# SEEING
# A SONG

GEMMA MCGRILLIS
LJMU

# CONTENTS

# SEEING A SONG

**GEMMA MCGRILLIS**

**MA GRAPHIC DESIGN & ILLUSTRATION**

**LIVERPOOL JOHN MOORES UNIVERSITY**

**7TH MAY 2019**

As a designer, I am interested in the visual world. I am inspired by beautiful patterns, intrigued by unusual colour or shape combinations and interesting structures, and I'm always on the look-out for something that will spark a new idea. Where design is my interest, music is my passion; one the head and one the heart. Nothing affects me in the way music does. It lifts my mood, it makes me cry, it comforts me, it excites me and transports me: more than anything else it gives me joy. Melodies and lyrics tap into the deepest part of me and I connect with them in a way that I connect with nothing else. Music is an integral part of my life. It is intertwined with my memories and it reminds me of the people and places I love.

Recently, I have been looking for ways to bring music into my work. I want to try and use the powerful effect it has on me to inform and develop my practice as a designer. With that in mind, I approached this research project with the intention of combining music with design. My research will be focused around this one question – 'Can You See A Song?' and I propose to examine how music can be reimagined into something visual. I intend to take a song and give it a shape; make it something to look at. Using the research I propose to undertake, I will create a visual interpretation of the song *Time In Joy* by Field Music.

**F**IELD MUSIC, namely brothers Peter and David Brewis, are a band from Sunderland in the north-east of England. They have released seven albums since 2005, one of which, *Plumb* was nominated for a Mercury Music Prize in 2012. Due to their unique sound, I find it quite difficult to place them into a particular genre; they have been described as an indie art rock band in the past so, for the purposes of this introduction, I will go along with that. I have admired their music for years and find at least one of their songs in most playlists I make. Their eclectic influences (Kate Bush, Stravinsky and The Beatles to name but a few) combine to inspire music that is exciting and unconventional. They are experimental in their approach to song writing and like to play around with composition and rhythm; creating new or adapting existing instruments and pushing the boundaries of the sounds they can create with them.

Despite its title and underlying message, *Time In Joy* is a song filled with contrasting emotion; dark in places and joyful in others. I hope that through my research I will be able to imagine and create a visual reflection of its contrasts and be able to express those contradictions effectively.

To reimagine something, you first need to see it from all angles. It seems a logical first step for me to examine *Time In Joy* and its component parts in detail. To begin my research, I intend to create a timeline of the song; one which details when instruments are played, the key and the lyrics at any particular moment in its duration.

I also intend to talk to the writers of *Time In Joy* to discuss how the song was made. I would like to know what their initial intentions were when they sat down to write; what message did they want to put across to the listener, why did they make particular choices, and do they feel those choices have had their desired effect? Armed with a combination of the knowledge I will gain from making the timeline and an understanding of its inception and creation, I hope to be in a position to start visualising *Time In Joy* and making some initial design decisions on how my interpretation of it might be realised.
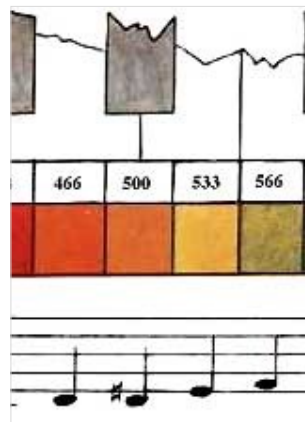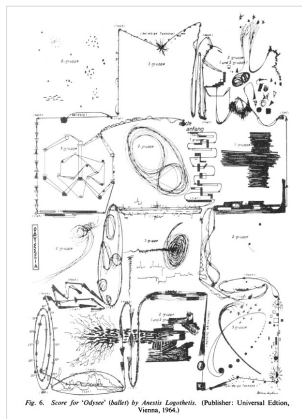


DAVID BREWIS & PETER BREWIS OF FIELD MUSIC
https://overblown.co.uk/field-music-announce-first-uk-shows-for-four-years/



*TIME IN JOY* FROM THE 2018 FIELD MUSIC ALBUM *OPEN HERE*
LISTEN HERE: https://www.youtube.com/watch?v=0wQnqvvlhfU

# "BUT IF DEEP AND DARK YOU SAY YOU NEED, WELL LET ME DISAGREE THERE'S NOTHING ELSE SO DEEP AS TIME IN JOY"

**FIELD MUSIC – TIME IN JOY**

TOP ROW LEFT TO RIGHT: ANESTIS LOGOTHETIS *'ODYSSEE'* – NORMAN MCLAREN *'BEGONE DULL CARE'* – A SOUNDTRACK
BOTTOM ROW LEFT TO RIGHT: STEPHEN MALINOWSKI *'CLAIR DU LUNE'* – OSKAR FISHINGER'S *ORNAMENT MUSIC* –
ALEXANDER WALLACE RIMINGTON'S *COLOUR STAVE*

Representing music visually is not a new concept. To help me to develop my own methods of music visualisation, I intend to investigate how music has been recorded and represented in the past. I will be looking at the evolution of notation through graphic and animated scores and taking inspiration from pioneering artists and composers including Wassily Kandinsky, Oskar Fischinger and Norman McLaren.

I am also interested in Synaesthesia, more specifically sound-to-colour Synaesthesia and and the connections and associations that some people instinctively make between colour and sound. I intend to research the condition and learn about some of the artists and composers whose work has been influenced by it.

After completing the research detailed here, I will use the inspiration and knowledge I have gained to create my interpretation of *Time In Joy*, my own visual version.

It will need to do a number of things for me to be satisfied that it is in any way a reflection of the song. Firstly, and most importantly, it must evoke a feeling of joy and optimism. Secondly, it must show contrast and complexity. And lastly, it must be a fully formed piece of visual art. The beauty of a song is in its ability to hide its layers from the listener, and to present itself as a whole; to exist as an entity that, whilst reliant on its components, blends them so well that they go almost unnoticed. My version of *Time In Joy* must do the same thing; it must be more than the sum of its parts and not just a collection of ideas.

# TIMELINE

**T**o begin this project, I felt it necessary to break down *Time In Joy* into its component parts; I wanted to find out which instruments were included in the arrangement, when they appeared in the track and for how long.

Information of this kind is usually recorded in a musical score. As the song is a relatively new release, I was unable to find any written information on its musical arrangement, so I set about creating my own visual score. All observations on the instrumental arrangements and key have been my best estimate; I have had to use my ear to determine which instruments appear when, and for how long. I cannot claim the resulting timeline to be 100% accurate in its representation of the song, but I believe the level of accuracy it displays is good and is sufficient for the purpose of this exercise.

After listening to the song a number of times, I was able to identify the following instruments used in its arrangement:

| VOICE (LYRICS) |
|:---:|
| WOOD BLOCK |
| BOTTLES |
| SHAKER |
| STRINGS |
| VOICE (OTHER) |
| FLUTE |
| GUITAR |
| BASS |
| DRUMS |
| KEYBOARD |
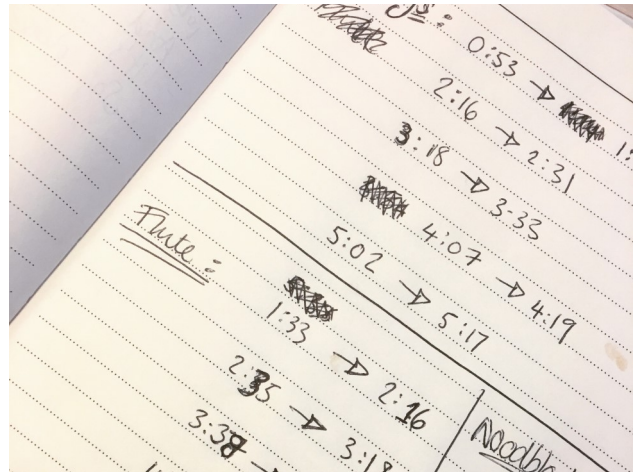


Once I had this information, I went through the song again, focusing on one instrument at a time and recording down when they played and for how long. To show my findings, I represented each instrument using a block of colour and arranged them along a timeline to indicate when they appear. Above the layers of colour blocks, I wrote down the lyrics as they appear at each stage along the timeline, creating a further layer of information. In addition to the musical arrangements, I also included the times during the song when a major/minor key or feel is apparent. These can be identified by the lighter/darker shaded sections on the background of the timeline.

The resulting visual score makes it easy to see how the instruments, lyrics and key have been combined at each stage in the song.

To see the timeline, click the link below:
https://www.gemmamcgrillis.co.uk/timeline
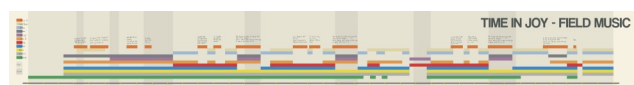


Breaking down *Time in Joy* into a timeline has helped me to start regarding it as a visual thing; I can now easily see what its structure is, where the changes in mood occurred and which instruments contributed to those changes.

# SONGWRITER

http://quire2011.blogspot.com/2011/12/peter-brewis.html

**T**o help me understand the structure of the song a little better I decided to pose some questions to one of the song writers, Peter Brewis. My hope was that speaking to Peter would help me to understand the choices he had made regarding musical arrangements and instruments.

After initially making contact with the band via email, I was able to arrange a time to speak to Peter over the telephone. Ideally, I would have liked to have a face to face conversation as I wanted to go through the timeline in more detail with him and I knew that it wouldn't be as effective to do this remotely. However, busy schedules did not allow a suitable time or place to meet, so instead I emailed the timeline to Peter in advance of our chat to give him a chance to look at it in more detail.

Armed with a print-out of the timeline and pages of questions, I called Peter at the time we had agreed. Understandably, I was fairly nervous at the prospect of interrogating one of my favourite songwriters, but a few minutes into our chat my nerves had disappeared thanks to Peter's friendly manner and honest responses.

As the message of *Time in Joy* is that deep experiences are not exclusively the product of a sad or melancholy time and that happy or joyous times can be equally meaningful, I wanted to know if this theme was the starting point for the song. Peter explained that, for him, the lyrics and music start out as two separate things – he keeps a notebook filled with ideas for lyrics or themes and dips into these when writing. For *Time in Joy*, the guitar line was the starting point and it built from there. He wanted to incorporate a flute part into the song so played around with the initial guitar melody to incorporate the more playful sound of a flute. From there, the bass and keyboard parts were built up to work around the guitar/flute sound.

The lyrics were a separate entity, brought in once the basic melody had been established. Peter describes the story of the song as someone posing a question: can joy be as deep and meaningful as melancholy? Peter said that he avoids trying to make people feel a prescribed emotion when writing a song; he likes their music to be ambiguous, preferring to view a song as a way of asking a question.

## "At the end of a song should be the word 'discuss'. It's a starting point for a conversation rather than a complete thought or message."

*PETER BREWIS*

I asked Peter if there are particular instruments or arrangements that he uses to, for want of a better word, conjure a feeling or mood. He said no, that they prefer to play around with the traditional uses of instruments and experiment with how they can be played and combined. As they actively try and avoid telling the listener how to feel, they like to experiment with sounds and combinations of sound to create their music. He said that they can sometimes, like with the strings in *Time in Joy*, use an instrument's traditional connotations in an ironic way. He believes culture has a big impact on the way in which the listener experiences certain instruments/keys/tempos; that often we are conditioned to associate particular melodies or sounds with particular moods or feelings. As writers, he and David try to steer clear of conforming to those inbuilt preconceptions.

Because of the playful, optimistic message of the lyrics, they experimented with different methods of making sounds for *Time in Joy* – for example, there are popping sounds, kissing sounds, glass bottle sounds. Peter explained that he and David spent an afternoon experimenting with ways they could make samples without instruments and produced a number of sounds that lend the track a playful, fun air.

When listening to the song, I felt a sense of contradiction in certain parts – why does a song championing joy have many sections that felt dark? I put this to Peter who explained that he likes to have contrast in his music and consciously gave the chorus a more melancholy air to afford that difference in mood. The contrasting sections of the song from major to minor help give the impression of a two-sided conversation on the question that has been posed regarding the power of a deep emotional experience – can joy be as powerful as sadness?

Getting the chance to talk to Peter about *Time in Joy* was a real privilege and has given me lots to think about as I approach my own interpretation of the song. I want to be sure to bring the element of fun he intended for the song into my work and must keep the concept of contrast at the forefront of my planning.

# NOTATION

As my research is based around the question of whether it is possible to see a song, I wanted to investigate methods that have been employed over the centuries to visually represent music. For as long as we have made music, humans have invented ways to pass on their musical skills and ideas to others. Traditionally, melodies and lyrics were passed down generationally through sharing, listening and copying. Many cultures evolved their own individual methods of recording and preserving music; for the purposes of this project I have chosen to focus on the evolution of western music notation.

Around the eighth century, the first methods of recording music emerged in the form of Neume notation. Neumes are symbols placed above the words or syllables in a song and are there to give the singer information about the pitch of the notes proceeding. The origins of these symbols are unclear, but it is widely believed that they were influenced by accents in Greek and Roman literature.

*"Most often encountered is the theory that the 'accents' of late Classical antiquity – the Alexandrian 'ten prosodic signs': acute, grave, circumflex etc. – were the principal factors in origins. Generally speaking, an acute accent would enter musical service as the indicator of a higher pitch than the one preceding; a grave accent, of a lower pitch; a circumflex, of a succession of higher and lower pitches."*

KENNETH LEVY
*ON THE ORIGIN OF NEUMES*

Neume notation had its limitations, as the singer would already have to know a piece of music quite well in order to understand the melody in the first place.

*"Since exact pitches could not be discerned from Neumatic notation, a melody still had to be taught to the performers through oral tradition. Therefore, the formation of music notation did not replace the traditions of music. Instead, it complemented and enhanced musical methods that were already in practice. "*

HOPE R. STRAYER

*NEUMES TO NOTES: THE EVOLUTION OF MUSIC NOTATION*
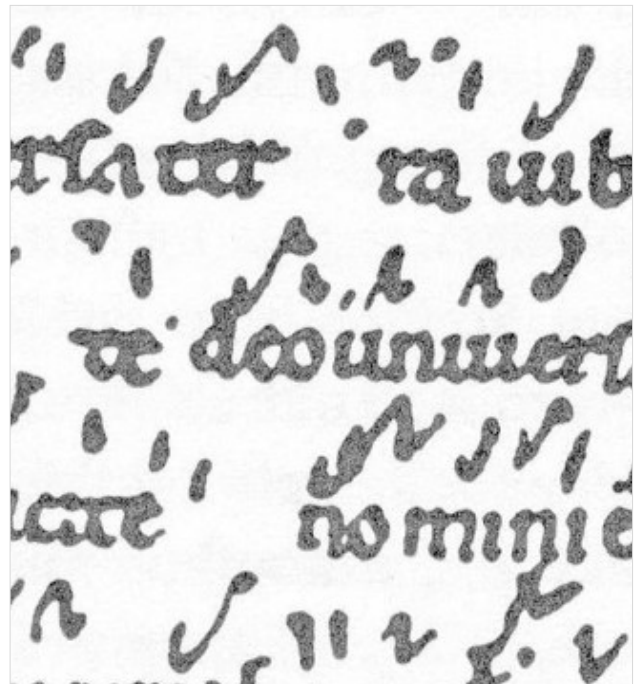


*AN EXAMPLE OF NEUME NOTATION*
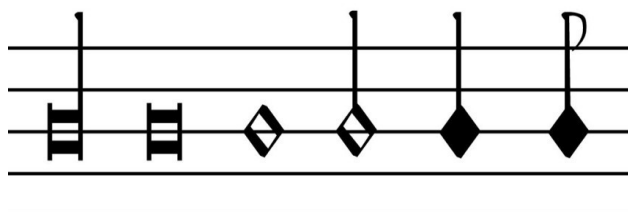http://themelodybook.com/early-western-music-notation-767/

This issue was resolved a few centuries later with the introduction of the stave; four horizontal lines upon which notes were recorded to indicate their pitch and arrangement. A Benedictine monk named Guido d'Arezzo is believed to have introduced stave notation in around 1000AD. Notes in a piece of music were represented by marks and positioned on the four lines of the stave in sequence. This method of notation gave singers an indication of the pitch of the notes that were recorded and meant that a piece could be sung without the performer having to have in depth prior knowledge of its melody.



AN EXAMPLE OF GUIDO D'AREZZO'S FOUR LINE STAVE
http://bunthorne.blogspot.com/2015/03/guido-darezzo.html

Singers reading these early notations now had an idea of melody, but no information on the rhythm of the music. Note-markings were all similar and the duration of each could not be determined by its appearance.

Without guidance on rhythm, the markings on the stave were simply a collection of notes without structure; they did not reflect the timbre of the piece of music they were attempting to represent. As Andrew Klarmann wrote in Gregorian Chants, *"Rhythm is the soul of a melody. Its presence endows the composition with life and unity"*. Further developments in the 13th century allowed for the recording of rhythm through the introduction of different shaped markings to represent the length of notes.



MARKINGS NOW GAVE INFORMATION ON THE LENGTH OF A NOTE
FROM LEFT TO RIGHT: LONG, BREVE, SEMIBREVE, MINUM, SEMIMINUM, FUSA.
http://jandrewowen.com/en/2018/09/01/monteverdi-unfiltered-how-to-read-monteverdi-part-books/

Notation continued to evolve over the following centuries, expanding to include many additional instructions to the musician including, key and time signatures, dynamics, accidentals, rests and clef. The introduction of the printing press allowed for wider distribution of written music and this helped to standardise the way each piece of information and direction was represented and recorded.

# Quartet No. 5 in B-flat Major

DETAILED AND CONSISTENT NOTATION METHODS ALLOWED COMPOSERS TO CREATE EVER MORE COMPLEX MUSICAL ARRANGEMENTS. THIS SCORE SHOWS THE 4 DIFFERENT PARTS OF STRING QUARTET No. 5 BY FRANZ SCHUBERT, 1890.

https://www.musicprinting.co.uk/store/schubert-franz/string-quartet-no-5-d-68/
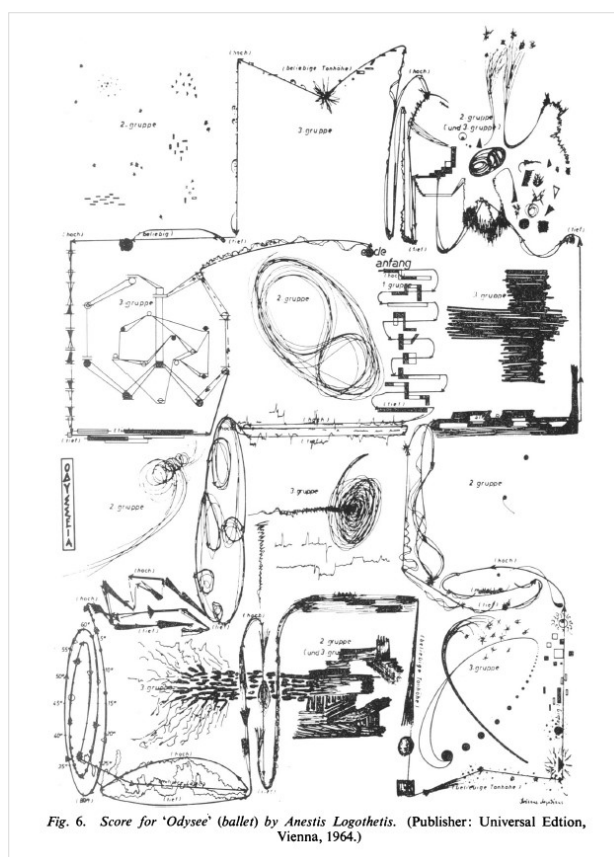
# GRAPHIC SCORES

*WHERE ART AND MUSIC COLLIDE*

**T**he twentieth century brought about some of the most radical changes in music notation with the introduction of the graphic score. Innovations in electronic methods of recording and making music brought about the necessity of inventing a way to record these new sounds. The freedom afforded to composers working with this new electronic medium allowed them to create their own musical languages; they were able to break free from the traditional constraints of notation and express themselves in a more graphically exciting way. The line between art and music was becoming ever more blurred.

*'No longer could the composer imagine notation to be, like writing words, the immediate expression of thought: thought had to go into how the thought was going to be expressed.'*
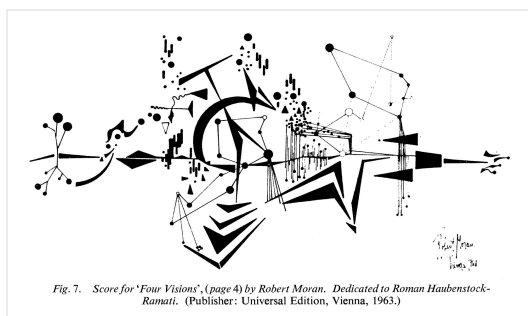
*Eye Music: The Graphic Art of New Musical Notation*

*Arts Council*

Graphic scores had no standardised methods of notation – they followed very few rules and the appearance and structure of the marks within them varied dramatically from composer to composer. Some examples taken from J. Evarts *The New Musical Notation – A Graphic Art?* can be seen below, along with supplementary instructions to the performers on how to approach playing the score.



Fig. 6. Score for 'Odysee' (ballet) by Anestis Logothetis. (Publisher: Universal Edtion, Vienna, 1964.)

Anestis Logothetis: – *'Odyssee' (ballet)*

'The composition is built of two elements of motion. One is continuous and forms a "path" which runs in vertical and horizontal segments... Performers in three groups: one group plays the first element of motion – the "path"... The smallest number of players is nine; *they may select their instruments according to their own wishes.'*
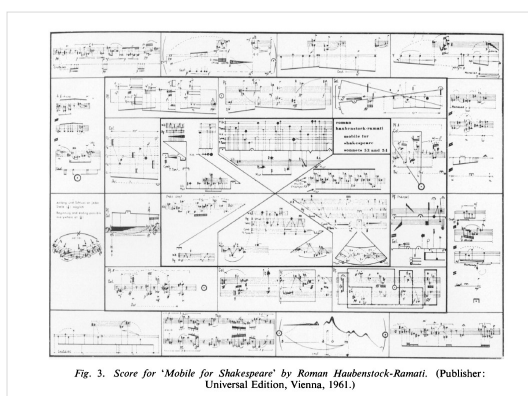
Fig. 7. Score for 'Four Visions', (page 4) by Robert Moran. Dedicated to Roman Haubenstock-Ramati. (Publisher: Universal Edition, Vienna, 1963.)

Robert Moran: *'Four Visions'* (for harp, flute and string quartet)

'The performers may begin at either side of the individual movements and read directly across to the other side... Each performer has a full score and reads directly from each musical structure.'
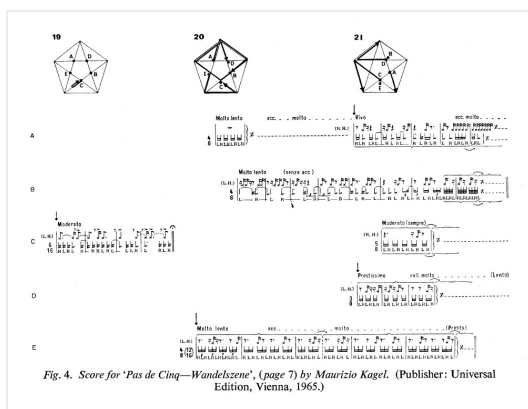


Fig. 5. Score for 'Olympia' by Rudolf Komorous. (Publisher: Universal Edition, Vienna, 1966.)
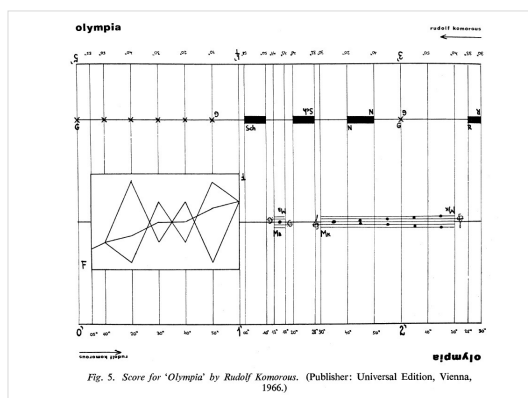
Rudolf Komorous: *'Olympia'*

'This is a composition for two performers. However, it is possible to distribute the instruments among a larger number of performers... The work is composed in a symmetrical form. The notation corresponds to this. When, during the performance, after 2' 30", the middle of the work is reached, the score is reversed 180° for the second half. It is read from left to right... The sign "N" means free like birdsong.'



Fig. 3. Score for 'Mobile for Shakespeare' by Roman Haubenstock-Ramati. (Publisher: Universal Edition, Vienna, 1961.)

Roman Haubenstock-Ramati: *'Mobile for Shakespeare'*

'Each part is composed of several "areas". Each part reads its area in clockwise or counter-clockwise order. The note patterns within a given area, however, are always to be read from left to right. For the singer, each area corresponds to one line (10 syllables) of a Sonnet. Each part may begin with any area.'



Fig. 4. Score for 'Pas de Cinq—Wandelszene', (page 7) by Maurizio Kagel. (Publisher: Universal Edition, Vienna, 1965.)

Maurizio Kagel: *'Pas de Cinq – Walking Scene'*

'Parts of the performers A, B, C, D and E may be taken by 5 male or 5 female actors. All participants carry a walking stick... The performers walk along lanes constructed to form a regular pentagon... footsteps and taps of the walking sticks are the only audible occurrences... a purely instrumental version for 5 percussionists (without actors) may be made using the rhythmic patterns.'

Throughout history, written music had been the resulting output of a composer's self-expression; symphonies and concertos were the written communication of their ideas and feelings. Traditional scores were designed to be followed exactly and the rhythms and melodies within them to be reproduced in the same way each time they were performed. The graphic score turned this concept on its head. This new type of notation was there to serve only as a suggestion to musicians; a guide for them to use to form their own musical piece of self-expression.

Graphic composers placed the onus on the performer, allowing musicians the freedom to interpret their markings in whichever way they felt appropriate. Because of this, no two performances were ever the same and the melody and rhythm could differ enormously with each interpretation. As Evarts states, "It is inevitable that according to these scores there is no one work but, rather, an infinite number and a new one each time the score is 'realized'."
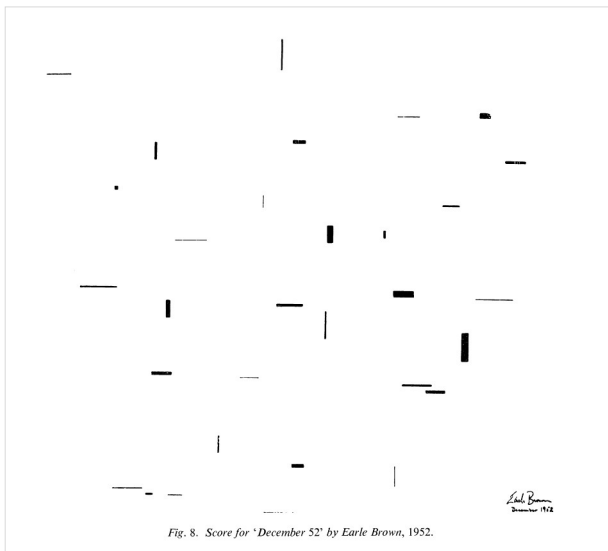


Fig. 8. Score for 'December 52' by Earle Brown, 1952.

EARLE BROWN'S COMPOSITION DECEMBER 1952.
EVARTS, J. THE NEW MUSICAL NOTATION – A GRAPHIC ART?' P411

Earle Brown's composition *December 1952* (above) was one of the first scores to do away entirely with any suggestion of traditional music notation. The arrangement of the black rectangles seems to make no attempt to give information on how the piece of music is to be played.

# "My open form music has choice, multiple choice. When I make my music, because there is more than one possibility of how a melody of a score or a context will appear, it's always by choice. What I've introduced into that work is the possibility that the musicians can, in collaboration, make different avenues and possibilities and potentials of realisation of my composition."

**EARLE BROWN**

*QUOTE TAKEN FROM A 1991 INTERVIEW WITH BRUCE DUFFIE*

*http://www.bruceduffie.com/brown.html*

# ANIMATED SCORES

## GRAPHIC COMPOSITION

**A**round the same time, an alternative method of graphic composition was growing in popularity; the animated or optical score. Despite having similarities in their avant-garde approach to composition, an animated score differed from a graphic score in one fundamental way: it was not open to interpretation. Because of the nature of its output source, each performance of an animated score would be the same as the last. An animated score was made by photographing pieces of cut-out paper or, alternatively, by drawing directly onto photographic film: the composer would make markings to emulate the marks produced when soundwaves are converted into light.

To understand better how graphic scores were made, it is helpful to know how film soundtracks were produced. I have used stills and quotes from the commentary of the 1943 film _Sound Recording & Reproduction (Sound on Film)_ Encyclopaedia Britannica Films, and the 2010 paper _"It Looks like Sound!": Drawing a History of "Animated Music" in the Early Twentieth Century'_ (Robertson, E., Haggh-Huglo, Barbara H., Warfield, Patrick, & Witzleben, J. Lawrence) to compile the storyboard on the following page.
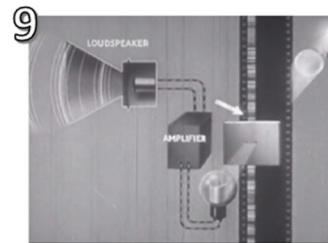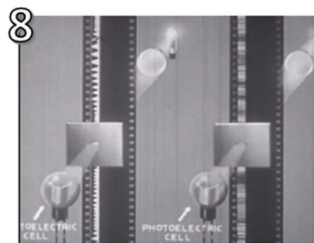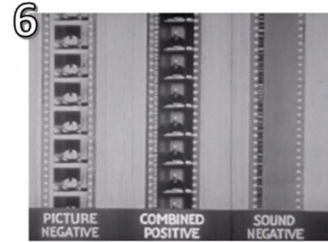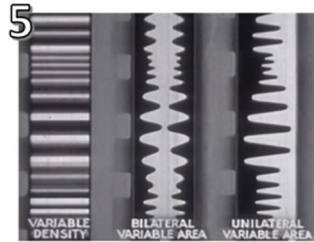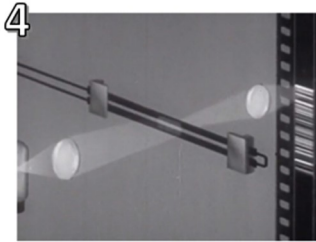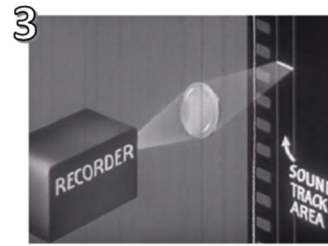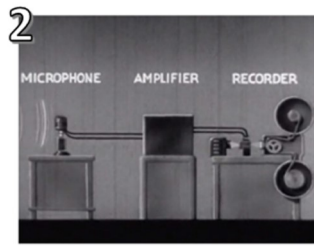
1. Photographic film is only affected by light so sound must be converted to corresponding changes in light. Sound waves are transmitted to microphone where they are converted into changes in an electric current.

2. These variations in the electric current are then amplified and used to control the amount of light falling on photographic film.

3. The light that falls upon the film is in the form of a fine, bright line. The part of the film on which the line of light falls to make the photographic record is called the Sound Track.

4. The position of the light affects the type of sound track pattern that is produced on the film.

5. All three of the sound tracks pictured here contain records of light variations, all of which correspond to the pressure variations in the original sound. They would all produce the same sound.

6. The sound and pictures are both recorded on separate negatives. These negatives are then combined to produce a positive print.

7. The positive print is then used in the theatre to reproduce the original picture and sound synchronised together. A light is shone through the positive print.

8. The varying beam of light from the soundtrack falls onto a photoelectric cell, producing variations in the electric current which are directly proportional to the variations in the light beam.

9. An amplifier increases the current to the point where it will operate a loud speaker. The loud speaker converts the current into soundwaves; the counterpart of the original waves from the microphone.

Composers of the animated score made their music by creating their own visual soundwaves. They photographed or drew on the pattern of soundwaves on a soundtrack, not knowing exactly what sound would be produced by their markings. For the early adopters of this method, it was almost like composing blindfolded; they could use their knowledge of frequency and pitch to estimate what notes would be created through marks with a particular length or thickness, but ultimately the patterns they made would produce a melody and rhythm that could not be predetermined.

Oskar Fischinger, a filmmaker and animator in the early twentieth century, was one of the pioneers of the optical soundtrack and his work helped to refine it into a precise art form. In 1932 he produced a number of experiments that he called *Ornament Sound.* These experiments took the form of strips containing lines and shapes arranged in a repeating pattern. These patterns were added to film from where they could be converted into soundwaves and played through a loudspeaker.
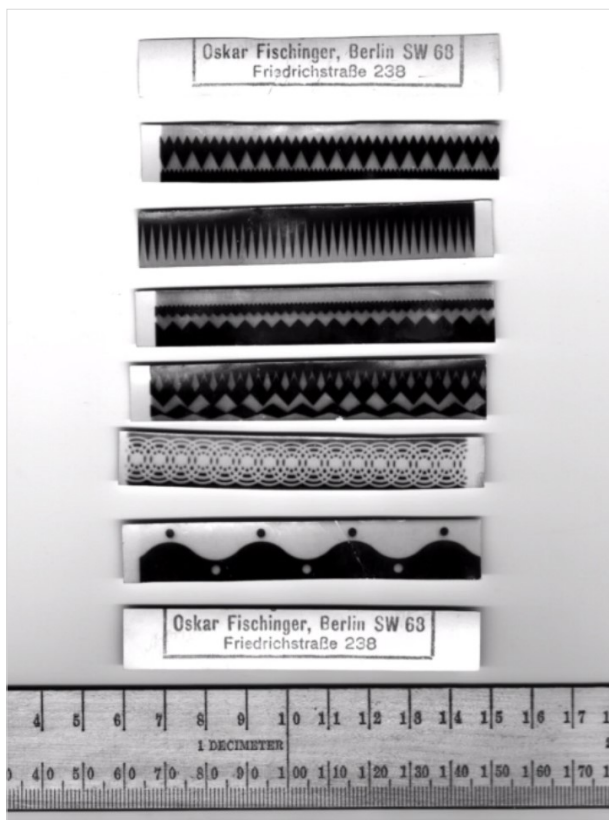


ORIGINAL STRIPS FROM FISCHINGER'S ORNAMENT *SOUND EXPERIMENT*
STILL TAKEN FROM: https://player.vimeo.com/video/114947808

*'Between ornament and music persist direct connections, which means that Ornaments are Music. If you look at a strip of film from my experiments with synthetic sound, you will see along one edge a thin stripe of jagged ornamental patterns. These ornaments are drawn music – they are sound: when run through a projector, these graphic sounds broadcast tones or a hitherto unheard of purity, and thus, quite obviously, fantastic possibilities open up for the composition of music in the future.'*

**OSKAR FISCHINGER**

**QUOTE TAKEN FROM AN ARTICLE FISCHINGER WROTE IN 1932, 'SOUNDING ORNAMENTS'**

A short example of the *Ornament Sound* experiments can be seen here:
https://player.vimeo.com/video/114947808

Fischinger believed that his experiments would be the beginning of a new way to create music, one that would allow composers to make precise sounds that could not be tainted by incorrect performance. The precision with which the artificial sound waves could be created, and the possibility for refinement in their structure meant that a new, almost perfect sound could be achieved.

*"Now control of every fine gradation and nuance is granted to the music-painting artist, who bases everything exclusively on the primary fundamental of music, namely the wave -- vibration or oscillation in and of itself"*

*OSKAR FISCHINGER*

*QUOTE TAKEN FROM*
*https://asmir.info/lib/fischinger.htm*

Having spent a number of years in the refinement of his technique, Fischinger then moved away from composition towards a more dynamic, visual translation of music. He began to make animated films that moved in perfect synchronisation to music. One of his most famous and interesting works is an animation to the Second Hungarian Rhapsody by Franz Liszt called *An Optical Poem*, produced for MGM in 1938. The introduction to the film reads, "To most of us music suggests definite mental images of form and colour. The picture you are about to see is a novel scientific experiment – its object is to convey these mental images in visual form."
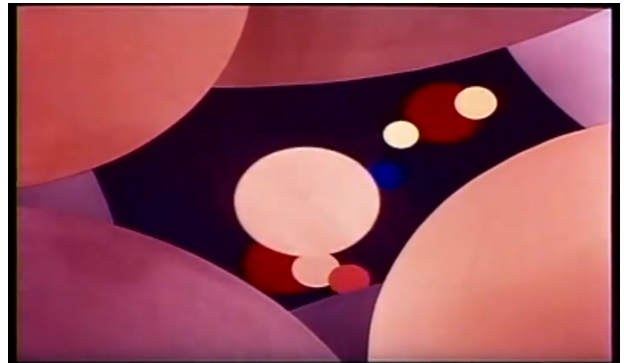


The animation was made using cut-out paper shapes that were suspended on fishing wire. Each sequence of shapes was photographed frame by frame and then combined to create the illusion of a dance. To watch *An Optical Poem* click the link below:

https://www.youtube.com/watch?v=6Xc4gO0FFLk

Another filmmaker and animator exploring a similar idea was Norman McLaren. Not only did McLaren experiment with hand-drawn soundtracks, but he also made several animations that synchronised images with sound. McLaren drew his visuals, and often his sound, directly onto the film, making what are known as 'cameraless' films. Using many different types of media, including ink, paint and pen, he would draw onto the film frame by frame, creating visually exciting and dynamic animations. One of his films from 1948, *Begone Dull Care,* was of particular interest to me as it is, similarly to Fischinger's *An Optical Poem,* a virtual dance

The film, made in partnership with Evelyn Lambart, is a series of shapes, lines and colour, all painted directly onto the film. The resulting visual is a mesmerising seven minutes of manic images, echoing the expressive nature of the Jazz music it accompanies. To watch *Begone Dull Care* click the link below:

https://www.youtube.com/watch?v=0r2COvWPO4Y



STILL TAKEN FROM NORMAN MCLAREN'S 1948 FILM 'BEGONE DULL CARE'
https://www.youtube.com/watch?v=0r2COvWPO4Y

# SYNAESTHESIA

**SEEING THE WORLD IN HARMONY**

**L**ike Pythagoras and Aristotle before him, Isaac Newton believed there was a direct correspondence between the colours of the spectrum and notes in an octave.

*"When Isaac Newton first passed white light through a prism and watched it fan out into a rainbow, he identified seven constituent colors—red, orange, yellow, green, blue, indigo, and violet—not necessarily because that's how many hues he saw, but because he thought that the colors of the rainbow were analogous to the notes of the musical scale."*
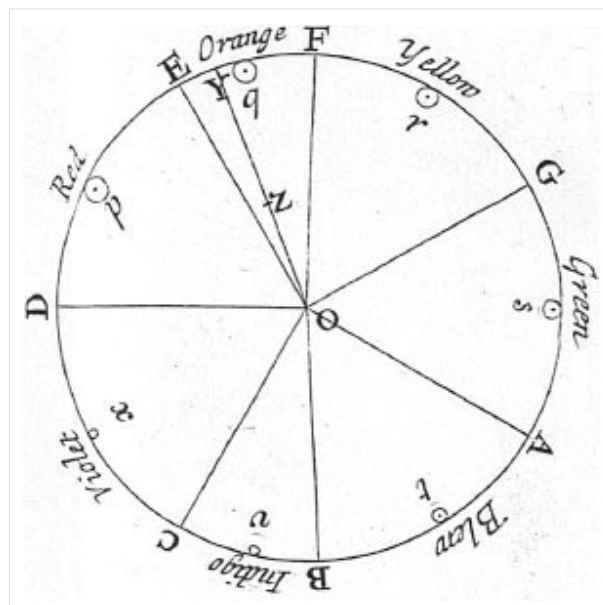


ISAAC NEWTON'S COLOUR WHEEL
https://www.the-scientist.com/foundations/newtons-color-theory-ca-1665-31931

For around 1% of the population (Eagleman, D.M. *Synaesthesia*), the senses are interlinked and connected. Synaesthesia is a condition where one sense is activated by the stimulation of another. For example, as Eagleman writes, 'Synaesthesia is a fusion of different sensory perceptions: the feel of sandpaper might evoke an F sharp, a symphony might be experienced in blues and golds, or the concept of February might be experienced above the right shoulder.' Synaesthesia, and more specifically sound-to-colour synaesthesia, is an area I want to know more about as I feel will help inform my choices when deciding how to represent the components of *Time in Joy*.

Initially synaesthesia, or rather the effects of it, had been dismissed as the use of metaphor; of someone likening the experience of one thing with another. In recent years however, it has been scientifically proven to exist as a condition, one that is twice as prevalent in women as men (Harrison, J. & Baron-Cohen, S. *Synaesthesia: An Account of Coloured Hearing*). For someone with synaesthesia, sensory experiences are interconnected; sounds, smells and sights link together in unexplained but consistent pathways. One of the indications that a person has synaesthesia is that their perceptions remain consistent throughout life – a sensory trigger will always elicit the same reaction.

*"Typically, people with synaesthesia will report that the perception has remained the same since their first memory of it. In many cases, this will have been since the age of 4 or even earlier, as all subjects have a strong conviction that they have had synaesthesia for as long as they can remember."*

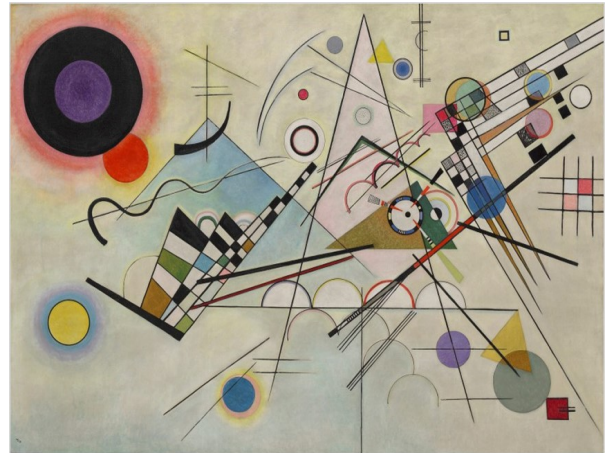*Harrison, J. & Baron-Cohen, S. (1994). Synaesthesia: An Account of Coloured Hearing.*

According to Mulvenna & Walsh in their 2005 article, synaesthesia is unusually prevalent in artists, writers and musicians. They quote composer Olivier Messiaen as saying, 'Colours are very important to me because I have a gift - it is not my fault, it's just how I am - whenever I hear music or even if I read music, I see colours".

When researching graphic scores, a number of different articles I read referenced Wassily Kandinsky with regards to his apparent synaesthesia. Kandinsky's art was a vibrant and dynamic combination of shape colour and line. He has been quoted as saying, in reference to a performance of Wagner's opera Lohengrin:

## *"I saw all my colours in spirit, before my eyes. Wild, almost crazy lines were sketched in front of me."*



WASSILY KANDINSKY - COMPOSITION 8
https://www.guggenheim.org/arts-curriculum/topic/vasily-kandinsky-composition-8

*"Kandinsky achieved pure abstraction by replacing the castles and hilltop towers of his early landscapes with stabs of paint or, as he saw them, musical notes and chords that would visually "sing" together. His swirling compositions were painted with polyphonic swathes of warm, high-pitched yellow that he might balance with a patch of cold, sonorous blue or a silent, black void"*

*https://www.telegraph.co.uk/art/artists/wassily-kandinsky-who-was-he/*



WASSILY KANDINSKY - *CONTRASTING SOUNDS*, 1924
https://arthive.com/wassilykandinsky/works/212344~Contrasting_sounds

Kandinsky developed a colour theory that described the emotional effect a colour could have. The image below from the Arnold Schönberg Center, also details their instrumental or sound equivalent.

**Color Theory according to Wassily Kandinsky: "Concerning the Spiritual in Art"**

| Color | Eigenschaften | Klangfarbe |
|---|---|---|
| yellow | "warm," "cheeky and exciting," "disturbing for people," "typical earthly color," "compared with the mood of a person it could have the effect of representing madness in color [...] an attack of rage, blind madness, maniacal rage. | loud, sharp trumpets, high fanfares |
| blue | deep, inner, supernatural, peaceful "Sinking towards black, it has the overtone of a mourning that is not human." "typical heavenly color" | light blue: flute darker blue: cello darkest blue of all: organ |
| green | mixture of yellow and blue stillness, peace, but with hidden strength, passive "Green is like a fat, very healthy cow lying still and unmoving, only capable of chewing the cud, regarding the world with stupid dull eyes." | quiet, drawn-out, middle position violin |
| white | "It is not a dead silence, but one pregnant with possibilities." | "Harmony of silence", "pause that breaks temporarily the melody" |
| black | "Not without possibilities [...] like an eternal silence, without future and hope." Extinguished, immovable | "final pause, after which any continuation of the melody seems the dawn of another world" |
| gray | mixture of white and black "Immovability which is hopeless" | soundless |
| red | alive, restless, confidently striving towards a goal, glowing, "manly maturity" Light warm red: strength, energy, joy; vermilion: glowing passion, sure strength Light cold red: youthful, pure joy, young | "sound of a trumpet, strong, harsh" Fanfare, Tuba deep notes on the cello |
| brown | mixture of red + black dull, hard, inhibited | high, clear violin |
| orange | mixture of red + yellow radiant, healthy, serious | middle range church bell, alto voice, "an alto violin, singing tone, largo" |
| violet | mixture of red + blue "morbid, extinguished [...] sad" | english horn, shawm, bassoon |

http://www.mat.ucsb.edu/~g.legrady/academic/courses/12w259/Kandinsky_%20Color%20Theory.pdf

Russian composer Alexander Scriabin, although not believed to be a synesthete, made connections between colour and sound in his works. Most notably, his final composition *Prometheus "Poem of Fire"*, 1910. This piece was written for voice and orchestra and also for an invention called a "colour organ". A 2010 performance of Prometheus at Yale University can be seen by following this link:

https://www.youtube.com/watch?v=V3B7uQ5K0IU
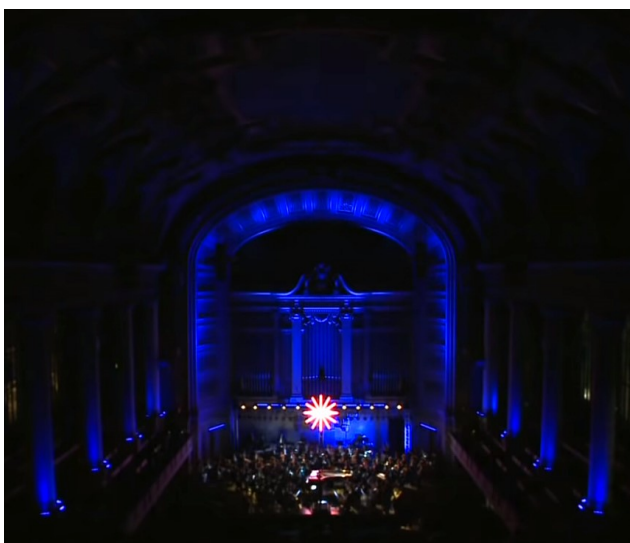


STILL TAKEN FROM A VIDEO OF THE YALE UNIVERSITY 2010 PERFORMANCE OF SCRIABIN'S *PROMETHEUS: POEM OF FIRE* https://www.youtube.com/watch?v=V3B7uQ5K0IU

Colour organs are instruments designed to simultaneously play music and colour and have been imagined in one form or another by composers and artists since the late nineteenth century. The first known pioneer is believed to be Bainbridge Bishop, an American artist who in 1877 patented an instrument that used panes of coloured glass with shutters that were operated by the keys of an organ (see illustration).
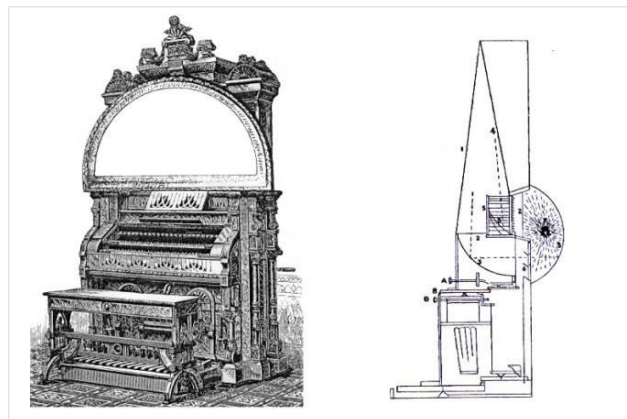


ILLUSTRATION AND DIAGRAM OF BAINBRIDGE BISHOP'S COLOUR ORGAN 1877 https://www.researchgate.net/figure/Organo-de-color-de-Bainbridge-Bishop_fig3_277009983

A couple of decades later in 1893, English artist Alexander Wallace Rimington was the first person to use the term "colour organ" when he designed his own version of a colour-projecting instrument. Rimington used the colour scale pictured below to represent notes and projected light through corresponding glass filters.



http://www.colourmusic.info/maistre2.htm
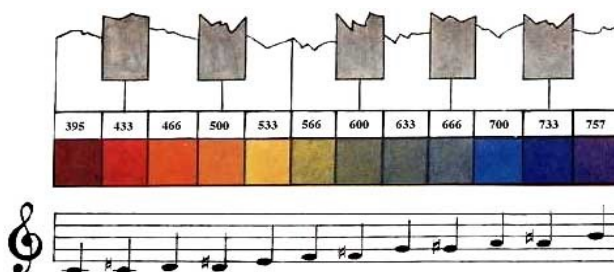
Many variations on the original idea of the colour organ have been seen throughout the 21st century but the concept of it never really took hold. Despite this, colour organs are still believed to be an important tool in the investigation of music/colour synaesthesia. In his article *Color Organs* from 2008, Teun Lucassen describes them as, 'a real-life implementation of the ideas of direct correspondence between colour and music.' He claims the goal of the colour organ is to help non-synesthetes to experience synesthetic effects.
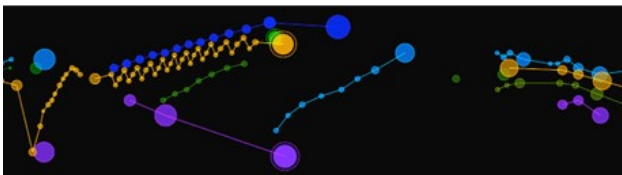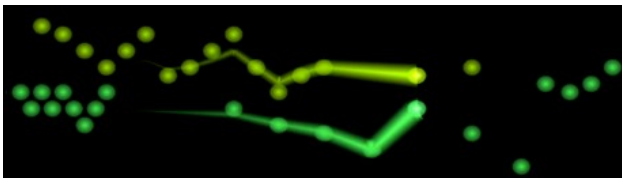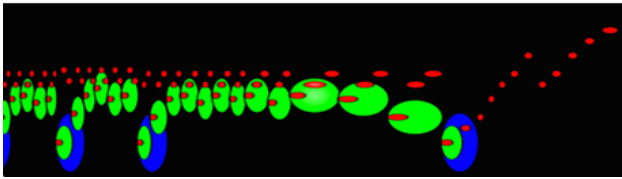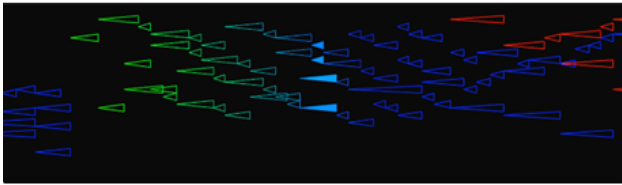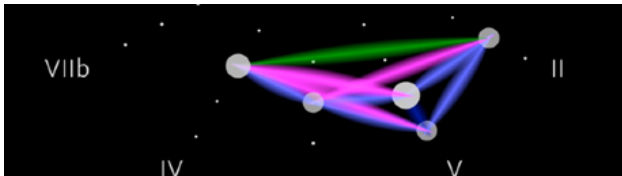
# MUSIC ANIMATION MACHINE

*STEPHEN MALINOWSKI*

**S**tephen Malinowski is an American composer and software programmer. In 1974 he came upon the idea of representing a complex musical score visually, in a way that would help a listener to follow it more easily. He made a long paper scroll, and on it he recorded each note of one of the Brandenburg Concertos in the form of a bar of colour. The resulting visual score gave an idea of the length and pitch of the notes within the concerto, but no indication of the dynamics, timbre or harmony. In 1985, he developed this idea further by writing a software programme called The Music Animation Machine. This programme translated the elements of a piece of music into a collection of shapes and colours, producing a visual representation of the notes, harmonies and rhythms contained within.



A SECTION OF *CLAIR DU LUNE* BY CLAUDE DEBUSSY - PUBLISHED IN 2005 AND CREATED BY STEPHEN MALINOWSKI USING HIS MUSIC ANIMATION MACHINE
http://www.musanim.com/Renderers/

EXAMPLES OF DIFFERENT GRAPHIC REPRESENTATIONS OF MUSIC MADE USING STEPHEN MALINOWSKI'S MUSIC ANIMATION MACHINE.
IMAGES FROM TOP: DYAD SPIRAL - TRAILING RIBBON – 3D TRIANGLES – CRESCENT FLOWER - 3D ELLIPSES – BALLS
http://www.musanim.com/Renderers/

The Music Animation Machine has been used to translate hundreds of pieces of music into visual form, an example of which can be seen by following this link to Stephen Malinowski's YouTube channel:

https://www.youtube.com/watch?v=LlvUepMa31o&t=130s
(A visual score of *Clair du Lune* by Claude Debussy – published in 2005)

Malinowski tries to express multiple elements of a piece of music using his software and is continually developing it to try and make the resulting animations more expressive. There are now many variations on the original coloured bar concept, examples of which can be seen opposite.

The combination of shape and colour in Malinowski's animations express the technical elements of the music in a mesmerising way. They have a grace and movement that I find incredibly beautiful, especially his later, more graphically experimental works. As a visual expression of the technical components of a piece of music, the animations are surprisingly emotive. One could argue that this is because of the music itself, but I find that the imagery enhances my listening experience and brings its own layer of interest and emotion. However, Malinowski does not attempt to tell his viewer how to feel. The feelings that arise when listening to a piece of music are not something that can be explained easily and would be even more difficult to express through coloured shapes.
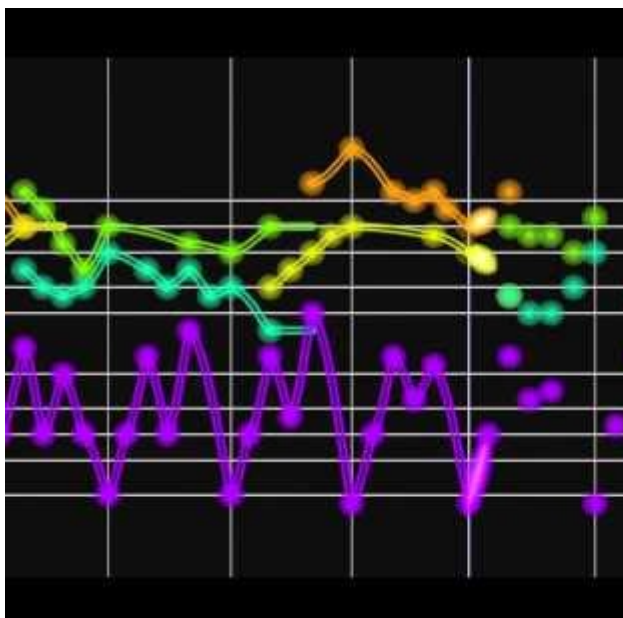


STILL TAKEN FROM AN ANIMATED SCORE OF BRAHMS STRING QUINTET IN G MAJOR, OP. 111: III. UN POCO ALLEGRETTO
https://asq4.wordpress.com/2014/06/17/new-animated-score-video-from-stephen-malinowski/

'**When I listen to a piece of music, I am discovering things, and appreciating the music more as a result of what I'm learning about it. What I'm trying to share with the viewers of my videos is that experience—the experience of discovering things about the music. I'm not trying to foist my own discoveries on people. So, even if a piece of music reminded me of dancing hippopotamuses, I wouldn't put them in a video. Rather, I try to make the visualization as neutral as possible; I try to stay out of it. I think of what I'm doing as being like giving the viewer a "musical microscope"—something that lets them see aspects of the music that would otherwise be hidden—and saying, "see for yourself".'**

**STEPHEN MALINOWSKI**
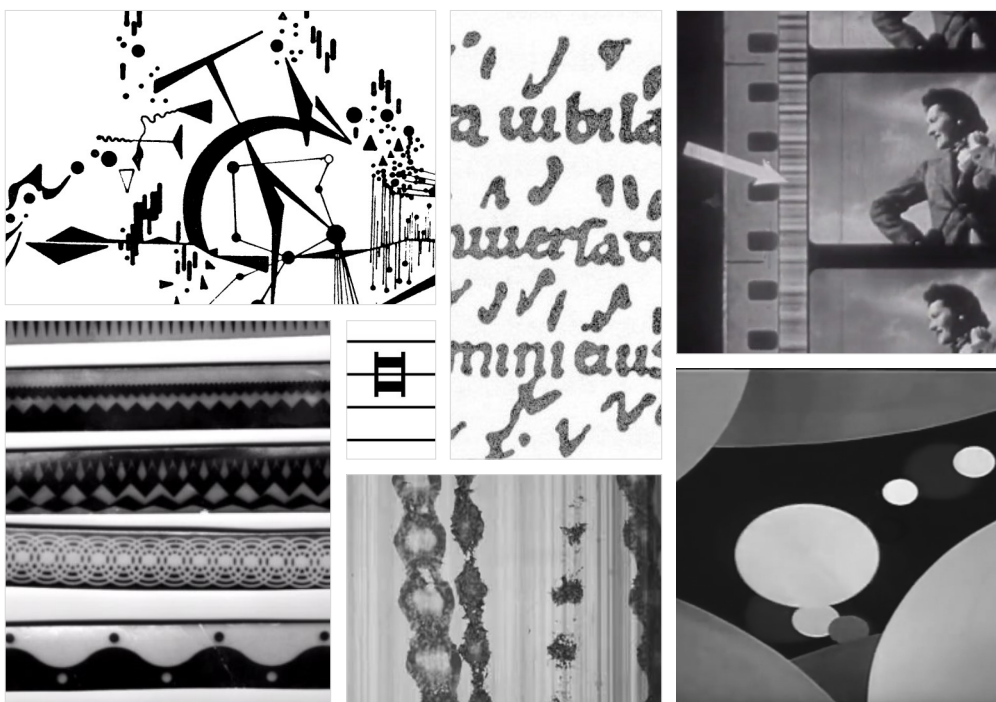
# CONCLUSIONS

**M**y conclusions from this project will form the foundations of the development of my own music visualisation methods. Taking inspiration from the people and the systems I have researched, I intend to apply elements of those ideas and methods to the planning of an animated film, synchronised to *Time In Joy.*

# CONCLUSIONS

After completing my research, I am now in a position to apply a number of criteria to the planning of my practical outcome. Having broken down the song with the help of the timeline and after my discussion with Peter Brewis, I have concluded that any practical piece must have the following characteristics in order for it to be a reflection of *Time In Joy*.

*It must have movement to give the viewer a sense of the flow and rhythm of the song.*

*It must have contrast: be both playful and dark.*

*It must be layered to echo the complex musical arrangement of the song.*

*It must use colour to emphasise the mood of each part of the song.*

*It must be, a finished and complete entity – more than just a sum of its parts.*

# CONCLUSIONS

Giving the animation a sense of movement is perhaps the most important criteria for me to get right. I need to find a way to express the rhythm of the song otherwise, similar to neume notation, the images within the animation will simply be a collection of markings without shape or form.

I decided to experiment with some test animations to help guide me in my planning for the next stage of the project.

I began by listening to the song and drawing the shapes and lines that came to me instinctively: loosely basing this idea on the connections colour-to-sound synaesthetes make.

I was happy with the patterns that were coming from this exercise and liked the flow that I was able to produce whilst drawing along to the rhythm. I tried the same method in Photoshop and was able to develop the appearance of the line using different pens: one that appealed to me in particular gave the appearance of the lines on a stave.

The visual contrast of black marks on a white background reflected the traditional methods of notation and also graphic notation. And, keeping in mind what Peter had said regarding the importance of contrast in his writing, I feel it goes some way towards achieving that.

Using a screen-recording app, I drew out the song in sections, pausing where I felt there was a natural end to a phrase or mood.



Changing the amount of pressure I applied to the pen allowed me to create further contrast in the appearance of the line, which I used to accentuate where the dominant beats in a bar or phrase appear. The light/dark sections of the line afford the viewer a better understanding of the song's rhythm and they also help to give depth to what could otherwise just have been a collection of interwoven lines.

The resulting drawing of all the phrases in *Time in Joy* can be seen below.

(Click the image to access a larger PDF version.)

**TIME IN JOY**

**FIELD MUSIC**

The test animation I have made is a good starting point; it has movement and contrast and I feel I have managed to capture something of the flow of the music through the travelling path of the line. It reminds me a little of a dance; the line moves its way around the page in shapes and patterns that could almost be choreographed.

To watch my test animation click the image below:



https://www.youtube.com/watch?v=f9_75K7G2PI

As it stands, I think that the animation is a fair representation of the rhythm of *Time in Joy*, but it doesn't reflect the themes, melody, musical arrangement or lyrics of the song.

In order to develop this idea further, I want to introduce colour into the animation, making the initial concept of a dancing line one of many layers that combine to create a whole picture of the song, its themes and its mood.

I am interested to learn more about synaesthesia and the naturally occurring associations that some people make between sound and colour. I would like to conduct further research into this area to help guide my decisions regarding the use of colour as a mood descriptor in the animation.

Expressing the mood and message of *Time in Joy* is vital if I want this piece of work to reflect it effectively. I feel that its lyrics are already a visual component; one that is recorded in text and therefore not necessarily something I should include. I want to find a way to express the meaning and story of the lyrics without the use of text so could explore synaesthesia, and perhaps colour theory as an alternative way to do that.

# *CONCLUSIONS*

I plan to continue to my research into the visualisation of music to help inform further development of this project. At this point in my research, I still have questions regarding the expression of mood and story and don't feel I am able to progress further until I have completed more investigation into  non-verbal methods of communication.

I would also like to explore the concept of music visualisation in a live music setting, perhaps working with a composer or performer to co-produce a visual/sound piece of work. I was inspired by the Yale production of Alexander Scriabin's composition *Prometheus* (page 22) and would like to work on something similar in a contemporary music genre.

I have found this research project fascinating and see it as the start of a new direction in my design practice. Finding new ways to connect music and graphic design is an exciting prospect for me, one I feel passionate about continuing to explore.

# BIBLIOGRAPHY

**PUBLICATIONS**

Alves, B. (2012). Consonance and Dissonance in Visual Music. Organised Sound, 17(2), 114-119.

Arts Council, & Mappin Art Gallery, Sheffield. (1986). Eye Music: The Graphic Art of New Musical Notation: [exhibition] Mappin Art Gallery, Sheffield, 7 June-13 July 1986, and Elsewhere.

Canemaker, J. (2004). Optical Poetry: The Life and Work of Oskar Fischinger. Print, 58 (3), 24-163.

Eagleman, D.M. (2010) Synaesthesia. BMJ, 340(7740), p.b4616.

Evarts, J. (1968). The New Musical Notation—A Graphic Art? Leonardo, 1(4), 405-412.

Harrison, J. & Baron-Cohen, S. (1994). Synaesthesia: An Account of Coloured Hearing. Leonardo, 27(4), pp.343–346.

Hope, C. (2017). Electronic Scores for Music: The Possibilities of Animated Notation. Computer Music Journal, 41(3), 21-35.

Hope R. Strayer. (2013). From Neumes to Notes: The Evolution of Music Notation. Musical Offerings, 4(1), 1-14.

Levy, K. (1987). On the origin of neumes. Early Music History, 7, 59-90.

Lucassen, T, (2008) Color Organs. University of Twente.

Klarmann, A. (1945) Gregorian Chant. Toledo: Gregorian Institute of America.

Mulvenna & Walsh, (2005). Synaesthesia. Current Biology, 15(11), pp.R399–R400.

Robertson, E., Haggh-Huglo, Barbara H., Warfield, Patrick, & Witzleben, J. Lawrence. (2010). "It Looks like Sound!": Drawing a History of "Animated Music" in the Early Twentieth Century. ProQuest Dissertations and Theses.

Roehl, A., Moskowitz, David V. Breuninger, Scott, Kocher, Stephanie, & Lombardi, Paul. (2012). John Cage Twentieth-century Avant-garde Composer and a Historical Perspective of His Use of Graphic Notation in Composition. ProQuest Dissertations and Theses.

Taylor, A. P. (2017). Newton's color theory, ca. 1665. Scientist,31(3)

Wilson, B., & Forney, Kristine K. (2006). Animated Music: The Development and Use of the Optical Soundtrack as a Musical Instrument. ProQuest Dissertations and Theses

# *BIBLIOGRAPHY*

## *WEB & FILM*

**COLOUR ORGANS**
*http://www.colourmusic.info/maistre2.htm*
*https://www.researchgate.net/figure/Organo-de-color-de-Bainbridge-Bishop_fig3_277009983*


**NEWTON**
*https://www.the-scientist.com/foundations/newtons-color-theory-ca-1665-31931*


**NORMAL MCLAREN**
*http://www.screenonline.org.uk/people/id/446775/*
*http://www.animatormag.com/archive/issue-19/issue-19-page-22/*


**NOTATION**
*https://www.classicfm.com/discover-music/how-music-notation-began/*
*https://www.mfiles.co.uk/music-notation-history.htm*
*https://www.wqxr.org/story/how-was-musical-notation-invented-brief-history/*


**OSKAR FISCHINGER**
*https://asmir.info/lib/fischinger.htm*
*http://www.bruceduffie.com/brown.html*
*https://www.theguardian.com/artanddesign/2013/jan/09/oskar-fischinger-animation-disney-nazis*
*https://player.vimeo.com/video/114947808*
*https://www.youtube.com/watch?v=6Xc4gOOFFLk*
Encyclopaedia Britannica Films. (1943). Sound Recording and Reproduction (Sound on Film). (Chicago: ERPI Classroom Films). 16mm Film.


**STEPHEN MALINOWSKI**
*https://www.youtube.com/watch?v=SQfzNJGnqnw*


**SYNAESTHESIA**
*https://synesthesia.com/blog/what-is-synesthesia/*
*https://www.telegraph.co.uk/art/artists/wassily-kandinsky-who-was-he/*