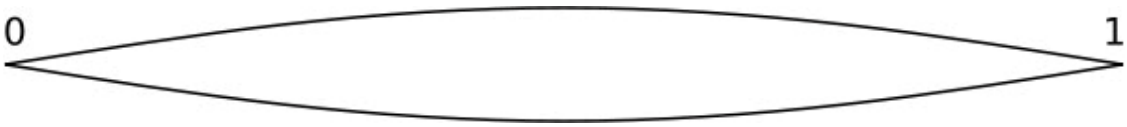
LCC for Guitar - Introduction

In order for guitarists to understand the significance of the Lydian Chromatic Concept of Tonal Organization and the concept of Tonal Gravity, one must first look at the nature of string vibration and what happens when a string vibrates. The Lydian Chromatic concept is based in the science of natural acoustics, so it is important to understand exactly what happens acoustically to a note and the harmonic overtones that nature creates.

A guitar string (or any string from any stringed instrument) vibrates when plucked or struck, producing a tone. The vibrating string creates a natural resonant series of vibration patterns which are called Harmonics. When you strike the string by itself, it vibrates back and forth and moves air molecules, producing sound. This is called a FUNDAMENTAL. (See fig 1.01a)

Fig 1.01a – FUNADAMENTAL/OPEN STRING = A 440hz/440cps

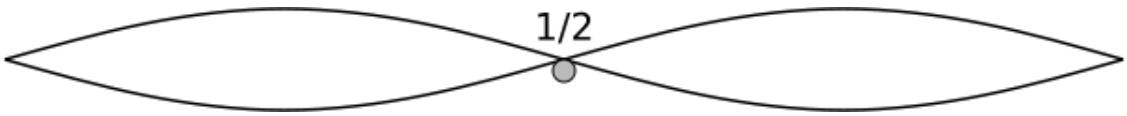
The fundamental vibration pattern on a single string. This is the FUNDAMENTAL vibration or tone and can be equated to a fixed amount of vibrations or cycles per second (cps) For example, consider this to be the open 'A' string producing the note A which in turn a universally considered to vibrate at 440cps or the equivalent of 440hz.



If you loosen a guitar string you can visually see the result of the vibrations; the string makes a wide arc near the center and it narrows towards each end.

When you touch the string exactly in the center (exactly between both ends or on the guitar the physical location is at the 12th fret) it divides the vibration exactly in half and produces a note or tone exactly one octave higher in pitch. This is called the first harmonic overtone and the center point of the string where it touches is called a harmonic node. The note produced by the first overtone is exactly double the vibration ratio of 440 so it would be 880 cps (of 880 hz) - (See fig 1.01b)

Fig 1.01b - First OVERTONE , one OCTAVE higher/12 Fret = 880 cps



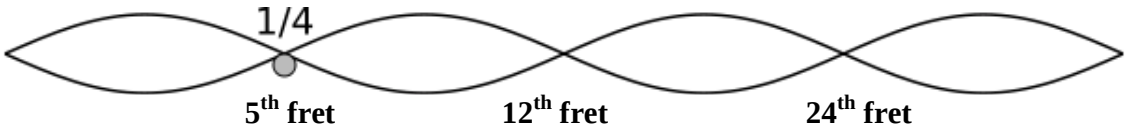
12th Fret

The second overtone produced by a vibrating string is from the harmonic node created at the 7th fret. This produces a note an Octave plus a Fifth interval above the fundamental. This itself is used to establish the strength of the Perfect 5th as the strongest consonant interval. See Fig 1.01c

Fig 1.01c - Second OVERTONE , one OCTAVE PLUS A FIFTH/7th fret = 1320 cps

The third overtone produced by a vibrating string is from the harmonic node created at the 5th fret. This produces a note an TWO OCTAVES above the fundamental. See Fig 1.01d

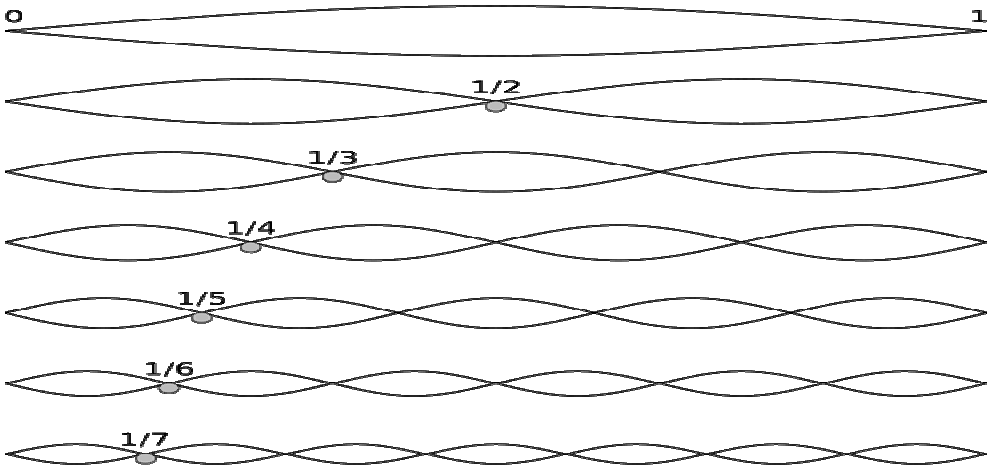
Fig 1.01d - Third OVERTONE , TWO OCTAVES/5th fret = 1760 cps



The fourth overtone produced by a vibrating string is from the harmonic node created at the 4th fret. This produces a note an TWO OCTAVES plus a Major 3rd above the fundamental. See Fig 1.01d

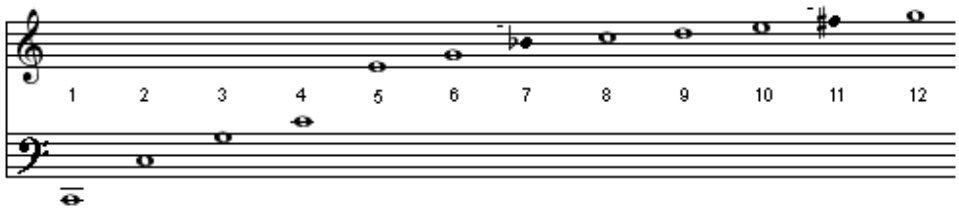
Fig 1.01d - Fourth OVERTONE - Two Octaves plus a Maj 3rd /4th fret = 2200 cps

These string divisional points are called harmonic nodes, and they progress successively on the string by touching the nodes exactly on the locations where the 12th, 7th , 5th, 4th, 3rd and 2nd frets occur.



The open string creates what is called the fundamental tone. The next tone created by the harmonic overtone series is at the 12th fret which is exactly one octave higher than the fundamental tone. The next sequentially created harmonic overtone is a 5th above the first harmonic at the 7th fret. The next harmonic after that is created on the 4th fret and the note is a major 3rd above the octave.

When you map out all the naturally occurring harmonics on a string you get what is called the Harmonic Overtone series. The specific order of the notes that are naturally acoustically created are 1, 1, 5, 1, 3, 5, b7, 1, 9, 3 #11, 5, 13, b7, 7, 1, b9, 9, #9, 3.
The following example shows the notes of the **Harmonic Overtone series up to the 12th overtone:**



1 1 5 1 3 5 b7 1 9 3 #11 5 ..etc
(#4)

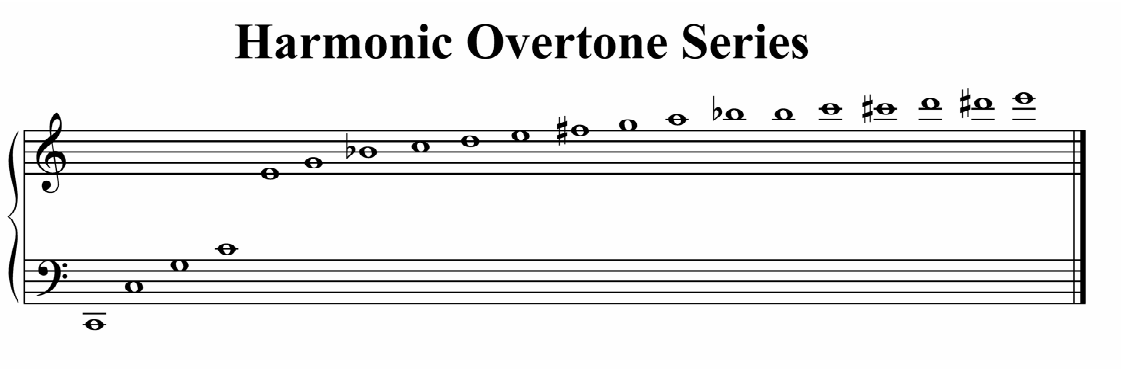
If one looks at the numeric names of the notes created with the overtone series, one can easily see that the first interval is an Octave, which is the strongest tonal center, followed immediately by a perfect 5th and then another octave. The perfect fifth occurs immediately after the octave, and it occurs 3 more times within the first 12 overtones, which gives further proof as to the strength of its natural occurring harmonic

consonance. Notice that the interval of the Perfect 4th does not occur, yet the #4 occurs as a #11 (augmented eleventh or augmented 4th) in the series.

The perfect fifth therefore is the strongest naturally occurring consonant interval in music and it is used as the basis for the Lydian Chromatic Concept. This naturally occurring harmonic structure of 1,1,5,1 forms that basis of what are called "power chords" on the guitar. Power Chords sound as strong as they do because of the octaves and 5ths used to create them. This proves that the interval of the 5th may be the strongest musical sound after the octave.

> According to Wikipedia, "The perfect fifth is occasionally referred to as the diapente, and abbreviated P5. Its inversion is the perfect fourth. The term perfect has also been used to distinguish intervals tuned to ratios of small integers from those that are "tempered" or "imperfect" in various other tunings such as equal temperament. The perfect unison is 1:1, the perfect octave is 2:1, the perfect fourth is 4:3, and the perfect fifth is 3:2. Within this definition, other intervals may also be called perfect, for example a perfect third (5:4) or a perfect major sixth (5:3). The perfect fifth is an important interval in tonal music. It is more consonant, or stable, than any other interval except the unison and the octave. It is a valuable interval in chord structure, song development, and western tuning systems. It occurs on the root of all major and minor chords (triads) and their extensions. It was the first accepted harmony (besides the octave) in Gregorian chant, a very early formal style of musical composition."[1]

The 5th produces a perfect mathematical ratio of 3:2 and is the most consonant sounding interval after the unison or octave. It is the most widely used and accepted interval to use as a base for chord structures and is used extensively in guitar music. By taking any perfect 5th interval and successively stacking a series of perfect fifths above it, we begin to unravel the ideas behind Pythagoras' discoveries of tonality. The Pythagorean system of tonality takes the notes in the naturally-occurring Harmonic Overtone series and re-arranges them as to stack the notes in perfect fifths so that a total stack of twelve perfect fifths are derived. **Here is the harmonic overtone series up to the 20th overtone and a diagram showing the Pythagorean re-arrangement of the stack.**



C	C	G	C	E	G	Bb	C	D	E	F#	G	A	Bb	B	C	C#	D	D#	E
1	1	5	1	3	5	b7	1	9	3	#4	5	13	b7	7	1	b9	9	#9	3

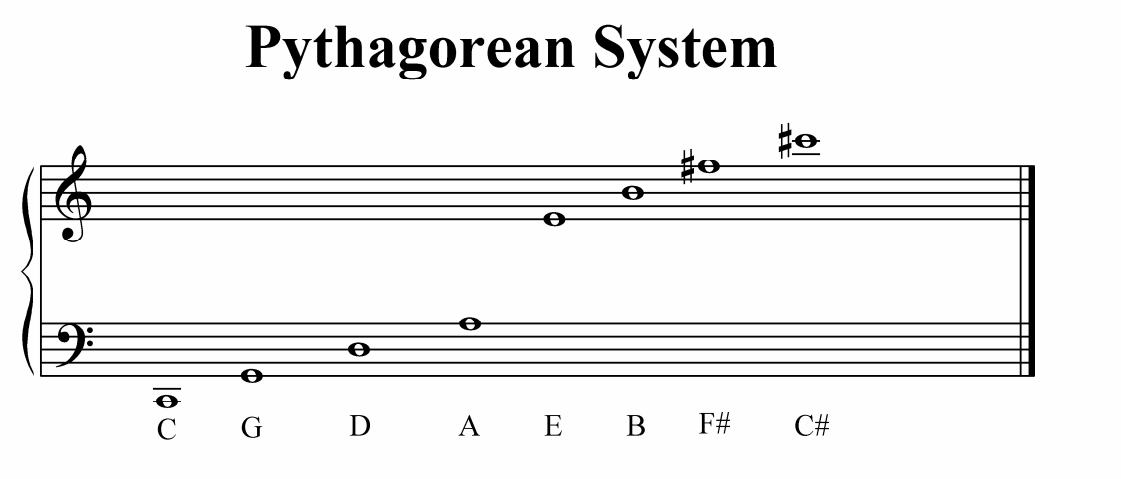
[1] Wikipedia: http://en.wikipedia.org/wiki/Perfect_fifth

This is the naturally occurring arrangement of the notes in the overtone series:

C C G C E G Bb C D E F# G A Bb C C# D D# E

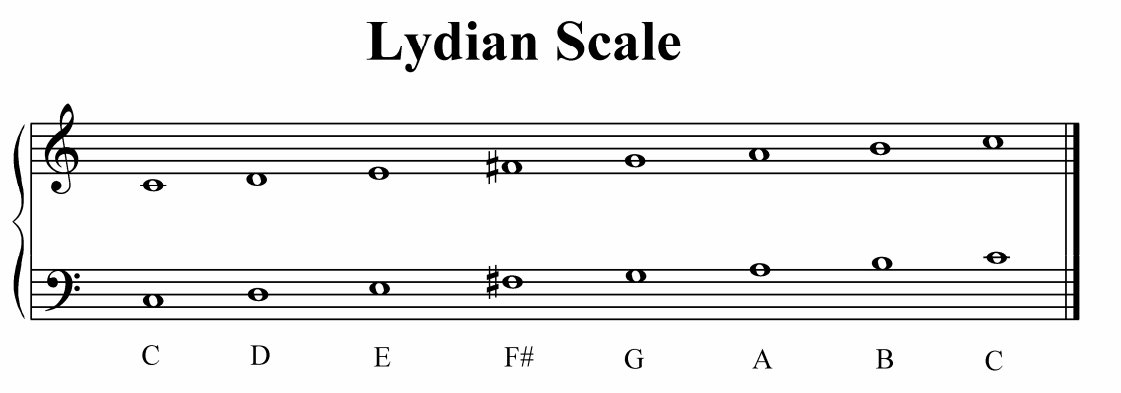
Pythagoras organized and re-arranged them and stacked them in order using the strongest naturally occurring consonant interval, fifths:

C G D A E B F# C#



Note: There does not exist a G# or Ab in the overtone series, so we stop at C#.

If you take Pythagoras stacked fifths and re-arrange the notes in alphabetical order to get a scale, you get: C D E F# G A B omitting the C# (or adding it in between C and D as a passing tone).



This arrangement of notes based on stacked fifths is the LYDIAN Scale, and it is the most organic and harmonically natural sounding scale as it originates with intervals of fifths, the strongest consonant interval. Notice the naturally occurring raised 4th (F#).

This is the basis of the theory of the Lydian Chromatic Concept. The Lydian Chromatic concept is a music theory organizational framework based entirely on the idea of a naturally occurring harmonic system of musical tonality which is derived from the Lydian Scale (1-2-3-#4—5-6-7-1) instead of the commonly-used traditional major scale (1-2-3-4-5-6-7-1). All harmonies are derived from the original Lydian Scale and it is used in place of the traditional major scale. The raised 4^{th} degree (#4) of the Lydian Scale changes the way we hear and think about tonality. We have traditionally been used to thinking of the 4^{th} degree of any scale as a Perfect 4^{th} however the Lydian Scale always assumes the 4^{th} is raised to a #4. This allows perfect harmonic alignment with chords and allows for an understanding and complete organizational framework for Jazz and Modern Harmonic structures.