

### What is Human Music?

- What ***is*** human music??? Answer(s) to this question are profound....
  - An aesthetically pleasing ***sequence*** of tones? ***Why*** are they aesthetically pleasing?
    - Anthropocentric – humans (*n.b* we are ***social*** creatures!) are primarily most interested in the sounds that we humans make. Because of the way our 1-D vocal chords vibrate (obeys the 1-D wave equation), the human voice is ***rich*** in harmonic overtones, related by ***integer*** multiples of the frequency of the fundamental (lowest frequency):  

$$f_n = nf_1, n = \text{integer} = 1, 2, 3, 4, 5 \dots$$
 ← Has ***profound*** implications for human music...
    - ***Question:*** What was the ***first*** human musical instrument?  
***Answer:*** The human voice!
    - It is ***not*** an accident/random coincidence that the musical instruments we humans have developed over the millennia artistically mimic/emulate the human voice (some to greater extent than others) – thus our musical instruments ***also*** have overtone structures of  $f_n = nf_1$  as opposed to *e.g.* completely arbitrary or no relation.  
 (*n.b.* percussion instruments & the beat/tempo/rhythms of music emulate the ***internal rhythms*** of humans – *e.g.* our heart beat, & also play on our internal sense of the ***rate*** of passage of time...)
    - The musical scale(s), chords and chord progressions that we humans have developed for our music reflect our anthropocentric interest/enjoyment in hearing complex sounds that have human, voice-like  $f_n = nf_1$  harmonic structure.
  - ***Why*** is music pleasurable to humans?
    - Can trace music in human society back to stone age/paeolithic era/prehistoric times (*i.e.* ~ 30,000-40,000 years ago). Does it go back even earlier???  
 Homo sapiens as distinct primate species is ~ 200,000 years old.
    - Music ***is*** an intimate part of human culture, apparently from way back...
    - Music ***is*** of fundamental importance to humans – ***Why?***
      - Important in/for human evolution? To what degree? ***Why? How?***
      - Have you ever met anyone who ***hates*** music? {Yes – problems with their brain...}
  - Music has been shown to ***stimulate*** the human brain, in many ways...
    - Auditory signal processing center(s) in our brain also connected to emotional centers.
    - Participation/listening to music produces “feel-good” brain chemicals – dopamine, serotonin, oxyocin, reduces stress hormones (*e.g.* cortisol), boosts immune system!
    - Choirs singing together ***synchronizes*** heartbeats (via vagus nerve excitation)!
    - Music ***facilitates*** brain development of young children and in ***learning***. ***Why? How?***
    - Memory of music is different from that of normal “everyday” memory – very strong!!
      - Can recall/“play” entire songs/albums back in one’s head. ***How/why?***
      - If musical memory is so strong,  $\Rightarrow$  music ***must*** be important to us! ***Why/how?***  
 Written human language only ~ 6000-7000 years old (coincides with development of agrarian societies – recording “financial” transactions) worldly wisdom before that (hunter-gatherer societies) only passed down orally – spoken word – but perhaps also in songs?