

# LAST PAPER FROM DAVE HILL

Corr. writeup 3

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From: ascend11@aol.com  
Sent: Wednesday, October 01, 2014 3:03 PM  
To: Social Services - Ontario Grove Healthcare & Wellness Centre  
Subject: CD 1

Dear Music Lover;

The enclosed CD with demos & example musical phrases contains recordings with narrated demonstrations and musical examples of melodies and harmonies having chords which until the present have been little used because of difficulties in performing them with traditional instruments. Music having these "new" harmonies can now be performed without restrictions or unusual difficulties thanks to computer tools which have greatly expanded the range of musical sounds available to performers for their use. However these new possibilities have as yet to be fully understood and exploited by musicians because they are still infrequently heard and absent from most courses offered to students of music.

Musical thought, training of musicians, and most music which has been performed and heard over the 20th century and on up to the present have taken place or been created with the equal temperament tuning and music scoring system in mind and present day music is almost always heard on instruments tuned to equal temperament. Even singers and performers on stringed instruments seek to hold to equal temperament, even though they are not constrained to equal temperament by their instrument. Equal temperament tuning (think of the piano as it is usually tuned at present) is based on a pitch scale - low to high - of twelve equally spaced pitches per octave. The size of the step in pitch between one note and the next is one equal temperament semitone (sound frequency ratio approximately 1.06 to 1.000 as I'll explain).

The pitch distance or musical INTERVAL between two notes is defined by the arithmetic ratio between the sound wave frequencies of the notes. Thus the interval between scale note A4 which corresponds to a sound wave frequency of 440 cycles per second and the note an octave above it, A5, which has frequency 880 cycles per sec, is described as corresponding to frequency ratio 880:440 which reduces to the ratio 2:1.

Certain basic intervals occur nearly universally in Western polyphonic chordal music, having formed the basis for classical music from the 15th century to the present. These intervals are: 2:1 octave, 3:2 fifth, 4:3 fourth, 5:4 major third, and 6:5 minor third. These basic intervals and chords built from them can be approximated to produce music considered acceptably in tune by most musicians using notes of the equal temperament scale. However some of these intervals are audibly slightly mistuned and there is a cost to the harmoniousness

and beauty of music performed in equal temperament. For example the ideal frequency ratio for the major third is 5:4 which reduces to 1.250:1, while the frequency ratio between the notes sounded to produce a major third in equal temperament is 1.260:1 and the difference this produces in the sound of the major third where it occurs in music is audible. Even today, most people are unaware of the fact that the sound of music usually heard - in equal temperament tuning - has its character "stamped" by its being performed in equal temperament and that the same score music sounded in another tuning, ideally just intonation where the intervals between the notes in chords of the music are very nearly exact, could sound better - for some of us a lot better.

Harmonies largely beyond the reach of instruments tuned to equal temperament

There are pitch intervals based on frequency ratios of numbers higher than 6 which cannot be unambiguously sounded using the notes of the equal temperament scale. Thus the minor third - ratio 6:5 (1.200:1) - and the subminor third - ratio 7:6 (1.167:1) - sound distinctly different one from the other, but both intervals must be represented by the ratio corresponding to three semitone steps of the equal temperament scale - 1.189:1. Two different chords, each of which has a place in music are (1) the 10:12:15 minor triad having a 6:5 minor third between the two lower notes and a 5:4 major third between the two upper notes and (2) the 6:7:9 subminor triad. The 10:12:15 chord and the 6:7:9 chord have very different sound characters, but are not distinguishable per the EQT system without being specially marked.

Intervals and chords having frequency ratios of 11 between some of their notes have a unique eerie character which isn't easily or clearly captured using notes of the equal temperament scale. There is an important place in music for 11-ratio intervals and chords and their musically sensitive use in many places where they are appropriate stands to enrich musical art in ways we do not yet fully grasp.

The acceptance of note frequency ratios of 5 in addition to those of 3 in Renaissance times was a game changer for musical art, and that development, I believe, affected the overall "mood" of our civilization beyond the art of music alone. The adoption of the "new" intervals and chords in music and their use free of the restrictions due to technical limitations of musical instruments in use before powerful computer tools for use in music became available may prove ultimately to be another game changer bringing significant benefits to society beyond the field of musical art alone.

The CD represents some of my best work in music. I hope to put that work to profitable use by marketing one or more CDs with narrated demos and musical examples which effectively introduce the new musical sounds previously beyond reach to students of music and music lovers who want to understand them and use them.

Recommended ordered list of tracks on the CD with brief descriptions

- 1. Track 15: Demo of the five basic (not six) intervals of traditional harmony and the major and minor triads - early recording from the 1980s; several music students have found the approach taken here fascinating
- 2. Track 16: Differently systematized approach to the intervals and chords of traditional harmony - first part of a three part demo leading stepwise up to 11- ratio harmonies; Part 1 concerns intervals and harmonies based on the odd integers 1, 3, and 5
- 3. Tracks ~~4~~<sup>4</sup> & ~~5~~<sup>5</sup>: Examples of music having "traditional harmonies" in just intonation - note pitches accurately tuned to produce near exact integer frequency ratio intervals - piano

Tracks 8, 9, 10, & 11: Voice synthesis for upper 2, upper 3, upper 4, all 8 parts of an 8 part phrase in the work: "Von Himmel Hoch" by Renaissance composer Michael Praetorius - (best with left and right stereo speakers set to equal volume)

- 4. Tracks 17 & 18: Parts of demo of intervals and chords based on ratios of 7, 9, and 11
- 5. Tracks 1, 14, 12 & 3: Examples of music using the new intervals & chords