

Moore's Mystical Music Moment

Part 1

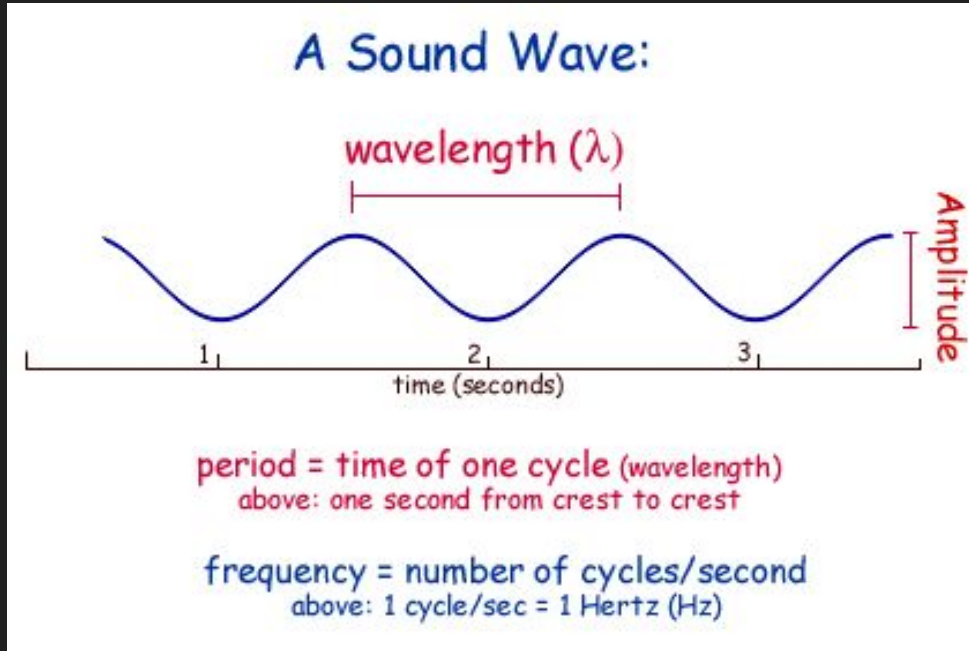


Where does music come from?

In order to understand the fundamental nature of music, it is necessary to understand the fundamental nature of sound.

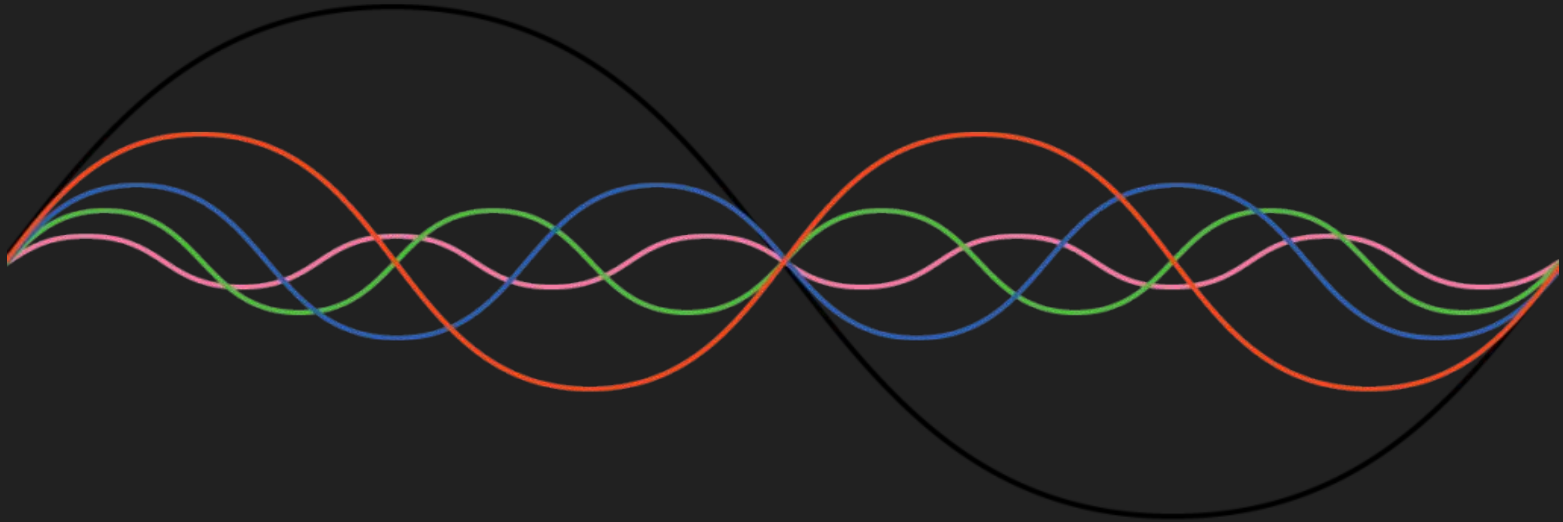


Where does sound come from?



When a physical body is resonating (e.g. vibrating string), sound is propagated from the source to the observer (ear, microphone, etc) as regular pulses of high and low amplitude air pressure. The measurement of the arrival of these pulses can be idealized as a simple sin wave with wavelength λ , and a frequency v/λ where v is the air speed of the traveling wave.

How does sound become music?

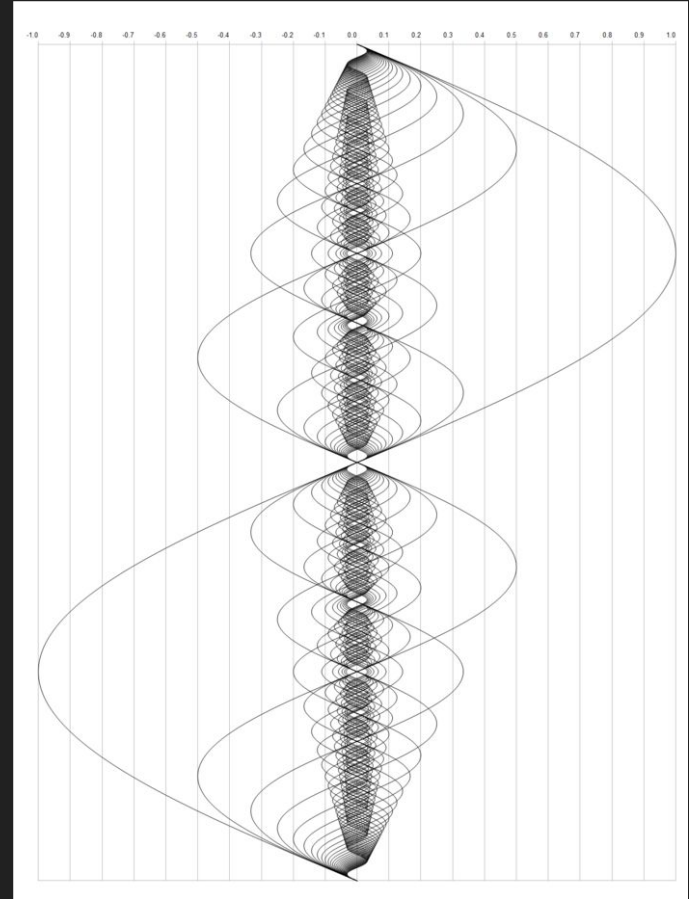


Constraint! If you constrain a wave to fit into a space such that its outermost nodes are immovable, only an integer multiple of wavelengths (or half / quarter wavelengths depending on the physical system) will fit within that constraint.

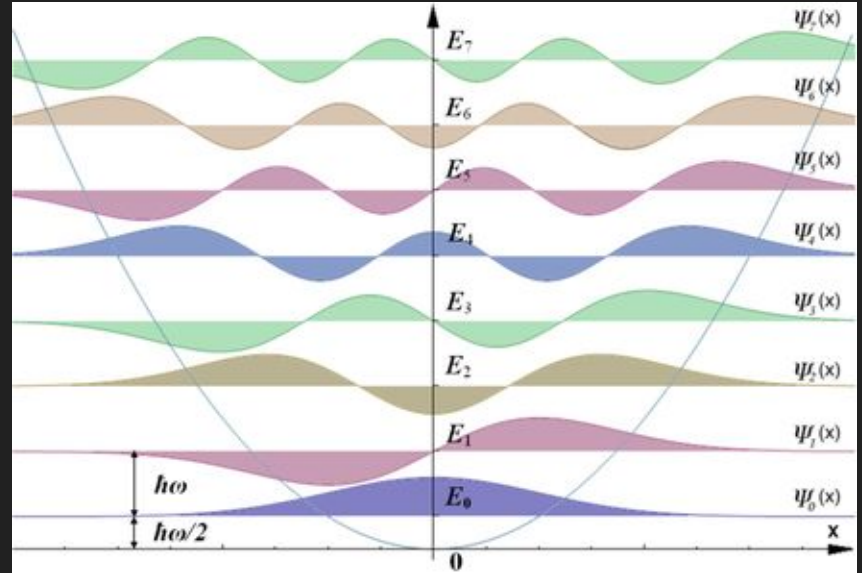
So wut?

The Harmonic Series!

By constraining a physical system to operate in limited modes, we have discovered the Harmonic Series! The harmonic series is nature's tuning system. As we increase the number of wavelengths that fit within our constraint, we are producing higher and higher pitched harmonics. These correspond to the pitches that musicians associate with the 12 tones used in Western music (with yet higher harmonics corresponding to the tones used in non-western music systems). Pictured to the right you can see the first 32 frequencies of the harmonic series.



Enhance!



This harmonic behavior isn't limited to just sound waves. All wavelike phenomena are subject to harmonics. For example: Light, Radio, Heat, Electricity, and even Quantum Oscillators as pictured above are all systems which generate harmonics when constrained.

Live Demo:

- Frequency Analysis (Fourier Transform)
- Feel the vibrations (Just Intonation vs Equal Temperment)
- Why Mixolydian is the true natural major.