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Creation
Element 1
Research Proposal

Musical interpretations of 7 wonders from our cosmos

Abstract

The focus of this study is on musical interpretations of places of beauty, scientific interest and anthropology. From both our planet and the space beyond it. Considering both artistic conception and emotional/psychological interpretation. Whilst combining natural elements with contemporary instrumentation.

There are two key questions that underpin this project;

How do you effectively make a musical interpretation from a place of beauty, scientific or anthropological interest? What are the key areas to address when conveying this to the listener?

The interpretive interrelation of colour, emotion and shapes with sound and musical keys/modes will be studied. Along with our evolution as a species in context of our relationship with music, instruments and our surroundings.

Methodology will mainly be qualitative. Research will be using both interpretive studies, primary musical sources and interpretive musical sources.

The resulting body of work will be created using analogue and digital synthesizers, electric bass and guitar, acoustic and sampled drums, audio samples and vocal recording. A modern digital audio workstation will be employed to mix and master the project using virtual effects and utilities. The final audio will consist of 7 songs and be approximately 30 minutes in length. This will be supported with a five thousand word reflective essay.

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Aims and objectives

The aim of this project is to study the language of musical interpretation and to look at how emotions and impressions can be translated into musical form.

There are two areas of enquiry (see abstract).

The measurable objectives will involve feedback from a sample/control group on the subjects of study. This will be done in three stages. Before the start, to help define a brief for each subject. During the process, using reflective analysis from all project participants. And at the end, using the original sample group and a control group. This final stage will help to quantify if the brief can be correctly interpreted.

For the purposes of this study 7 subjects have been chosen; Mars, Caves, The Sea, The Large Hadron Collider at CERN, The Pleiadian star constellation, The Huli tribe in Papua New Guinea and the Great Pyramids of Egypt.

These subjects will be linked by research into how sound is related to colour and emotions, How emotions link with keys and modes, and how sound is linked with shape.

Case studies will be examined for each subject. Where possible the context has also been defined a little more specifically. For example incorporating instruments played by the sea itself, or instruments made of stone for caves.

A Key objective is to incorporate existing musical genres relative to each theme whilst still keeping the subject matter identifiable. Plus integrating a unique audio interpretation.

This will be done by careful analysis of the collected research data.

It is hoped that a model for further studies could be developed from this.

Others taking similar studies could then expand their interpretation by looking at this research.

Literature Review

There are two main questions that will form the backbone of these musical interpretations (see abstract). These questions can be explored by looking at the methods of translation and the areas they are focusing on.

To aid in this translation we can use the concept of equivalent circuits.

Where an arrangement of simple electrical components that is electrically equivalent to a complex circuit and is used to simplify circuit analysis (dictionary.com, 2020).

In this case translating physical form to musical form. This will need a variety of approaches

due to the vast subject matter. Some will be more subjective than others. Yet when combined should begin to form a more cohesive interpretation.

Taking it back to basics everything comes from stars! They take a fuel and convert it to something else. Hydrogen is formed into helium, and helium is built into carbon, nitrogen and oxygen, iron and sulfur. Everything we're made of (Worrall, 2015). From these are drawn all the components for everything we see.

There will always be a way to create analogies from things that are so intrinsically related. The question here is how to define them.

So what do sound and light have in common?

Sound and light both exhibit oscillatory wavelike characteristics with various frequencies, wavelengths, and amplitudes (Hollander, 2014).

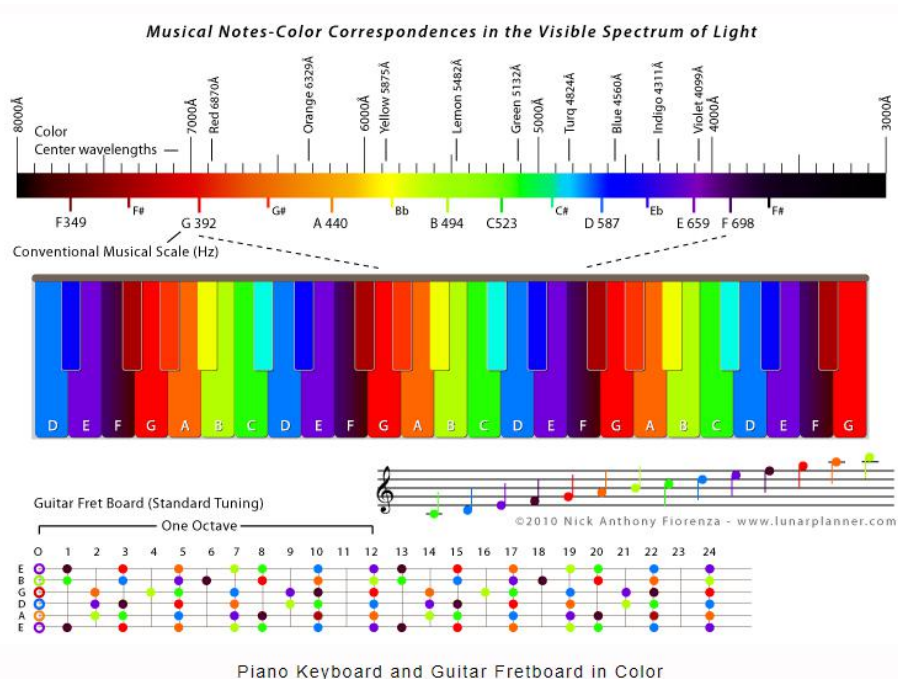
It follows that there must be a way of interpreting colour to music.

One such study was undertaken by Nick Anthony Fiorenza as part of his work on planetary harmonics. He discovered that the octave of visible light extending from the colour red to the colour violet is forty octaves higher than the middle audio octave. Light is measured by the length of a wave (space) rather than how many waves are occurring in a second.

To convert a frequency to wavelength, we divide the "speed of light" by the frequency.

Conversely, to convert a wavelength to frequency, we divide the "speed of light" by the wavelength (Fiorenza, 2019).

From this he calculated a chart using equal temperament using the middle octave of a piano.



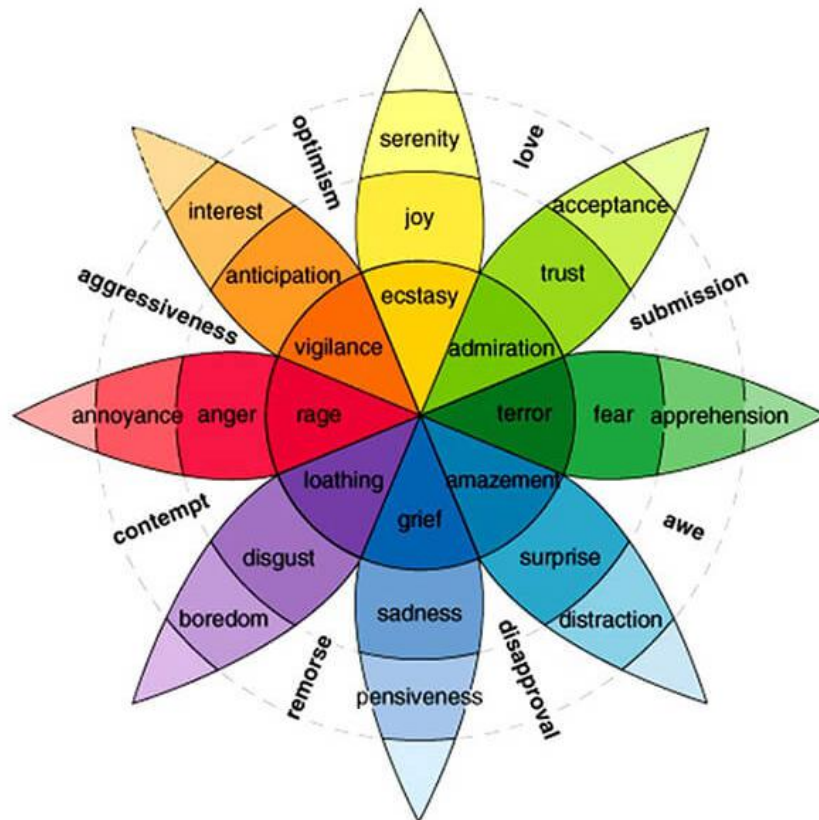
Note: Translating the colors of visible light to a computer screen or to printed document is an approximation. Keep this in mind if you are using or printing the above chart for your personal use.

Equal Temperament, Standard Pitch A=440 Hz			
Middle Audio	+40 Octaves	Wavelength in Ångströms	
F ₄ 349.229 Hz	(+39 Octaves)	7805.8002 Å	(near IFR)
F# 369.995 Hz	406813254963167.2 Hz (+39)	7367.6984 Å	(deep red)
G ₄ 391.996 Hz	431004160041680.9 Hz (+40)	6954.1727 Å	(red)
G# 415.305 Hz	456632676573511.7 Hz	6563.8697 Å	(red-orange)
A ₄ 440.000 Hz	483785116221440 Hz	6195.4725 Å	(orange)
A# 466.164 Hz	512552738450571.2 Hz	5847.7443 Å	(yellow)
B ₄ 493.883 Hz	543030101260894.2 Hz	5519.5419 Å	(lemon)
C ₅ 523.251 Hz	575044581326848 Hz	5212.2522 Å	(green)
C# 554.365 Hz	609530763532042.2 Hz	4917.3521 Å	(green-turquoise)
D ₅ 587.330 Hz	645776164341678.1 Hz	4641.3565 Å	(blue)
D# 622.254 Hz	684175508430127.1 Hz	4380.8604 Å	(blue-indigo)
E ₅ 659.255 Hz	724858538169466.9 Hz	4134.9825 Å	(violet)
F ₅ 698.457 Hz	767961593001541.6 Hz	3902.9001 Å	(deep violet)
F# 739.989 Hz	813626509926334.5 Hz (+40)	3683.8492 Å	(near UV)

(Diagram from Fiorenza, 2019)

But how does this relate to emotions?.

Its not hard to describe red as angry and yellow as joy. But colours and emotions can be more subtle.. This diagram from H Jarad in his article on musical key characteristics and emotions describes the wide range of human emotions and their connection to many shades of colour.



Comprehending the complexities of combined emotions

(Jarad, 2020)

The association of musical keys with specific emotional and their qualitative characteristics was fairly common prior to the 20th century. It was part of the shared cultural experience of those who made, performed and listened to music (wmich.edu, 2020).

A major key is normally a happy key while a minor is more serious. With each minor and major key having its own emotional flavour. For example D major is Triumphant while D minor is more melancholy (Jarad, 2020).

Similarly Modes have their own emotional context. For example Locrian can be very dark and unstable while Dorian can be hip and sophisticated (Ethan, 2020). And so in this way it is possible to translate colours and emotions into musical keys and modes.

Some examples are listed in the following chart by Valverde on his blog on how to project emotions through music.

MODE	DEGREE	NOTES	EMOTIONS
Ionian (major)	I	CDEFGAB	Happy
Dorian	II	DEFGABC	Sad but hopeful
Phrygian	III	EFGABCD	Dark
Lydian	IV	FGABCDE	Uplifting and quirky
Mixolydian	V	GABCDEF	Happy but serious
Aeolian (minor)	VI	ABCDEFG	Sad
Locrian	VII	BCDEFGA	Evil

The different modes: name, degree of the scale, notes (using C major as an example) and the related emotions

(R Valverde, 2020)

What about the relationship between shape and music?

In translation from simple geometry to music you could think of a dot as a musical 'stab'. A line as linear piece of music with a start, middle and end. A circle as a loop of music that works in an ever repeating cycle. Or a square with four distinct styles that change abruptly in a repeating cycle.

Dmitri Tymoczko at Princeton University has furthered this process by translating music to a geometrical language of shapes. Based on the mathematics entangled in the structure of music. Their theory is that musical operations, such as transpositions, can be expressed as symmetries of n - dimensional space (M West, 2008). In other words the chords, transpositions and other musical elements can be translated into multi dimensional geometric shapes.

Music has also been translated in new ways from both hard science and its workplace.

A sound artist called Bill Fontana joined CERN as an artist in residence during the summer of 2013. His aim was to create audio landscapes from recordings of machinery in the laboratories and at the Large Hadron Collider (LHC). He scoured the laboratory for clicks, whirrs, whistles and the other noises that make up the CERN soundscape. He also tuned into the proton source using audio equipment and accelerometers and then broadcast the sounds of the machine (Koek, 2013).

An approach allowing musicians to create musical interpretations from the data collected at LHC has been developed by the institute itself in collaboration with other universities. The process is called sonification.

The sonification engine takes data from the collision event, scales and shifts the data (to ensure that the output is in the audible frequency range) and maps it to different musical

scales. From there, a midi stream triggers sound samples according to the geometry and energy of the event properties (Quantizer, 2018).

This data is then used by musicians of various genres to create cohesive tracks. Offering an output from hard scientific data to the general public through creations in techno, house and experimental music. Does this go far enough to make truly relatable music or merely interesting sound-scapes? Something this study aims to embrace.

Even for early man, sound played a major role as a form of communication and emotional escapism. Investigations of prehistoric, megalithic structures have identified acoustic resonances at frequencies particularly near 110Hz..representing pitches in the human vocal range..findings suggest that the acoustic properties of ancient structures may influence human brain function (Cook, Pajot, Lauchter, 2008).

There is evidence that rock structures were used for percussive resonance in a variety of ancient sites around the world. For example in the southern Indian area of Sanganakallu-Kupgal there are boulders with groove like etchings in them. When struck with small granite rocks, these impressions emit deep, "gong-like notes". (Aluta, 2007) The music of the ancients can be rediscovered in a new light by combining these sounds with new designs. Indeed a German Professor named Klaus Fessmann defined his interest in "Cave language" with a unique sound created by carving slats at key points into large resonant stones (Fessmann 2020). Once polished and rubbed in a circular rhythmic motion the resonant frequency could be excited in a similar to a Tibetan singing bowl. He describes the sound as the music of the earth, the sound-shaped memory of this matter (Fessmann 2020).

There is still living evidence of the importance of ancient music in areas like Papua New Guinea. Home to thousands of cultural groups who hold a yearly song meeting to display their music, dance and costumes. One stand out group are The Huli. Real show masters: they wear their special wigs, and decorate their faces with yellow and red paint. When it's their turn to present their tribe, they leave a stunning impression behind. (Tribes.world, 2019). The singing and music of this tribe is extremely unique and is often recorded by visiting tourists. It would be interesting to integrate these ancient tribal elements with a modern musical interpretation.

The importance of music and dance in ancient culture was also very evident with early Egyptians in the area of the Great Pyramids of Giza. The most important musicians were from the temple, followed by those of the ruling family. The musicians would entertain at celebrations and feasts (Shaaban, 2017). There are musical instruments from this time featured in artifacts spread all over the world (such as lyres and the ney (a type of flute)). It's not fully clear what this music would have sounded like. Although an indication came in May 2011 when a singer named Stellar recorded a number of impulse responses for Altiverb from the King's chamber of the great Pyramid of Giza. Several remarkable resonances can be heard that are connected to 432 Hz, along with a 13 second reverb (Arjen, 2012).

Man's current renewed interest in space exploration puts Mars well within the sights of many future missions. This enigmatic red rock has long inspired musical interpretation. Most famously Mars the bringer of War by Holst. Yet the almost eerie wind ravaged desert revealed in recent NASA Rover photos make Mars look more like a ghost world. The recent

Insight mission has captured the first recordings of Martian wind and thunderstorms. A modern musical interpretation considering this new data would hopefully evolve traditional cultural views on Mars.

Space is vast and places we currently only dream of visiting spark the imagination. One such constellation is The Pleiades. Mentioned as early as 2350BC in Chinese annals, were called the seven sisters in Greek mythology (Maia, Alcyone, Asterope, Celaeno, Taygete, Electra, and Merope (L Riley)).

There have been many modern musical works on the Pleiades. Notably by Eric Ešenvalds. His classical interpretation premiered at the Grant Park Music Festival Chicago in 2018. He stated that the star cluster has triggered the imagination of people for centuries and made an excellent subject (Ešenvalds, 2018).

A more modern sounding interpretation from Professor Plumb is brought to life in an epic, animated space odyssey. As a blazing rock and roll instrumental (A Cabrera, 2019).

Using a technique that calculates the brightness of stars (published by The Royal Astronomical Society) 6 of the brightest stars in the constellation were transformed into sound and had their pitch increased by 25 octaves. Due to their complex frequencies (slowly pulsating binary stars!). They produced rich harmonic tones perceived as single notes (White, 2020). Integrating this data based sound into a cohesive musical piece could offer new musical perspectives.

From a sea of stars to our own oceans such vast spaces stir emotions.

But what about the sea itself as a player of instruments?

There are three very unique organs built into jetties and piers around the world. One in Zagreb, Croatia, another in San Francisco and a good effort in Blackpool!

In all three sound is created by the impact of waves against the pipe ends combined with the subsequent movement of the water in and out of the pipes (Explatorium, 2020). The Zagreb organ has the addition of a large resonating chamber which helps to amplify sound up the pipes.

The sounds are almost ethereal in nature and at the mercy of the waves and tides.

These unique sea organs could be placed in a contemporary piece of music to show the seas musical skill in a new light!

By combining the research for these subjects with audio examples and interpretation it is hoped that some new perspectives can result.

Perhaps the working method in this study could be applied to other areas within our physical, cosmic and anthropological landscape.

Elements could be adapted for the Sync market and sample packs created from the resulting productions. This could also act as starting points in similar projects.

Methodology

In the course of gathering reference literature lots of audio extracts will be compiled.

Some will be for reference while others will contain usable audio samples. These will form custom audio packs for each track. Notes regarding the source of the material will be kept for copyright reasons should the final tracks be released commercially.

This approach will also enable audio data from the source literature to directly shape the feel of the tracks. Plus help to keep them on brief.

Before starting production a questionnaire will be sent to a sample group of people (Appendix 1). They will be asked to think of three descriptives that come to mind when they think of the subject for each song. This can be a phrase, a single word, a colour, an emotion or an image. This information will be collated with the reference material and sent to all involved with the project. This will help to build the brief and act as a reference guide through the creation process. The data can also be analysed and used to define the relative key, mode and tempo for each interpretation.

The project will include a small team of musicians (Appendix 2). Working remotely using file sharing and a group forum. The aim is that group input and discussion will create a more accurate representation of the brief data.

To aid in this process reflective analysis will take place after each song so that lessons can be evaluated and a refined action plan put into place for the development of the next song (Appendix 3).

The same sample group that received the first questionnaire will receive a second one upon completion of the songs. Along with a control group who have not previously been involved. They will not be told the title or subject of each song but will be asked to give their impression of the subject matter and any other reflections. (Appendix 4).

This will allow us to assess how closely the songs relate to the subject matter and so how close to the brief they are.

Time-line

Qualitative questionnaire 11th - 18th September

Track production and reflective analysis 18th September - 13th November (around 8 days per track).

Mastering 14th November - 19th November

Qualitative follow up questionnaire 20th November - 1st December

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Appendix

Appendix 1. Initial questionnaire

Hey Folks - Could you give me a hand gathering data for my final masters degree project? Its musical interpretations from places of beauty, scientific or anthropological interest.

Write three descriptives that come to mind when thinking of each listed subject.

This can be a phrase, a single word, a colour an emotion or an image.

- 1.) Mars
- 2.) Caves
- 3.) The great Pyramid in Egypt
- 4.) The Sea
- 5.) Tribes in Papa New Guinea
- 6.) The Pleiadian star constellation
- 7.) The Large Hadron Collider at CERN in Switzerland (The big circular tube running 27 KM underground where they smash protons together)...Thank you!!

Appendix 2. Project personnel

Kevin J McKenna - Concept, Research, Project management, Music Score, Keyboards, FX, Drum programming, Production, Mixing, Mastering.

David Akahum - Guitar and Bass

Andy Gordon - Guitar

Troi Parker-Roth - Vocals

Joel WinterFlood - Vocals

Catherine Barry - Vocals

David Pankhurst - Live Drums

Jamie Tassel - Additional percussion programming support

Appendix 3. Project personnel reflective analysis

(To be completed at the end of each track before commencing on the next)

- 1.) What was your involvement with the last track completed?
- 2.) How did you find the process? Was it interesting? Did you find it challenging?
- 3.) How did this change your understanding of the track and the project as a whole?
- 4.) How else could you have approached the track to make things easier?
- 5.) How would you approach this differently in future?
- 6.) Do you have any suggestions for the group as to how we can improve things based on this knowledge?

Appendix 4. Final questionnaire

Hey Folks - Please listen to each track and write three descriptives that come to mind when thinking of each listed subject. This can be a phrase, a single word, a colour an emotion or an image.

If you have any other reflections about the track then please feel free to write that down also.

Many Thanks for your valuable feedback.

Suggested Reading

Trevor Cox (2015) *Sonic Wonderland - A Scientific Odyssey Of Sound*
(Vintage Books)

Paul Devereux (2001) *Stoneage Soundtracks - The acoustic archaeology of ancient sites*
(Vega)