

Chromesthesia - A Journey in Colour and Music

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Introduction

I have always been fascinated by the possibility of translating one art form into another. This interest probably stems from my passion for all art forms, which pushed me towards imagining an “Omni-medium” encompassing all the forms.

Keeping the above in mind, I have decided to explore the correlation between the perception of colour and musical composition as my final term project.

Building on my BSc in Psychology, I had initially devised a “pseudo-experiment” to explore the condition of chromesthesia (a form of synesthesia that causes people to see sounds in colour) and had even lined up some interviews with people with chromesthesia. However, it soon became apparent that the nature of my project would not be scientific but artistic, focusing on the music writing process and how it can be affected by drawing upon the interpretation of something as simple as colours. Therefore, I set out to create a concept four-track EP, written using four simple briefs: red, blue, black, and white.

Although this was not strictly a scientific endeavour, I have drawn upon some scientific sources that have inspired me to undertake this journey, and I will discuss them later in this essay.

When devising this project, one of my biggest worries was the coherence of the final product: if each track represented a colour, they would all be radically different in terms of sound. I discussed the possibility of maintaining the same instrumentation and singer

throughout the EP with my mentor, and it was decided that this would aid in creating final product coherence.

Although my main area of production expertise is electronic music and software synthesis, I decided to take on a challenge by opting for analogue instrumentation and using the university's commercial studio. I decided to use drums, percussion, electric bass, guitars, Fender Rhodes, and Wurlitzer. I did use some synthesised sounds, but the majority and focus of the finished product is real instrumentation.

After the writing stage, when I got the chance to listen to all four demos back-to-back, I was worried about the final product turning out to be disjointed, as different colours and different writers yielded drastically different genres and sounds. However, although this was somewhat the case, the mixing process (and using the same recording space and instrumentation) mitigated the issue to the extent that I am satisfied the EP can stand on its own. Furthermore, I believe the very concept justifies some leeway regarding having different genres in the space of one EP. I see the finished product as a journey that takes the listener through various hues of musical experience.

Conception

Since a young age, I have had two ever-present and unwavering passions: music and film. I believe part of my fascination with connecting two senses (vision and hearing) stems from my obsession with the relationship between these two mediums. It was natural that I would eventually grow an interest in film music.

During the past year of my Master's Degree, I have not only scored four short films, but have also developed in the certainty that my future will be grounded in film music. My last submission was partly centred around scoring a student-made short; therefore, I had a rough idea I would be scoring a film for my final project. That idea fizzled out quite rapidly, as I thought a film score would be rather mundane, and I wanted to focus on a final product that would be more exciting and pique both my interest and the excitement of potential collaborators.

I also toyed with creating an interactive installation that would somehow turn sound into colour but quickly decided against it as my mentor remarked that the process should be inverted: turning colour into music.

Research and Case Studies

Synesthesia is a condition in which stimulation of one sensory modality causes unusual experiences in a second, unstimulated modality. (Hubbard and Ramachandran, 2005)

I first became aware of the existence of synesthesia while following an online masterclass by jazz musician Adam Neely, who is affected by grapheme-colour synesthesia, in which viewing letters and numbers induces the perception of colours. (Neely, 2017)

Neely also held a talk in which he illustrated how some polyrhythms, if sufficiently sped up, can generate a chord with corresponding ratios (for example, a 3/2 polyrhythm will translate into a perfect 5th when sped up, a ratio of 3/2 from the root note of the scale).

In his talk, he also draws a parallel between audio and light waves, affirming that it is somewhat possible to draw a parallel between sound and colour (eg. A, or 440Hz, multiplied by $1e+12$ turns into 440THz, which represents red on the visible light spectrum). I became enamoured with the concept and set my mind on finding a way to translate music to colour and vice versa reliably.

I began to research a range of artists, past and present, who have been affected by chromesthesia, Scriabin, Sibelius, Liszt, Pharrell Williams, Aphex Twin, and Tyler, The Creator, to name a few (Walters, 2022).

Out of the artists mentioned above, Scriabin can be considered to be the synesthete pour excellence: not only could he see sound in colour, but he even devised an instrument (the “clavier lumiere”) that would translate notes into colour for his synesthesia-centred composition, “Prometheus” (Buja, 2015).

Although Scriabin’s effort was incredible for his time, I could not find any mention of a more modern example: a concept album completed with the clear objective of exploring the parallel between colour and music. The lack of precedent served only as extra motivation for me to pursue this project.

Lastly, although the prominence of the “concept” album (or of the album in general) might have declined following the advent and prevalence of streaming services, “Artists such as Kendrick Lamar, Drake and Travis Scott regularly call on a host of collaborators to keep the momentum going on both the ever-present mix tapes that litter places like Soundcloud and their albums proper.” (Slate, 2019).

I see albums and EPs as art pieces, standing by themselves. They are supposed to be enjoyed from start to finish, as intended by the artist, and often take the listener on a journey that can prove more valuable than the relatively momentary trip through the experience of a

single track. For this reason, I decided to pursue this route for my final project, to keep the art form alive and pay my respects to the artists and producers that have come before me.

The Writing Process

I originally intended to take a semi-scientific approach. I planned to set up lights in the writing rooms to reflect the colour of the track we would be writing on the day. Furthermore, as mentioned earlier, I planned to interview people with chromesthesia and have listeners fill out questionnaires to see if they could perceive the track's colour. I also wanted writers to wear clothes and eat food of the given colour.

It did not take me long to realise that not only might the conditions not aid the creative process but there was also a possibility that they could be a hindrance to the quality of the final product. As my mentor mentioned in my MD session, the most important thing is the quality of the music, and the process has to be tailored to facilitate the writing process at every step of the way.

To quote one of my favourite producers, Rick Rubin: “It really is small steps and trying not to think too much. It’s more emotion and heart work than head work. The head comes in after to look at what the heart has presented and to organize it. But the initial inspiration comes from a different place, and it’s not the head, and it’s not an intellectual activity.” (Iraheta, 2015)

Writing music is a creative endeavour, not a feat of engineering. I, therefore, decided to do away with any potential “gimmicks” and take a more straightforward approach. The

realisation that it was sometimes difficult to step away from my background in psychology- in favour of focusing more on the philosophy and practice outlined by Rubin - was an interesting, and at times, complex one, which ultimately allowed me to create the kind of product I intended to, with a sole focus on trusting in the instinctual aspects of the creative process, rather than pre-ordained approaches designed to influence the outcomes on listeners beyond the music.

The writers were told which colour they were writing for and then given artistic freedom to write what they felt. The sessions usually started with a brainstorming session, in which we discussed themes and musical tones that the colour brought to mind, then built up from there.

Like in all creative endeavours, there was a fair degree of improvisation at times, which I actively encouraged; this created opportunities for the writers to express their creativity and, most of the time, this led to unexpected and desirable creative outcomes that then successfully moved the process forward.

Writing “Home” (White)

Right at the beginning of the session, we discussed the themes emerging from the idea of white and immediately agreed on three main feelings: Innocence, Purity, and Memory. The song quickly became centred around the concept that one could always find refuge in happy memories no matter the circumstances, specifically focussing on innocent, positive childhood memories.

The song was initially written in C Major but later transposed to B Major to better fit within the singer’s vocal range.

We naturally gravitated towards a major key as it elicits a “happy” feeling, as opposed to minor keys, which are generally perceived as “sad”. Interestingly, this phenomenon is due to our group evolution and how we modulate our voices according to status. As illustrated by Norman D. Cook: “decreasing vocal pitch is used to indicate strength and social dominance (commands, assertions), whereas increasing pitch signals defeat and social weakness (questions, uncertainty). The effect of major or minor chords is thus inherently positive or negative because the tonal structures have ancient evolutionary implications of high or low social status.” (Willimek, 2019) This is because major chords are resolved down from musical tension, whereas minor chords resolve up from the point of tension.

The track was relatively easy to write; however, we hit a brief roadblock while discussing lyrics and felt we did not want to end up with cliché lines. I believe we were able to extricate ourselves from this possible trap and have a track with a good amount of body and significance.

Recording

In line with the concept of purity and authenticity of emotion, I opted for a live recording, with no overdubs or added instrumentation for this track - I wanted it to sound as “pure” as possible.

To achieve the desired effect, we recorded the singer while playing the piano, without a click track. Although this has previously been done (Fyfe, 2000), it is mostly a rarity nowadays. Multi-tracking is the preferred recording mode, giving more freedom from hassles such as bleed and phase issues. We used a dynamic microphone to capture the vocal performance and minimise bleed from the piano.

We recorded the piano with a pair of large diaphragm condenser microphones on the soundboard, a matched pair of small diaphragm condensers on the hammers, and two small diaphragm condensers in X-Y Pair as room microphones to achieve a spacious stereo image (Rochman, 2017). Also, we had two ribbon microphones at the back of the piano.

Mixing

I set out to record this track live to achieve authenticity and a faithful representation of the performer's emotions, but also because I thought that mixing it would be relatively simple - all I had to do was get a good performance, and the mixing process would be easy. I was wrong. We got a lot of bleed, and I had not realised or considered that piano and voice have many frequencies in common, so I found it difficult to separate the two for processing.

I started by using RX on the vocals to get rid of some piano bleed, which was quite effective. Furthermore, I applied practically no tuning to the vox, as this would cause phasing issues from the two different sources.

I used a tube compressor with about -2db reduction for the verses and -3db for the choruses to maintain a consistent delivery but not to bring up any extra, unnecessary bleed. I also wanted a pretty natural performance, so I did not want to overly compress it and make it sound unnatural. I automated a plate reverb, a room reverb, two hall reverbs, and a slapback delay to keep the vocal performance developing and compensate for the lack of instrumentation. This is similar to what Tom Elmhirst did with Adele's Hello, using up to eight or nine different spacial effects at one time (Weiss, 2015).

In line with Adele's "hello", I also automated a high-end eq scoop, cutting out some of the highs at the start of the song from the piano, only to introduce them back in as the piece developed. Furthermore, I used a mid-side eq plugin to remove some of the mids from the piano in the "mid" section to make space for the voice, only to bring it back in when singing was not going on.

Writing "So Blue" (Blue)

Inevitably, the first writing prompts came from the idea of "feeling blue." Naturally, the inspiration followed, and we wrote about a toxic relationship that a person keeps returning to. It has to be mentioned that the writers I picked for this piece come from a pop background, so the track itself has pop connotations, which doesn't necessarily sit with the rest of the composition.

I have to say, though, that I've found the writing process seamless and that we had a finished product in a single session, which I thought was impressive.

Recording

We had a pretty standard drum kit set up, with a dynamic microphone for the top and the bottom of the snare, two dynamic mics for the toms, a dynamic microphone for inside the kick to capture the boominess of the kick, and one for the outside, to record its tonal qualities. We also set up a matched pair of small diaphragm condenser mics as overheads to capture the stereo image of the kick (Robjohns, 2003). This was the first track I ever recorded a live drum kit for, and it was a challenging but enjoyable experience.

The bass was recorded straight through the DI, as I thought this track did not need too much bass tone but just had it do its job in the lower frequencies without any bells and whistles.

The vocals were recorded on a vintage large diaphragm condenser, which I thought would be the best option to capture a bit more of the airiness of the vocal as it seemed most authentically in line with the 'pop' nature of the song.

Mixing

The vocal was my main focus for this track, receiving most of the attention. I firstly pitch corrected the takes fairly heavily in order to keep in line with industry standards. I applied a high-pass filter to the takes at 90Hz to get rid of any boomy frequencies and extraneous sounds not necessarily perceivable, but that can cause a low-end buildup.

I applied a dynamic range compressor with a very fast attack to both the verses and choruses to catch any peaks coming through the vocal performance, then I split-tracked the take and added a tube compressor only to the chorus to make the vocal more consistent and appear closer to the listener as the song progresses. I also used a dynamic eq to cut out unpleasant resonances at 2kHz, 3.8kHz and 5kHz. I added two de-essers in order to get rid of sibilance, one at the start and one at the end of the chain. I added a pultec style EQ and applied a boost at around 3kHz to add some saturated highs. I had, again, a room, a plate and a hall reverb which I automated throughout the piece, as well as a slapback delay on the vocal to give it more of a sense of space. I also used side-chain compression on the reverbs and

delays to make sure they would duck down when the vocal was playing, leaving space for the performance (Hoffman, 2020).

There are a couple of moments in the track in which some plosives come through, but I wanted to keep at least slightly in line with the “natural” and “live” feel of the rest of the EP, so I opted to keep them in and not treat them completely. This is partly due to my obsession with Nina Simone’s track “Sinnerman”, in which numerous plosives are kept in and, in my opinion, add to the overall performance (Simone, 1’39”, 1962).

I edited the drums pretty heavily for this track, applying gates to both the kick and snare to get rid of cymbal wash and bleed. I also fitted the hits pretty tightly to the grid as I believe the drummer was not enthusiastic enough about recording this particular piece (Waves Audio, 2018).

Writing “Bleed” (Red)

I had decided fairly early on that I would write a whole track (at least the music) wholly by myself. I thought Red would be the perfect track as it made me think of rage, which fit perfectly with one of my areas of expertise: rock music.

I decided to use time signature changes to keep the listener a little unbalanced, just like one feels when enraged. The idea was also to come in right away with as violent a chorus as possible to convey a sudden rising of emotions.

Unfortunately, my strength does not lie in writing either lyrics or toplines, so I had to enlist the help of the singer of my band. I found this collaboration very fruitful as we share a similar musical vision, so the track came together almost immediately.

Recording

The key to this track was this: distortion.

Although with pop music, “vocal is king”, that is not necessarily the case for rock music. As stated on Pro Audio Files (2016): “There was about a five year period in the early 90s where you could not understand the words to any songs playing on the Rock FM station, unless it was Sublime or Chili Peppers. The guitars often take precedence in the mix, and the snare drum is usually pretty competitive as well.”

My focus was, therefore, on guitars. We ran a single coil pickup electric guitar through a 10 Watt valve amplifier with six microphones: a ribbon, a large diaphragm condenser (as used by Steve Albinim due to the consistent frequency response across the spectrum), and a dynamic microphone (for extended frequency response) on the cone. Also, a dynamic mic on the exposed back of the amp and a matched pair of room mics. I would then blend the different signals to taste to achieve a rich, thick guitar sound. (Senior, 2019)

I also ran the guitar through a distortion and a fuzz pedal for extra grit.

Lastly, I really wanted to capture a live performance feel and wanted the singer to be on the move as much as possible to give the vocal performance a sense of restlessness. I had

the choice of using both an sm57 or an sm58, but because I wanted the singer to hold the microphone in his hand while recording, I opted for the 58, as the grill is more indicated for preventing plosives (Shure)

Mixing

After listening to the recordings, I realised I had gone through the process of unscrewing the back of my amplifier for nothing, as the microphone pointing at the back of the cone was recorded at too low a level and could not get past the noise floor. I had, therefore, to discard it in favour of the other microphones.

I particularly liked the midrange response of the large diaphragm, so I kept it quite high in the mix. I recorded different takes of the same line and panned them to opposite sides. I ran the guitars through two compressors in series to make them sound as upfront as possible, and to blend the signals of the different microphones nicely. I also applied an inordinate amount of distortion to the DI signal, creating a sort of “trash signal” that added to the grittiness of the take.

In a similar fashion, I distorted and compressed the vocals extensively to enhance their aggressivity. To avoid getting an over-distorted mix, however, I only compressed the snare and guitar, as well as bus-compressing the kit with a glue compressor to give it more presence in the mix. I did, however, heavily distort the room microphone and brought it down in the mix.

Writing “Into The Void” (Black)

Writing this track was, in some way, a special experience.

I was lucky enough to enlist the help of a synesthetic writer and musician for this piece, one with which I have previously collaborated and who shares many of my musical tastes.

As soon as we started writing, we decided to go more in a surrealist / impressionistic direction in terms of lyrics. We did not want to write directly what we felt black represented but, in true synesthesia fashion, to paint a picture with words, a picture tinted in black and shadows.

The process started from a single note on a piano, a D, which my co-writer held as the darkest note of them all. Then we started writing words that would evoke suggestive, dark imagery as they came to us, without necessarily a logical link between them. It was a natural, easy process that resulted in a product that we are both very proud of.

Recording

For this track, I had a clear idea in mind to have a defined, repetitive, chunky and prominent bassline throughout. We achieved this by recording the DI signal of the bass as well as recording the amplifier with a dynamic mic with a good low-end response (White, 1999). I also decided to record some congas to add an extra percussive element to the track by using two large diaphragm condensers to achieve a stereo response.

The vocal was always going to be super compressed and distorted, so I decided to use a dynamic microphone instead.

Mixing

Although having two bass signals, distorting them and compressing them seemed like it would have been enough to achieve my purpose, I found that the bass was still lacking. I therefore ran the DI signal into an amp simulator to give it the grit I was looking for.

I also used a 20Hz high-pass filter for safety to prevent any unwanted rumble from unbalancing the mix.

To mix the vocal, I decided to overcompress it to an excessive extent (over -10db of reduction), as well as adding distortion and various delays. This was designed to make it sound as if was whispered and screamed at the same time. (Waves Audio, 2018)

I also pitched down a number of different backing vocals and tuned some of them to 100% to make them sound unnatural, almost dreadful.

I also applied quite a lot of bus compression to the drums to make them sound as upfront as possible and ran the room microphones through a fairly big hall reverb, as well as an overdrive.

The main vocal was also run through an automatic tuning plugin, but I got the settings too high by accident, resulting in artefacts. To my surprise, though, it created a strange and interesting vibrato effect that fit the “eastern” vibe of the track, so I decided to keep it as set.

I also used a tape emulation plugin on the master channel with fairly conservative settings, I found though that it brought the whole track together, so was quite happy with it.

Conclusion

In conclusion, I am satisfied with the final product I achieved. It was not easy to complete by any stretch of the imagination, as writing each track presented a challenge. As previously mentioned, I had never really worked with live instruments before this, let alone in such a high-quality commercial studio.

The two biggest challenges I faced were managing the group of writers and musicians while achieving a final result that would sound somewhat coherent.

I can say with confidence, however, that I prefer the “heavier” songs to the lighter ones, although “Home” is a moving track. I believe I should take this as a hint for the future: it is worth, in my opinion, working on what we actually love, and the results will show in the final product.

On this note, I have to say I have learnt a lot I did not know about production through working on pop: vocal production mostly, but also clever use of compression and going a 150% with effects. In some ways the “over the top” mentality of pop ties in with the genres I usually listen to, but I think that going forward, I will be pursuing mostly the genres I feel comfortable with, instead of the ones that sell.

Although I feel the EP is a viable musical journey, I do feel almost as if it is split into two parts that do not precisely fit together: the light (white, blue) and the dark (red, black).

I believe that if I were to undertake the project a second time, I would make sure to maintain the same group of writers throughout the whole EP. This would make organising and scheduling more manageable while helping achieve a more unified final result. A great way to do this would be to write and record the EP from scratch with my band rather than with external writers: not only do my band members already have a weekly allocated “meeting slot”, but they all have a fundamentally unifying musical “signature”.

Furthermore, given the nature of being in a band and having shared experiences, my band members and I have a shared “chemistry”, which is sometimes difficult to distil and replicate in a writing room with other writers.

Even if I were not to write the EP with my band members, I would probably decide somewhat to restrict the musical style or genre of the songs written. Most writers usually follow pretty restrictive briefs. Although this might seem stifling to the creative process, having a jointed, finished product that can coherently stand by itself is more important to me than achieving complete creative freedom.

However, I look back with satisfaction on what I have achieved, not only this past term but this past year. I know I have become a much more skilled producer, and this EP is a testament to that. I look forward with optimism in the knowledge that the experience and expertise I have accumulated this past year will aid a bright and prosperous future in music.

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