Experimental sound (MU60011E)

Assessment 2 written work

'Chordal colour'

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Project title

Chordal colour

Executive Summary

This projects intention was to create music from a collaboration of 'colourful people', with the belief that each persons unique push or pull would direct and influence the route the composition went in.

The work that has been created for this project are audio tracks available on the supplied audio CD. Through out project peoples perceptive correlations between colour and sound were sought and utilised to eventually create musical compositions based upon the idea of a 'colour scale'; mapping musical notes to colours.

In order do this; twenty six individuals were surveyed to try obtain their unique perspectives on both their aesthetic and musical sensibilities. The questions in the survey were constructed to reveal any correlations between music and colour and to unearth people that had crosstalk between these sensibilities.

Of the people that partook in the survey, six had this mentioned crosstalk and the resulting tracks utilise their answers in various permutations to create the audio compositions.

The compositions themselves were created from data gathered through the survey; peoples favourite progressions, scales and notes are examined along with their varying music tastes to choose instrumentation and to decide the overall aim of each composition.

These aims varied in each composition as they were created from interesting correlations in the survey results obtained from each participant and would vary dependant on the survey data. Each track is composed from the pairing two participants.

Track one aims to show two participants dependancy on the I-IV-V progression and is an attempt to show their typical listening music in a different light. This is achieved by utilising chord progressions that contain the least amount of either the I, IV or V chords and keeping familiar instrumentation.

Track two aims to show music created with a common thought process; utilising participants that had similar sensibilities to achieve a musical flow.

Track three aims to show music created through a constant struggle for dominance between clashing personalities. This is achieved by pairing participants with opposite sensibilities and tastes in music to achieve this effect.

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Introduction

The project; 'Chordal Colour' was based from the study of mapping colours to musical notes; colour music, a subject that gained popularity from the 18th century onwards. It is a subject that is still alive today. *'People still want to believe in this connection and I want people to experience it in my art.' (Zieverink 2007)* The projects initial aim was to find perceptive correlations between colour and sound on a broad scale focusing on demographics, though this was narrowed down to the individual scale because the scope that peoples sensibilities could vary. The utilisation of participant data also differs from the original proposal; where in the proposal I intended to use data to prove a point, I used it instead to influence and direct the compositions and their aims. I felt these changes were required to overcome problems presented by the data and was necessary for the project to properly develop.

The compositions in this project are created from the survey data and fluctuate between musical styles; accommodating the participants unique tastes and sensibilities within it. Each composition was created through the use of MIDI sequencing.

Much research has gone into the different proposed theories of 'colour scales' with many hard to find sources such as a copy of Newton's 1974 book 'Optiks' are available on the research folder disk

Another aspect to the research was learning the music theory used to underlie the composition structure and was also used extensively to create the survey. A lot of time was spent observing survey data to find different mindsets that are representative of the connections between colour and sound; this was all done through the use of music theory.

This is an experimental project because of its exploratory nature. It utilises the unique perspectives of individuals to create unconventional compositions.

Assignment brief

The assignment brief is to create audio of an experimental nature using unconventional techniques and ideas. In particular this project uses takes an approach to composition and instrumentation based upon the unconventional composition process of using data and thus adheres to these principles.

This project consists of as stated in the proposal:

- Three track audio CD
- A research folder
- Written documentation

To create the audio it was necessary utilise a survey but to create this any decisions needed to be informed on the topics of colour and music theory and so research was the first part of the project.

The research folder contains many digitised versions of books used throughout the research and project construction process. Due to the nature of the project a good background in music theory was required in order to create the compositions from survey data. Given the scope of music theory; only the principles used are discussed. The references listed provide more detailed explanations.

Once preliminary research was complete it was necessary to create a survey, gather responses, analyse the data and use it for composition.

Research

To make an informed decision on creating the survey it was necessary to research other peoples work on correlations between colour and sound. The most valuable website on the topic was Rhythmiclight.com where a chart of proposed colour scales from pioneers and experts could be found. Of particular interest was how these people decided to map each colour to a given note and much research went into finding this information, unfortunately of the thirteen on the website; information on how they mapped their colours was hard to find and so details were limited to eleven. *(a chart of the various colour scales can be found in the research folder as well as certain texts)*

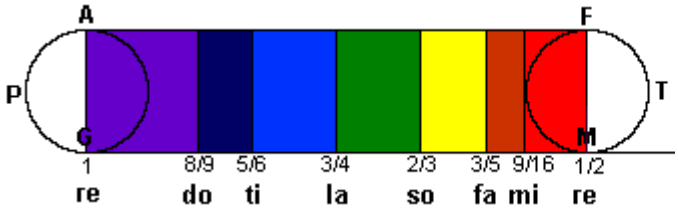
Colour Scales *(examples in shown in Cmaj)*

Newton

The colours Newton proposed were based on boarders between each colour in a prism and musical ratios.

Its been stated in some writings that Newton based his colour scale from D minor *(Franssen, M. p20)* however this is only a half truth as later discovered from further reading it was actually based on D dorian a common church mode at the time *(Colour music Australia)*. The dorian mode is considered a minor mode but its different from D minor; which would be aeolian, in that D dorians natural major would be the C major scale rather than F major in the case of D minor (aeolian). From a musical point of view its understandable how this confusion can arise.

Looking at the dorian mode, it's made up of the steps T-S-T-T-T-S-T and is symmetrical. When examining the colours of the rainbow through a prism you see a similar ratio between the space occupied by each colour. (Unknown 1)



Louis Bertrand Castel

Castel was a French mathematician that challenged Newtons descriptions of prismatic colour and was a pioneer of building the first the first colour organ. *(Franssen, M.)*

His colour scale was based off the three primary colours red, yellow and blue. Other colours in his colour scale were decided upon through the examination of how many distinct colours could be seen between these primary colours. *(Ibid)*

He argued that blue retained its character over a variety of tonal values thus was to be the root note, red was the dominant colour in nature and so made it a dominant 5th, leaving yellow to be a major third (Red, yellow, blue= Root, maj 3rd, 5th). Castel regarded these colours to be an absolute colour tonic which would not change with the key. He also took into account octaves with chiaroscuro. Moving towards black the lower the note and up to white the higher. *(Ibid)*

George Field

Field was a chemist who worked predominantly with pigment dies and the harmonies between them; believing that colours exist as a varying balance between light and darkness. He mapped his primary colours similar to Castel but moving from blue on the root towards red as a third and yellow as a 5th creating a triad out of the colours blue, red and yellow. It was Castels belief that if darkness was predominant, blue would occur; if brightness is predominant, then yellow would occur and if there was an equilibrium between them, there would be red. *(echo productions 1999)*

D.D Jameson

Jameson was another pioneer of the light organ building one in 1877 *(Wierzbicki 1990).* He mapped his colour scale from observations of light reflected from prism "the order of colours is that of a prism" *(Jameson 1844)*

Theodor Seeman

Seeman wrote about his mapping in his book "the laws of colour harmony" and based his choice of notes from vibrational order limiting the spectrum from C to A filling B with black. The reason for black filling the last note was violet had less than half the vibrational frequency of red meaning the colour spectrum fell short of an octave. *(Colour music Australia 1)*

A. Wallace Rimington

Rimington was a builder of another colour organ whose colour scale was, like many others, based on vibrational speed. However unlike Seeman he saw violet to be nearly double the speed of red and so considered it an octave while Seeman would of considered it more akin to a minor 6th. *(Rimington, A)*

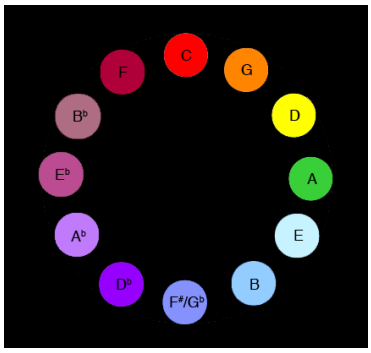
Bainbridge Bishop

In 1877 Bishop completed a light organ that both projected coloured light through illuminated windows *(Tanzini 2004).* It was based upon colours in the rainbow but substitutes more harmonious colours instead of the true shades. Red being mapped to C as "the key-note of the natural scale"
(Bishop, B.)

Alexander Scriabin

Scriabin was a Russian born composer who was said to have synestheisa and composed the colour music piece 'Prometheus: a poem of fire' *(Answers.com)*

Scriabins choice of mapping was based on the colours of a prism mapped to circle of 5^{ths}. Red was the fundamental on C, G being orange, D yellow etc. *(All Moscow)*



(Picture: Wikimedia Commons)

Ira Jean Belmont

Belmont was an artist that is said to have had synestheisa though used a complex mathematical formulas based on the comparative vibrations of sound and light waves, to calculate the relationship between notes and colours *(The Heckscher Museum of art 2009).*

Steve Zieverink

Zieverink is a modern day artist and musician who takes Angstrom units or the colour wavelength and converts it into hertz to get an approximation of musical notes. *(Zieverink 2007)*

H. Von Helmholtz

Helmholtz is a famous scientist who developed many ideas on colour and sound. He based his mapping on colours of the spectrum, Fraunhofer lines (dark features in the optical spectrum) and how musical intervals fall on them. *(Helmholtz 1924)*

Adrian Bernard Klein (Adrian Cornwell-Clyne)

Klein was an artist who wrote books on photography and cinematography. He was also the technical manager of the Gasparcolor company, an early film in London.

August Aeppli

Information on Aeppli is limited bar scale descriptions from Gerstners book; *the Forms of color (1986 p169)*

Musical scales

To fully understand the projects nature; one has to be informed about different musical scales used in the survey and they were used to compose with. The system used in the explanation below refers to whole tones (2 chromatic notes) and semitones (1 chromatic note) which are abbreviated to T and S. When TS is written it means an augmented tone or 3 chromatic notes.

Ionian: This is the first mode of the major scale and is often referred to as 'the major scale'. It is constructed through the scale degrees T-T-S-T-T-T-S *(TheoryLessons.com)*

Dorian: This is the second mode of the major scale and is constructed through the scale degrees T-S-T-T-T-S-T *(ibid)*

Phrygian: This is the third mode of the major scale and is constructed through the scale degrees S-T-T-T-S-T-T *(ibid)*

Lydian: This is the fourth mode of the major scale and is constructed through the scale degrees T-T-T-S-T-T-S *(ibid)*

Mixolydian: This is the fifth mode of the major scale and is constructed through the scale degrees T-T-S-T-T-S-T *(ibid)*

Aeolian: This is the sixth mode of the major scale and commonly called the 'natural minor' scale is constructed through the scale degrees
T-S-T-T-S-T-T *(ibid)*

Locrian: This is the seventh mode of the major scale. Its tonic chord is a diminished triad so is dissonant; it was not used in the survey for the sake of the compositions. It is constructed through S-T-T-S-T-T-T *(ibid)*

Harmonic minor: This scale is the same as the 'natural minor' scale but a raised sixth when ascending; however if descending the seventh is then flattened. It can be constructed
T-S-T-T-S-TS-S *(Milne)*

Melodic minor: This scale is the same as the nearly the same as the harmonic minor scale but both its sixth and seventh are raised when ascending and flattened again when descending. It can be constructed T-S-T-T-T-T-S *(Ibid)*

Hungarian gypsy: This scale is consists of a the harmonic minor scale with a raised fourth degree. It can be constructed T-S-TS-S-S-TS-S *(JGuitar)*

Theses scales were used in choosing the the final participants. The participants favourite note was matched with their favourite key and also where its root note was in comparison to its relative major; this was then used to select an appropriate major to use for implementing the chord progression data into the compositions.

Experimental Audio Focus

This audio project is experimental firstly in that it explores the relationship of our musical sensibilities in connection to our aesthetic sensibilities and secondly in that it aims to explore the possibilities of combining peoples musical preferences to create atypical scenarios and unconventional compositions.

The project aim was to create these compositions based from the sensibilities of people who showed through a survey process that to them; both colour and sound were linked. Finding people with this connection was based on several criteria discussed later, allowing aesthetics to influence help direct the project.

About the web survey

In order to gather usable data for the compositions, noting peoples musical and visual sensibilities vary from person to person, a survey was utilised. The survey was used to gather each participants musical preferences to things such as chord progressions, musical keys, instrumentation etc. to be used later in the composition stage while also used to gather data on their visual sensibilities and if they were in any way linked.

Although I created the survey, PHP scripting was more advanced than my current level of coding was capable of and so I enlisted the help of a web designer friend, Fergal Coulter, who also allowed me to host it on his server. *(due to this scripting a working download version of the survey cannot be made available, so it will continue to be hosted on http://www.neonfleacircus.com/survey/ the results however can be found on the research folder disk)*

Each question in the survey had the specific aim of finding:

- Whether the participant delt with colour or sound on a regular basis.
- Musical taste, what instrumentation or textures people were familiar with.
- Favourite note, part of the information to choose the song key.
- Favourite scale, another part of the information to choose the song key.
- Favourite colour scale, used in part to choose the participants to compose from.
- Rating of chord progressions, used to create the composition.
- Whether lower notes sound lighter/darker than high notes

In order to conduct the project a criteria of how to define 'colourful people' was created and implemented into the survey. The intention was to find people who appeared to have a link between their sensibilities in colour and sound; shown throughout the answers given in the survey.

The survey questions of importance to define 'colourful people' were:

- Favourite colour
- Favourite musical scale
- Favourite colour scale

More information on how 'colourful people' were defined will be discussed in the following section.

How the survey was conducted: *(See research folder disk for the results page)*

Firstly the participants gave their favourite albums followed by their preferred colour from a javascript colour picker. They then chose their favourite musical scale (all with the root note C) from the modes: ionian (major), dorian, phrygian, lydian, mixolydian, aeolian (minor) and locrian and also from the harmonic minor, melodic minor and hungarian gypsy scales.

These scales were chosen because they would be somewhat familiar to a western audience, with each mode being the same as a major scale based around a different 'tonal centre' and start on a different root note. The melodic and harmonic minor scales are relatively common in western music but less so than the previously mentioned modes. The hungarian gypsy scale was added as an unfamiliar scale that most people would probably not recognise.

The proposed colour scale pictures used in the survey, with most being chromatic, were shortened into a version based on C major. This was so that participants could listen to the (typically familiar) major scale being played while letting them observe the corresponding colour scale at the same time, allowing participants to decide which was the most appealing while in familiar territory.

Each participants favourite colour was examined against their favourite colour scale.
If it matched this then their favourite colours position in that colour scale was examined against the root position of their favourite musical scale to see if they all aligned.

If these criteria were met the participant was deemed a 'colourful person', if they didn't the participant was not used in the composition stage. The participants used will be referred to on a first name basis gathered from the e-mail addresses they provided.

Example:
In the case of the participant Dan, he chose:

- *Green as his favourite colour*
- *Lydian as his favourite scale (the root note of the lydian mode relative to the major scale in this example would be on the 4^{th} note position)*
- *D.D Jameson as his favourite proposed colour scale*

As you can see from this example Dans favourite colour matches the 4^{th} position of the Jameson colour scale; which is Dans favourite colour scale. The 4^{th} tone is also where we would find the lydian mode of any major scale. As they all align; the criteria is met and Dan is deemed a 'colourful person'

Taking the responses from the six people deemed by the survey as 'colourful', I examined the results given by each participant for interesting correspondences in their data. From this work I was able to determine good match ups for the compositions. *(see spread sheet in appendix)*

With the final six participants selected, the data they supplied was analysed for the composition stage. Each composition was created through pairing participants with interesting correspondences in their data together, in order to create a different outcomes for each of the pieces.

The survey questions of importance to do this were:

- Favourite note
- Favourite musical scale
- The Rating of chord progressions
- Scope of musical tastes

Piece one

From looking at the participants Maite and Dans data it is clear that I-IV-V is their preferred chord progression. The I-IV-V progression is commonly known as the 'pop progression' as can frequently be found in popular music (e.g. Knockin' on heavens door having the chords G-D-C = I-IV-V) They were paired in an attempt to create a piece driven by chord progressions they would consider awkward; omitting the clearest I-IV-V progressions to achieve this effect.

However the aim of this piece was not to be unmusical by consisting of the more disliked progressions; it was to express the participants reliance on common progressions and to show another side of how their regular listening could sound. For these reasons instruments and rhythms from their preferred genres were used.

The instruments chosen to represent Maites tastes were a harp and string section as would be found in 'Florence and the machine' and some parts of 'Melody A.M.' two albums listed in her survey results. To represent Dan the synth in Pink Floyds 'Any Colour You Like' seemed appropriate and typical prog-rock drumming that could be found on their albums. The Harp and string section was programmed into protools while the drums were created by playing them in live on a MIDI kit and tightening up the performance in the sequencer.

Piece two

The piece created from Arthur and Mikes data is a collaboration between their tastes. This is a demonstration of music created through both of their sensibilities, without negatively affecting the piece; because of compromises caused from battling tastes.

They were paired because they both rated each others favourite progressions quite highly with each having a similar dislikes for the same progressions also. Their tastes in music were equally similar; Arthur preferring a rock type ensemble, with Mike liking the same but including electronic instruments so a pad, piano, drums and a bass guitar were chosen for instrumentation.

The drums, pad and piano were sequenced manually with the rhythm track played again live on a MIDI drum kit. The drumming style was created in the same vein as a track on chosen by Arthur; the song 'Guys eyes' By the Animal Collective on 'Merriweather Post Pavilion' *(written as MPP in his survey results available on the research folder disk)*.

More interestingly however, is that once Arthur's favourite scale; G♯ Phrygian was transposed into its natural major for the chord progressions (E major), Mikes favourite note was on the 7^{th} scale degree (D♯). Using this information I decided to take every E major chord in the composition and add it s major 7^{th} turning them all into E major 7^{th} chords.

Piece three

The piece created from Fergal and Sean's data was a musical demonstration of opposite musical tastes working against each other for dominance; each person influencing the composition to their preference.

These two participants had opposite tastes in chord progressions, key and musical genres. The scope of their musical taste was also quite different; Fergal preferring 'traditional instruments' found on albums by artists such as Jethro Tull and The Small Faces where as Sean preferred Electronic music by artists such as *Orbital* and the *Japanese Popstars*. As such the piece has a jerky tension in it which shows the battle for dominance between their musical tastes

An organ and piano were chosen as instruments to represent Fergal traditional taste while a drum machine and synth were used to represent Seans newer preferences. In order to produce a rhythm section several patterns were programmed into a drum machine with each pattern triggering from the root notes of chords used in the piano section; when ever the note changed it triggered new patterns.

Ethical Issues

An ethical issue is something that brings into question what is principally right or wrong.

My main interest in music technology is mixing and considering that I wanted to draw attention to myself from studios in hopes that when I apply for a job that they may hopefully remember me in a positive light. To do this I had to gather e-mail addresses and contact many busy people. Unsolicited bulk e-mail is something I would consider spam and this to me is principally wrong, in this case I made an exception and sent out e-mails to thirty studios asking if their engineers would partake in the survey. I made this exception because I felt it could possibly be helpful to my future career. If I was met with no reply I resolved to leave them alone. *(e-mail addresses can be found in the appendix)*

Initially the project required e-mail addresses for a response testing, this aspect was dropped but at the time was implemented into the survey. When I did this I felt that it was important to let participants know their e-mail addresses would not be sold to third parties for marketing purposes.

The project examines peoples mindset to a degree, although the questions are not something most people would mind sharing it might be something to consider if I was to share the results with anyone that might find a use for any of my research. e.g publishing the survey results on the internet as creative commons, I would release them with no names just as participant 1, 2, etc.

Copyright issues

The only outside contribution to this project was by Fergal Coulter coding for the internet survey, this was provided free on a good faith basis. Copyright issues will not arise from this use.

It is posable issues may arise from providing certain books as PDF in the research folder, though all used are either out of copyright or available for academic use.

All images used in this write up were created by the author bar a wikimedia image licensed as 'MegaMatic' in the public domain.

Compositions are created through the use of survey data. Although the participants could be considered the intellectual property owners of their results they were submitted freely and utilised in a process that can't be considered their intellectual property. No copy right issues should arise.

The playing on the tracks is original work. No sampling of outside material has been used and so no copyright issues regarding to samples will arise.

Media Content

Audio CD burnt to Red Book standard

Track one	-	Maite/Dan	-	Avoiding the I-IV-V
Track two	-	Arthur/Mike	-	Co-operation with added 7^{ths}
Track three	-	Fergal/Sean	-	Fighting for dominance

To save on plastic waste the soft copy of the press release brochure is on the research folder disk.

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Appendix one (survey analysis chart)

Appendix two (studio e-mail addresses)

E-mail addresses of the studios and engineers mailed:
phil@strongroom.com,
neil@parloursound.co.uk,
info@smoothside.com,
julie@spz.com,
info@abbeyroad.com,
info@premisesstudios.com,
contact@castlesound.com,
studio@monkeypuzzlehouse.com,
info@farheath.com,
info@kore-studios.co.uk,
info@leedersfarm.com,
music@yellow-shark.co.uk,
enquiries@ten21.biz,
info@alexandersoundstudios.co.uk,
info@atmusicgroup.co.uk,
enquiries@oldsmithy.com,
info@airstudios.com,
info@hearnoevil.net,
info@sjpdodgy.co.uk,
jethro@mwncistudios.com,
ladyb@thesuite.sh,
l.gane@btinternet.com,
andy@andywhitmore.com,
tom@britanniarowstudios.co.uk,
fred@britanniarowstudios.co.uk,
sonny@sonnyengineer.com,
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