FAQ's (Frequently Asked Questions) about LucyTuning

Q. What's the point of converting to LucyTuning?

A. To provide a tuning system which is more precise than conventional Western tuning (12 note equal temperament [12tET]), and matches the musical harmonics. This allows musicians greater versatility and control over consonance and dissonance, and provides a wider vocabulary and palette of intervals, harmonies, and pitches.

Q. How accurate is LucyTuning?

A. As accurate as you wish it to be. In practice this is determined by the pitch resolution of your equipment and instruments and/or the acuity of your ears.

Q. How does LucyTuning reconcile the anomalies and contradictions of Just Intonation and other whole number ratio (WNR) tuning systems, which aim for zero beating?

A. LucyTuning uses a better physical and mathematical model for mapping harmonic relationships. This model is a dynamic three dimensional spiral instead of the traditional two dimensional static sine wave, and shows that harmonics beat at low frequencies.

Q. Are any notes tuned the same as 12tET?

A. Yes, All A's are derived from A4=440 Hz., which is the International Standard for tuning. All LucyTuned A's are the same frequency as A's in 12tET. i.e. LucyTuning has an octave ratio of 2. A2 = 110Hz. A3 = 220 Hz. A5 = 880 Hz. etc.

Q. Are all notes other than A's tuned differently?

A. Yes. If harmonically related to A by steps of fifths, (sharp keys) they are flatter than their 12tET equivalents, if related by fourths (flat keys) they are sharper than their 12tET equivalents.

Q. Can I freely modulate and transpose in LucyTuning?

A. Yes. The system works in a spiral instead of a circle as is found in integer ratio 2 equal temperaments. By steps of fourths or fifths you can move to any number of new and unique notes and pitches. Flat keys via fourths and sharp keys via fifths.

Q. Is a note of a particular name always the same pitch?

A. Yes, all notes are of unique pitch and name and may be described by: a) A single letter of the alphabet, between A and G,[eg. E] followed by, b) none or any whole number of sharps or flats [eg. Ebb] and c) An octave number (which as with conventional notation runs from C to C.) [eg. Ebb4].

Q. How is a note sharpened or flattened?

A. By multiplying or dividing the frequency of the note by the ratio of the difference between one Large and one small interval. i.e (L-s). [eg. The intervals Ab to A, and A to A# are both (L-s). The intervals Ab to A#, Abb to A, and A to Ax (##) are all (2L-2s) i.e. (L-s)*2.]

Q. Can I use conventional instruments to play LucyTuning?

A. It depends upon which instruments you wish to play.

a) For fretted instruments you will need to move or replace all frets except the octaves, and retune the open strings. See details on refretting instruments.

b) For keyboard instruments, you will need to retune all notes except the A's, and decide whether each of the notes used are sharp or the adjacent flat. Using many MIDI instruments, this may be achieved in software. See details on LucyTuning and MIDI.

c) All other instruments can play LucyTuning by retuning and subtle fingering and/or embouchure adjustments. Erv Wilson's hexagon marimba/keyboard layout and tubalong layout.

Q. Can LucyTuning be used to play ethnic scales and tunings?

A. Yes, LucyTuning technology can be used to code any scale or tuning system, and to play any scale that you can imagine.See details of Lucy Scalecoding

Q. How many notes per octave does LucyTuning use?

A. As many as you like. In practice, it is easiest to begin with 12, 19, 21, 25, 31 or 53 notes per octave and increase the number of notes as you gain more experience.

Q. How and when was LucyTuning discovered / invented?

A. The earliest written records that have been found which state that all musical scales may be derived from pi (the ratio of the diameter to the circumference of a circle) were by the British horologist John Harrison (1693-1776). The system may have been used in earlier times, yet documentary or archeological evidence is yet to be found. Charles Lucy was the first person in modern times to translate Harrison's ideas, computer model the mathematics, and design musical instruments to play it.

Q. Is the mathematics and physics of this system entirely understood?

A. Much work has been done on the mathematics. The models have been found to be mathematically consistent and to provide an infinite number of notes since they are derived from the transcendental number pi. Many physical experiments have been performed and the system appears to provide a better model for mapping musical harmonics than any other that has been found to date. Further work is continuing on the implications for theories in fundamental mechanics.

Q. How does LucyTuning relate to tunings derived from the Fibonacci series (phi) and e?

A. Both values may be shown to be mathematically related to [pi.](#)

Q. Why does LucyTuning work so well and sound so correct?

A. The system is related to pi, and it seems that sound waves move in spherical and rotating dynamic patterns.

Q. How can I try out LucyTuning on my instruments?

A. [EMail to Charles Lucy from here.](#) (lucy@harmonics.com) asking for tuning codes or fret positions (giving the nut to bridge distance for your instrument).

Q. Are recordings of LucyTuned music readily available?

A. Yes, many recordings by Arc Angel use LucyTuning: as do [LucyTuned Lullabies](#)

Q. What are the psycho-acoustic effects on listeners?

A. As using LucyTuning harmoniously generates [low frequency beating](#) in the Alpha and sub Alpha ranges, hypnotic and trance states have been observed and reported by users.

Q. Are MIDI files and keyboard fingering the same in LucyTuning?

A. Yes, keyboard players can retune their instruments to play the system, and maintain the same fingering. [For details on keyboard note assignment](#)

Q. Does LucyTuning match the rules of music theory?

A. Yes, except that it is derived from Large(L) and small(s) intervals instead of Wholetones and semitones of 12tET. It is a diatonic, negative [meantone](#) temperament. LucyTuning can map any combination and permutation of Large and small intervals that you can imagine for all Western scales and all known "ethnic" scales, plus an infinity of new possibilities.

Q. What are Large and small intervals?

A. On a conventional keyboard you can consider the Large interval as being the interval between two white notes separated by a black note. [A-B, C-D, D-E, F-G, and G-A]. The ratio is the two pi root of 2. i.e $1200/(2*pi)$ = approx 191 cents. The small interval as the interval between adjacent white notes. [B-C, and E-F.] $(1200-((1200/2*pi)*5))/2$ = approx 122½ cents. If you consider a complete circle to be one octave, the Large interval is the radian angle i.e. $360/(2*pi)$ degrees. This is the angle of divergence between the fourths and fifths, or the flat and sharp directions of the spiral. See [LucyTuning homepage](#) for associated links

Q. How many Large and small intervals are there in an octave?

A. Five Large plus two small intervals are one octave.

Q. How can I describe the major scale in LucyTuning?

A. L-L-s-L-L-L-s. Eg. C-D-E-F-G-A-B-C. Scale coding is 6/0/2

(6 steps of fourths and fifths/no missing steps/ note 2 is the tonic)

Eg. for the string of IV-I-V-II-VI-III-VII (in the key of C this is F-C-G-D-A-E-B ascending from C).

See details of [Lucy ScaleCoding](#)

Q. Have instruments of more than 12 notes per octave been designed and manufactured to play LucyTuning?

A. Yes, of many sorts and designs. [LucyTuning homepage for more details](#)

Q. Does LucyTuning also provide a new way of mapping rhythm?

A. Yes, by using Long(L) and short(s) durations.

Q. How is pitch related to color?

A. By octaving up frequencies to wavelengths at the speed of light and mapping wavelengths to time and color. [Notes on Pitch to Colour ideas](#)

Q. Can LucyTuning be played with 12tET fixed interval instruments?

A. Yes, although the 12tET instruments will sound "out of tune".

A. Yes, of many sorts and designs. LucyTuning homepage for more details

Q. Does LucyTuning also provide a new way of mapping rhythm?

A. Yes, by using Long(L) and short(s) durations.