky's *Manual of Quarter-Tone Harmony*, it seems he was not all that interested in utilizing the consonant benefits of these approximations.

With these intervals in mind, we can create twenty-four tone harmonies that sound rather pleasant and indeed much more palatable than the more atonal, microtonal works of the past. Though this is not where this theory ends; we can also use these intervals to seamlessly switch microtonal planes no differently than how Beethoven pivots to a different key. I like to refer to them as plane pivots, and these pivots are how we can maintain the presence of a tonic within different microtonal scales. Hand in hand with microtonal planes, these pivots can aid in preserving the harmonies of 12-TET, creating a tonal feeling in a microtonal piece. In the example below, from my piece *As the Sun Rises* for string orchestra, the harmony goes from E half-sharp minor then uses the G half-sharp to shift planes, arriving at the G major. The G half sharp has the leading fourth relationship to the fifth of the G natural major chord which allows for the plane to seamlessly shift back to standard 12-TET.

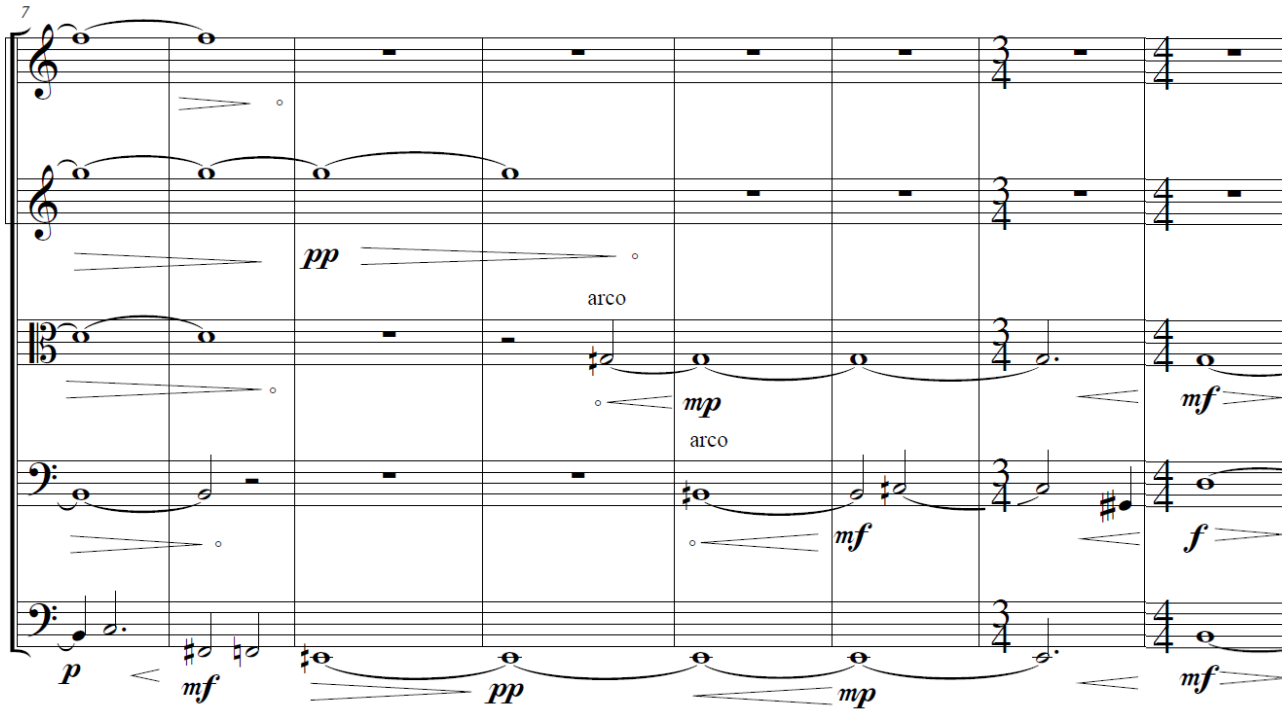

Figure 6 Luke Anthony Villavicencio “As The Sun Rises” mm. 7–14

In a world of octave divisions larger than 12-tone equal temperament, dissonance arises naturally, while consonance requires deliberate effort. As pioneers in this realm, we must strive to create music that showcases not only the dissonant, atonal possibilities of microtonality but also its harmonious potential. The interplay between these forces—tension and resolution—gives music its depth and emotional power. By mastering both, we can reveal the true beauty and expressive potential of microtonality.

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