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### Abstract

Music technology is being advanced in many ways; these include measuring acoustic resonant patterns within environments and implementing biofeedback methods through specifically designed electro-acoustic music. The question must be asked what effect does specifically designed environments have on given biological subjects. Computers are advancing rapidly in the 21st Century, but what researchers are finding is that the ancient Egyptians and Mayans may have had advanced knowledge of acoustics and biofeedback through certain 'hardware' stone devices "geo-physical computers" where the input and output results in access of key 'states' of entrainment.

### Introduction

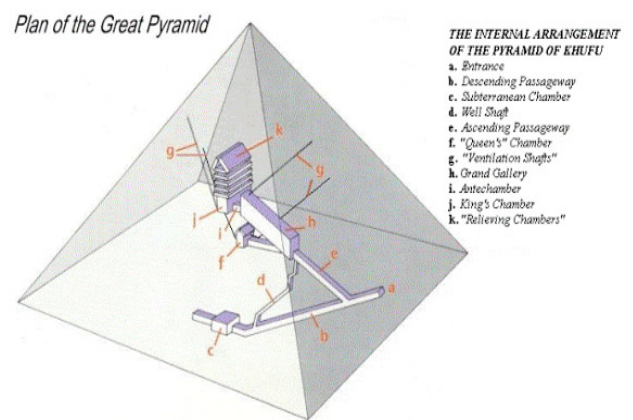
Resonance can be considered the foe or friend of sound engineers, but within the context of cognitive musicology, it can become a powerful force when the right conditions come together. It is when certain frequencies and beat-states (where two sounds that are close together in frequency, are interpreted by the human brain to create a third sound which sound like beats), are set up in sympathetic resonance with a given subject, that causes the body-mind state to enter altered states of consciousness. (Stefan, 1998) Certain frequencies and music can entrain the body-mind state when different forms of biofeedback are employed. (Brown, 1974). The Great pyramid, and the Mayan pyramid - Chichen Itza, are considered special places within the wisdom traditions of ancient cultures. (Handcock, 1998). There is a deep interconnectedness that unites these cultures with these structures, this can be best illustrated through the use of music, vibrations and acoustics. It has now been found that they contain elaborate resonant patterns and thus is argued that these sites were constructed so the initiate of visitor to the site, through the use of music and vibrations, could experience entrainment of the mind-body state. (Scarre, 1989)

### Great Pyramid

Let us first explore an overview of the complex acoustic systems that have been discovered in ancient temples; that have been documented by scientists worldwide. First we look at the Great pyramid which is situated in Giza, as a gigantic monument in stone. The main room of this study will be the Kings Chamber situated in the

## Ancient Geo-physical Computers, Advanced Acoustic Patterns and Biofeedback

5th socket of the Great pyramid. It is a solid granite room with a coffer of solid red granite and air shafts or now commonly recognised as star shafts. (Handcock, 1998).



*Figure 1. Detailed interior view of the Great Pyramid of Giza (Pyramid of Khufu) (1)*

What has been found is detailed acoustical patterns that have an intimate connection with the surrounding environment. Sonic engineers that have done research in this chamber, found that the length of the kings coffer, is shaped according to the size of the average human. When the acoustic testing was done, it was found that it resonated to concert A440. (This is the concert A, associated with the current western musical tuning tradition), (Howard, 2004). Further study also reveals that the chamber resonates to the frequency of F-sharp, this has been examined by Paul Horn a famous flutist and Tom Danley a NASA sound engineer.

The researcher for the Academy For Future Science; Tom Danley, found there were intervals of 90cps 180 cps 270 Cps 360cps. Where  $87.3 = F\text{-sharp}$   $174.6 = F\text{-sharp}$   $261.6 = C\text{-sharp}$   $369.8 = F\text{-sharp}$ . (Hurtak, 1998). More over Tom Danley also found that the star shafts also operate as Helmholtz resonators; a Helmholtz resonator can be likened to air blown of the top of a bottle. Let us examine what Tom Danley says about the Helmholtz effect and other presents frequencies:

What I saw were the normal the room mode resonances from absolutely rigid stone room, but also what I found were a number of low frequency components that were present without the test signal,

which, I suspect, were Helmholtz resonances caused by the wind blowing across the entry tunnel.....One thing that was interesting - over a number of octaves, some of the resonant frequencies fell into the pattern that makes an F-sharp chord. (Danley, 2002).

What was measured in the Helmholtz resonator effect was a number of low frequencies in-conjunction with the presence of the F sharp and Concert A in the greater mapping of the chamber. These frequencies are significant because they represent connections with the foundation of the western musical system and even ancient musical modes interconnecting with the greater life space. ( James, 1993). It is some of these dynamic qualities in relationship to acoustics; that include harmonic resonance, dynamic range and loudness, which could facilitate the entrainment of the body-mind state. What is important to under-stand here is that, there must have been a very advanced engineering that took place, which also only been found with recent advancements in acoustical testing. These frequency spectra are also found in other ancient stone structures, as examined in the next example.

## Mayan Pyramid

The next study is the Mayan pyramid of Chichen Itza – Kulkulan, which likewise contains very interesting acoustic patterns. This pyramid is located in the region of the gulf of Mexico and is considered one of the main ceremonial centres of the Mayan culture. (The Castle, 2004).If we ascend up the stair ramp to an interior platform near the top of the structure, there is an ante-chamber that is the famous jaguar throne, this is where there is found a zone of resonance.

There are also carvings of Quetzalcoatl, which are also important in the outer physical and acoustic structure. It has also been found like the Kings chamber that Kulkulan, contains a fundamental resonance frequency of F-sharp at 380hz, and F- sharp two octaves higher at 1550hz.(Hurtak, 2003).



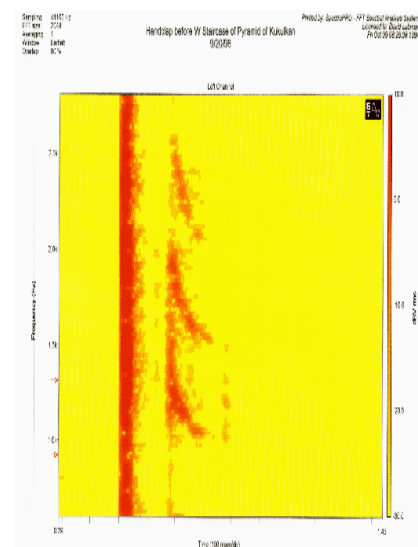
**Figure 2.** Pyramid of Kulkulan – Mexico (2)

These frequencies would allow the music vibrations to superimpose one upon the other, ending in a total immersion by a singer in the site using the F-sharp chord or scale. Kulkulan not only contains complex musical engineering but also other outer vibrations. Let

us understand first who Quetzalcoatl is and why he was so important to the Mayan culture as Daivd Lumbann explains:

“A Mayan glyph from the Dresden Codex makes the connection between the pyramid of Kulkulkan and the Quetzal bird. This glyph shows Kulkulkan, the "sovereign plumed serpent" with a gigantic Quetzal behind him. We argue that the Quetzal bird represents the spirit of the Maya. We also argue that spirits often speak in echoes. It seems most appropriate that the spirit echo of the Pyramid of Kulkulkan would speak in the echo-voice of the Quetzal.”(Lubman, 2004).

We find Queztacoatl appearing in the spring equinox of March 21st where the steps reveal the shadow pattern of an undulating pattern which is the body of the snake, cumulating in the face form of the head of Quetzalcoatl at the base. It was found that when you clap your hands at the base of Kulkulkan, there is a sound reverberation that comes back in the form of a Quetzal chirp; the native bird of the area. When Lubman had this sound frequency analysed with the actual real Quetzal bird sound, there was found to be a very close match in the frequency analysis. What does this mean? John Perritano states in his article it's a “chirping pyramid”; “This might be the world's oldest known sound recording.” (Perritano, 1999).



**Figure 3.** Sonogram of Handclap and Chirped Echo (3)

It seems to be that the ancients gave the pyramid the ability to 'sing'. It seems that there was advanced musical system not unlike the Great Pyramid. So the question must be asked, why do all of these 'sacred sites' of antiquity seem to put an importance on sound, art and music? We must first look into the science of biofeedback to explain the process to understand what the initiates would have practiced at these sites, to connect the music with the body and mind entrainment.

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## Biofeedback

We can understand biofeedback as “a method of controlling a system by reinserting into it the results of its past performance.” (Karlins, 1974). Therefore entrainment of the body and mind can be achieved, when we consciously learn and evolve beyond the old habits of the fight or flight syndrome; which is where our body reacts according to previous pre-conditioning. Biofeedback science can also be measured by the human subject(s) in relationship to rise or fall in skin temperature or slight changes that manifest in breathing patterns among many others symptoms. (Brown, 1974). It is taught that one is to become sensitised to these minute changes in the bodies many systems that allows the use of active control over the different states of consciousness. These ancient resonant sites are considered places of praise, worship and initiation. They are not considered sites or rooms one could enter any time of the day. This concept could be best equated with the Jewish concept of the Holy of Holies, where in inner most sanctuary of the temple, was reserved for special days and very sacred initiations/occasions. What has been shown is that the visitor or initiate to the site, would enter a space where a holistic process would take place. The sites were usually very secluded and would cause sensory deprivation. Thus through the holistic use music-chanting, and use of biofeedback methods, one could become fully immersed and begin to enter into altered states of consciousness.(Bonny, 1997). What is not known is how across different parts of the world the ancients all had a similar form of consciousness technology.

## Conclusions

With the finding of these advanced acoustical patterns through modern science we are beginning to see that the ancients did have an advanced form of consciousness technology and even incorporated into stone. As ancient geo-physical computers are giving up there mysteries, the ancients knew the correct frequencies and biofeedback techniques so the visitor or initiate to the site could really experience altered states of consciousness, so the old habits of the “human psyche” could be broken and re-patterned. Thus it is only through the unity of the sciences and arts that we can begin to decode these mysteries.

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## Images

1. Image Great Pyramid interior. 2006.  
[http://guardians.net/articles/images/Plan\\_Great\\_Pyramid.jpg](http://guardians.net/articles/images/Plan_Great_Pyramid.jpg).
2. El Castillo Chitzen Itza. 2006.  
[http://sk.wikipedia.org/wiki/Obrázok:El\\_Castillo\\_Chitzen\\_Itza.jpg](http://sk.wikipedia.org/wiki/Obrázok:El_Castillo_Chitzen_Itza.jpg).
3. Sonogram of Handclap and Chirped Echo. 2006.  
<http://www.ocasa.org/MayanPyramid2.htm>.  
The sonogram plots frequency (vertical axis) against time (horizontal axis). Loud sounds show in red; soft sounds show as yellow. The vertical red line is the spectrum of a handclap made by an observer standing about 10 meters in front of the pyramid staircase. The chirped echo is the set of three curved lines to the right of the handclap.