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MAGIC TRICKS AND OTHER SPIELE: AN INTERDISCIPLINARY EXPLORATION OF THE PHENOMENON OF PERCEPTION AND ILLUSION IN MUSIC

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Abstract

Our perception of reality is often distorted. We tend to believe that the illusions we perceive are the truth, while in reality, everything is seen and heard differently by each individual. Magicians are the master manipulator of perception, illusion, and deception.

This paper takes a closer inspection to an interdisciplinary process leading to the creation of a series of pieces inspired by my exploration of music, magic, and illusions. Beginning from ancient magical practices to modern optical illusions, alongside auditory illusions and various techniques that were used to manipulate human perception.

Keywords: Sonic Illusions, Perception, Music, Magic

As a music performer and composer, I am interested in exploring ways through which selected illusion techniques, from the past until now, both visual and auditory, could be adapted and translated to the context of a public performance with a clear music focus. I had planned for the show to be filled with illusions borrowed from my study of a repertoire of magic tricks developed by magicians over the last many centuries as well as my exploration of optical illusions. I aimed to replicate the satisfying effect that occurs when an illusion finally reveals itself, when the impossible is achieved and reality is defied. Manipulating what the audience perceives as reality. The act of translating these illusions into the language of musical notes provides a unique experience for the audience.

During the month of April in 2023, I devised a showcase containing series of compositions with heavy emphasis on both the elements of improvisation and auditory illusions. The show was hastily titled *'Magic Tricks and Other Spiele'*, a title that originally reflected from my aim to showcase exactly as it was called – magic and wonders. What ended up happening however, reveals my deeper instinct to connect. Not only from the thematic standpoint, but also from the perspective of a performer. The connection between us and the audience, the society, and most importantly, (probably), our minds.

This revelation led me to more questions such as how music is connected to magic - is the performative part all there is to it? Or are there any other aspects that might be a link hidden underneath the intangible veil of two art forms?

A brief selective history of the art of magic

Magic has a long and varied history, often intertwined with beliefs in the supernatural and occult practices spanning over multiple cultures and civilizations throughout the ages. While the exact origins of magic are difficult to pinpoint, its roots can be traced back to ancient times.

The ancient Egyptians had a rich tradition of magic and sorcery, which played a significant role in their religious and cultural practices. Magical spells, rituals, and amulets were used for various purposes, including protection, healing, and divination. An Egyptian papyrus dated around 2500 BCE portrays a magician named "Dedi" performing an animal decapitation trick for the pharaoh. According to the

story, Dedi magically replaces the severed heads and then makes a number of prophecies to the king. (Christopher, 1996, pp. 8–10) While some point out that there are a number of Egyptian stories that describe magicians who also make prophecies, the story of Dedi and his animal decapitation trick, while intriguing, is likely a fictional tale with elements of magical performance.



Figure 1: The Westcar Papyrus containing the story of Dedi (Schengili-Roberts, 2017)

It isn't before the 5th century, however, that magic as a performance art is reliably documented. One of those early pieces of evidence includes the Acetabularia, a group of Roman magicians who specialized in performing the Cups and Balls ("acetabula et calculi") routine. (American Museum of Magic, n.d.) Seneca the Younger, Roman Philosopher and dramatist, describes the routine in his 45th Epistle to Lucilius that provides definitive proof that magicians have been performing the Cups and Balls—and more importantly, perhaps, audiences have been watching and enjoying it—for some two millennia, at the very least. Interestingly, Seneca astutely observes that it is the mystery of the trick that engages him: *"... it is the very trickery that pleases me. But show me how the trick is done, and I have lost my interest therein."* (Seneca, 1917–1925)

During the Middle Ages (c. 400–1500 CE), relatively little is known about the history of magic. During this period, the practice of magic became closely associated with the occult, witchcraft, and supernatural beliefs. As a result, it was often viewed with suspicion by the Church, and those who practised magic were frequently persecuted as witches or sorcerers. (Seligmann, 2018, pp. 191–192) Magic as a form of entertainment was not particularly prominent during this period. However, the

increasingly trade-oriented nature of society allowed some street and travelling performers to make a living from classic effects such as the cups and balls, as well as from more contemporary practices involving sleight of hand with coins and other small objects, often used to deceive or short-change unsuspecting spectators.

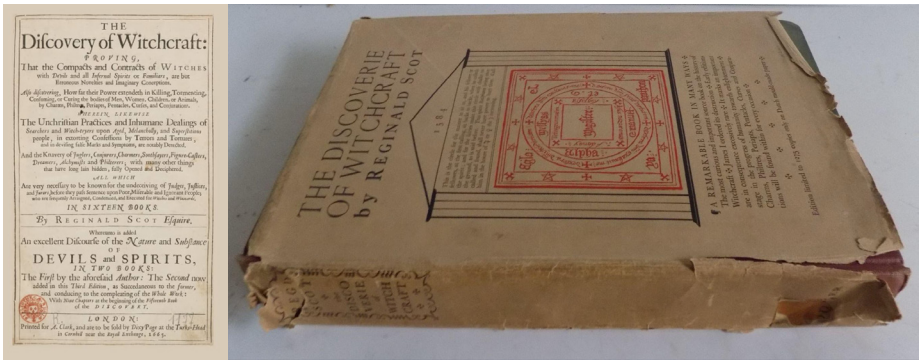

Figure 2,3 : Inner cover (left) and first edition cover (right) of The Discoverie of Witchcraft 2017)

In 1584, Reginald Scot published *The Discoverie of Witchcraft*, a book that sought to dispel superstitions surrounding witchcraft and magic tricks. It was, in part, an attempt to persuade the Church that individuals should not be burned at the stake or hanged merely for performing simple conjuring effects. The book revealed the methods behind many magic tricks, demonstrating that they relied on sleight of hand rather than supernatural powers. While *The Discoverie of Witchcraft* helped challenge the association between magic and witchcraft, it was not until later centuries that magic became widely accepted as a form of entertainment and performance art. The work is widely regarded as the first published treatise on performance magic.

The eighteenth and nineteenth centuries saw the emergence of what is often referred to as the Golden Age of Magic. Magic shows and performances became a popular form of entertainment, often accompanied by increasingly sophisticated automata and handcrafted mechanical curiosities. One of the most influential figures of this period was Jean-Eugène Robert-Houdin (Houdini, 2020, pp. 33–50), who is widely regarded as the originator of the modern style of conjuring. Owing to his innovative use of mechanical automata and his revolutionary approach to performance, he is often considered the “father of modern magic.”

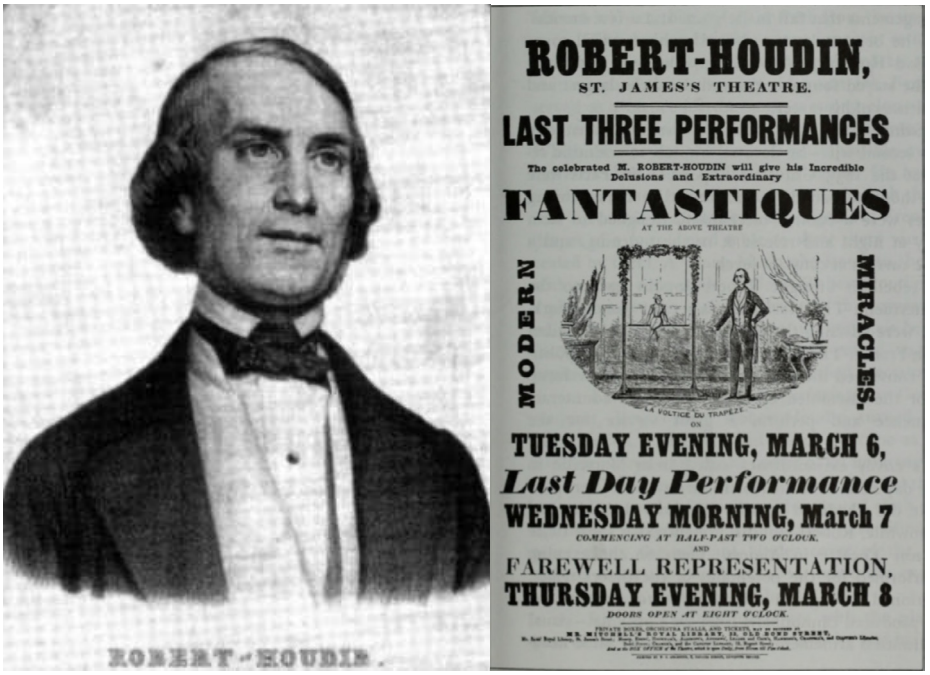

Figure 4, 5: Robert-Houdin's favourite portrait (left) and a London playbill featuring his mechanical trapeze performer, *Antonio Diavolo*.(right) (Christopher, 1996, pp. 134, 147)

Another character during the time is none other than Harry Houdini who took Robert-Houdin's name and made it his own stage name. (The Editors of Encyclopaedia Britannica, 2024) From about 1900, Houdini began to earn an international reputation for his daring feats of extrication from shackles, ropes, and handcuffs and from various locked containers ranging from milk cans to coffins to prison cells. One of Houdini's classics is called the *Metamorphosis.* (Folender, 2008) an illusion from early in Houdini's career, which he performed with his wife, Bess. In the illusion, Houdini is bound before being put into a small crate that is then locked shut. Bess would then stand atop the crate and pull a curtain up to cover her from the view of the audience, when she dropped the curtain, Bess was no longer there and instead it was Houdini. The crate was then unlocked, and Bess was found to be bound inside. The entire transformation took only seconds. This is the illusion that started it all for Houdini, and most likely one of the most beautiful escapes Houdini performed.

Modern Magic

In the twentieth century, magic continued to evolve as a performance art form. Magicians such as Harry Blackstone Sr., David Copperfield, Shin Lim, and Penn & Teller pushed the boundaries of illusion and brought new innovations to the field. They employed increasingly sophisticated props and technologies to create new effects while simultaneously reinventing classic routines.

In this regard, I would like to draw particular attention to Penn & Teller, a duo renowned for challenging the traditional culture of secrecy within magic. Their performances often involve openly revealing methods that magicians would normally conceal, yet they still manage to deceive audiences in the process.

Examples range from routines in which they appear to explain exactly how a sleight-of-hand effect is performed-such as their well-known cigarette trick, in which they seemingly reveal the method while continuing to fool the audience (Penn & Teller: Fool Us, 2015) to elaborate stunts such as hanging upside down while being filmed in a way that makes them appear upright on live television. (Saturday Night Live, 2013) They have even reinterpreted some of the oldest tricks in the magician's repertoire, such as the cups and balls, (Friday Night With Jonathan Ross, 2023, 10:30) by performing them with three transparent plastic cups, seemingly eliminating the possibility of concealment altogether.

It is worth noting that the history of magic is a vast and complex subject, encompassing numerous cultural traditions and developments across different periods and regions. The examples presented above merely scratch the surface of this rich history. Alongside the evolution of magic, another equally fascinating area of inquiry is that of optical illusions. These visual phenomena have been intertwined with magic since ancient times, exploiting the limitations and assumptions of human perception. To better understand this relationship, it is useful to take a closer look at the world of optical illusions and the ways in which they challenge and manipulate our perception of reality.

Introduction to optical illusions

Optical illusions, in their diverse forms and shapes, have been a subject of great fascination. It took a long time throughout history for painters to develop increasingly accurate representations of the visual appearance of things. It includes

elements such as the accurate depiction of the anatomy of humans and beasts, of perspective and effects of distance, and of detailed effects of light and colour. However, along with theatrical scenery, visual artists began to have a systematic approach to evolve a system of perspective around the 5th century BC in the art of ancient Greece, as part of a developing interest in illusionism allied to theatrical scenery. This was detailed within Aristotle's Poetics as skenographia ('scene-painting'): using flat panels on a stage to give the illusion of depth. (Dunkle, n.d.)

One baroque era art technique fully harnessing the power of spatial illusion: the trompe l'oeil is a style of painting that was developed in 17th century Europe, in response to cultural anxieties occasioned by revolutionary scientific discoveries, revolutionary religious upheaval, (Zamora, n.d.) and by the new taste for virtuosic visual display. The authority of perception was being undermined, and Baroque artists responded accordingly—and often fantastically—with structures intended to deceive the eye—the literal meaning, of course, of trompe l'oeil. Trompe l'oeil paintings were known long before the Baroque period, and long after. During the 20th century, this trick was mostly associated with works of surrealist painters such as Salvador Dali and René Magritte.



Figure 6,7. View of the nave, crossing, and choir (1685-97), Andrea Pozzo, Sant'Ignazio, Rome (left) The Human Condition (1933), René Magritte (right)

In modern media, there are several interesting applications of the technique apart from being used by street artists. OK Go's music video for "The Writing's on the Wall" uses a number of trompe-l'oeil illusions alongside other optical illusions, captured through a one-shot take. (Plait, 2014) Trompe-l'oeil illusions have been used as major gameplay mechanics in video games such as The Witness and Superliminal. (Shih, 2019)

Optical art is also another field that is unavoidable when we are discussing optical illusions. One of the most renowned figures in this realm is M.C. Escher.



"I don't grow up. In me is the small child of my early days."
Figure 8. Escher at work on *Sphere Surface with Fish* (1958) in his workshop, using a stick as a support, late 1950s (Simões, 2017)

Celebrated for his mind-bending architectural designs, perspective manipulations, and his creation of impossible spaces. (Locher & Veldhuysen, 2013) Interestingly, Escher himself did not consider his work as optical illusions, but rather as his personal exploration of beauty and purity. Nevertheless, his art undeniably had a profound influence on the development of op art in the modern world.

"I am always wandering around in enigmas. There are young people who constantly come to tell me: you, too, are making Op Art. I haven't the slightest idea what that is, Op Art. I've been doing this work for thirty years now." (M.C. Escher Foundation & The M.C. Escher Company, n.d.)

M.C. Escher's creations have challenged our visual perception with mind-bending visual paradoxes and intricate constructions. By delving into concepts of perspective, geometry, and symmetry, he encourages viewers to question their interpretation of reality.

In conclusion to what was discussed, to say that 'the eyes will only see what the mind can or want to see' would not be far from correct. Now, if we can't fully trust what we perceive through our eyes, what about sound? Can we trust what we hear?

Music and sonic illusions

Much like the evolution of optical illusions since the Baroque era, a parallel development can be observed in the realm of music. Techniques such as Canons which are based on the principle of strict imitation, in which an initial melody is imitated at a specified time interval by one or more parts, either at the unison or at some other pitch. As the melodies blend together, this creates an illusion, not necessarily as the intended effect, but soon after the techniques became more refined and developed into contrapuntal texture like Bach's Inventions, Sinfonias, and Fugues. (Schulenberg, 2001, p. 243)

When it comes to sonic illusions, it is unavoidable to mention Diana Deutsch's groundbreaking work in music psychology which has shed light on the fascinating world of auditory illusions and how individuals perceive and interpret musical patterns and speech.

One area of Deutsch's research focuses on is stereo illusions (Deutsch, n.d.) in music. Namely the Octave illusion, (Deutsch, n.d.) Scale Illusion, (Deutsch, n.d.) Chromatic Illusion, (Deutsch, n.d.) Glissando Illusion, (Deutsch, n.d.) and Cambiata Illusion. (Deutsch, n.d.) These illusions involve presenting different tones or musical elements to the left and right ears, creating a sense of spatial

perception. Surprisingly, individuals, including highly skilled musicians, can have stark disagreements about the placement of sounds.

For example, when listening to an Octave illusion, one person may perceive a high-pitched tone as originating from the right ear, while another may insist that it comes from the left ear. Discrepancies in perception like aforementioned examples are not influenced by musical expertise or training, highlighting the intriguing subjectivity of auditory perception.

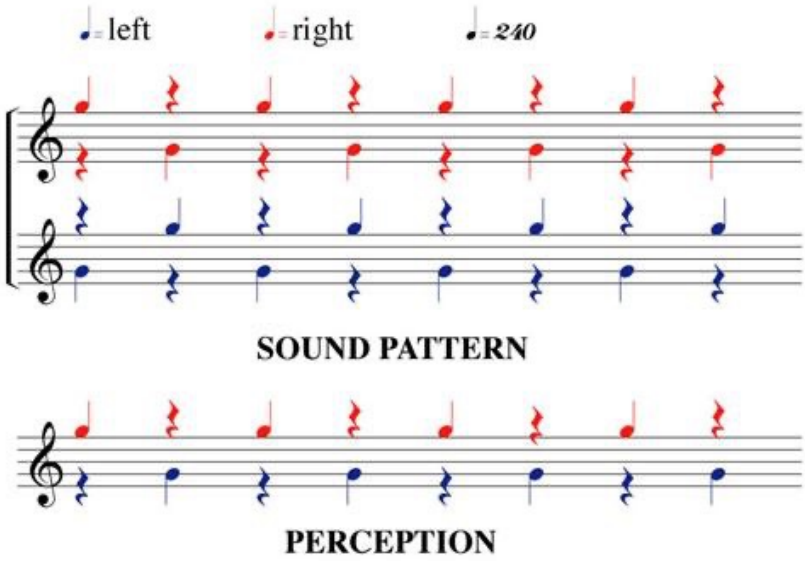

Figure 9: Notation example of Deutsch's sound pattern in Octave illusion example and what is actually heard

The tritone paradox (Deutsch, n.d.) is another significant auditory illusion explored by Deutsch. It involves playing a pair of tones that creates the perception of either an ascending or descending pitch movement. However, even expert musicians can engage in passionate debates about the direction of this perceived pitch movement. Listeners may adamantly argue whether the pattern is moving up or down, despite their musical expertise. These disagreements further demonstrate the complex nature of auditory perception and how subjective interpretation plays a role in our understanding of music.

According to Deutsch, in an experiment, the pairs of tones (Deutsch, n.d.) were played to a group of subjects, and they judged each pair if they heard it as an ascending or descending pattern. The results supported her conjecture.

"...the judgments of most subjects varied systematically depending on the positions of the tones along the pitch class circle: Tones in one region of the circle tended to be heard as higher, and tones in the opposite region as lower." (Deutsch, n.d.)

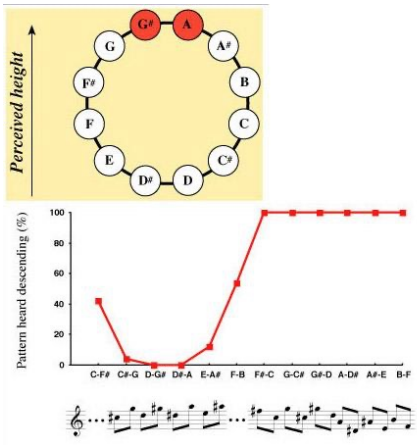

Figure 11: Perception of the Tritone Paradox by a subject who perceived the illusion in a pronounced fashion. The upper figure shows the orientation of the pitch class circle with respect to height, derived from the judgments of the subject shown in the graph. This subject's peak pitch classes were G# and A.

Deutsch's research challenges the notion that musical perception is purely objective and isn't universally shared. It suggests that our auditory system can be susceptible to illusions and that individual differences in perception arise regardless of musical abilities, leading towards implications not only for understanding auditory cognition but also in fields such as music education, composition, and even audio engineering. (Deutsch, 2017)

Furthermore, Deutsch's work extends beyond musical illusions to explore the perception of speech. She has investigated phenomena such as the "speech-to-song" illusion (Deutsch, n.d.), where spoken phrases are perceived as singing, blurring the boundaries between speech and music. These studies provide valuable insights into how our auditory system processes and interprets both musical and speech stimuli.

Overall, Diana Deutsch's research on auditory illusions in music and speech highlights the remarkable complexity of our perception and the diverse ways in which individuals experience and interpret sound. It deepens our understanding of the intricate relationship between the human auditory system, cognition, and the rich tapestry of musical and linguistic experiences.

There are many more interesting illusionists in the music world. In 1967, Steve Reich came across a novel process for achieving illusion. His "phasing" technique allowed him to generate something similar to a state of a trance - altering the thought process of both the performer and listener.

While performing and listening to gradual musical process one can participate in a particularly liberating and impersonal kind of ritual. Focusing in on the musical process makes possible that shift of attention away from he and she and you and me outwards (or inwards) towards it. (Cox & Warner, 2019)

Such effects can be perceived in one of his famous works Piano Phase (1967) where he applied his gradual process to composing for acoustic instruments. In this particular case, for two pianos. Reich describes his phasing process as *"...the process of gradually shifting phase relationships between two or more identical repeating patterns is an extension of the idea of infinite canon or round."* (Reich, 2002, p. 20)

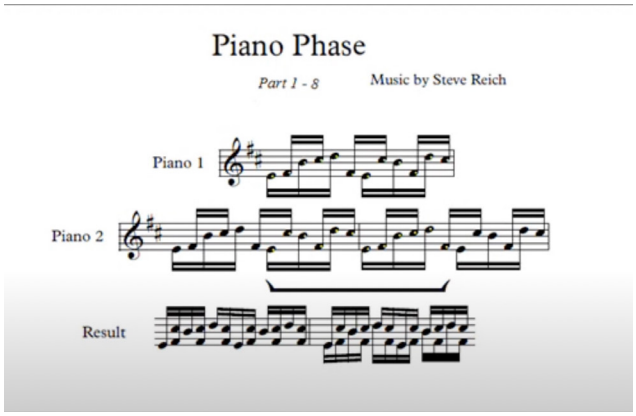

Figure 12: A visualisation showing part of the score and notated result of phasing effect of Reich's Piano Phase. (Matekon, 2015)

In Reich's *Writings about Music* (1974), he states that:

Even when all the cards are on the table and everyone hears what is gradually happening in the musical process, there are still enough mysteries to satisfy all. (Reich, 1975, p. 10)

György Ligeti achieved similar results in his "Etudes pour Piano" (Ligeti, 1985–2001) although through different means and also in an orchestral piece "Atmospheres" (Ligeti, 1961) where although sounds quite static, Ligeti didn't wish for something static, but rather the illusions of something that was.

La Monte Young is another notable figure who works directly with the way humans perceive sounds. However, in a completely different manner, he worked with tunings. Essentially bending the source and forcing the ears to adapt to a non "equal-tempered" tuning system such as his long performative program"The Well-Tuned Piano." (Young, n.d.)

All of the concepts and techniques mentioned above are merely examples that I have found most interesting. Some of which I have already applied to my composition. Such as the minimalistic approach of Reich or the usage of contrapuntal texture in my own acoustic compositions. While also borrowing ideas of the stereo illusions to apply in the electroacoustical side by trying to blend a pre-recorded video of my improvisation on piano with a live improvisation on stage, featuring myself and another me on the screen. There will be more in-depth details on various inspirations and techniques applied in the section below.

The Magic Show (Taksinwarajan, n.d.)

My fascination for magicians and their ability to achieve impossibility carried on into the next couple of compositions that I compiled in this section. I tried to create both the visual illusion and sonic illusion through various means such as making musicians appear on screen before revealing themselves on the stage, improvising on amplified piano alongside a pre-recorded piano improvisation, and pantomime.

The experience of writing for an orchestra and studying many inspired works

has greatly helped me find unorthodox ways to notate and effectively communicate my intentions to fellow musicians. This allowed for greater efficiency in realising a suite of musical ideas in just a few rehearsals.

The plan was very simple: I had 30 minutes to fill, 5 very capable musicians ready to play (flute, guitar, violin, viola, and double bass), tell a story, and connect all the dots together. In the end, it became a roughly 45 minutes-long show with 3 compositions and added materials of piano improvisation and pantomime in the middle. Using voice overs to tell a story - something honest and vulnerable. Inside a space where the stage ended up looking like this:

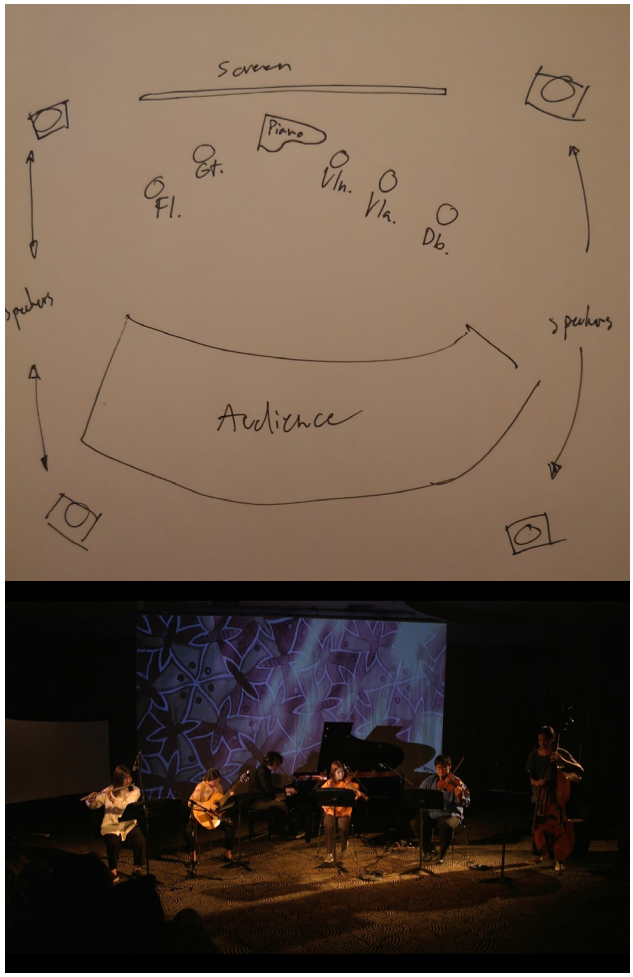

Figure 14-15: Diagram of the planned stage layout showing the positions of musicians and the required speakers on the corners of the room(left) with the image of the actual performance for reference(right)

The content of music itself, overall, the music mainly stays in B lydian scale. This is simply because of the choice I made when improvising for ideas in the finale: the piano keeps a steady ostinato of G sharp minor 7 over B major and the harmony slowly shifts note by note.

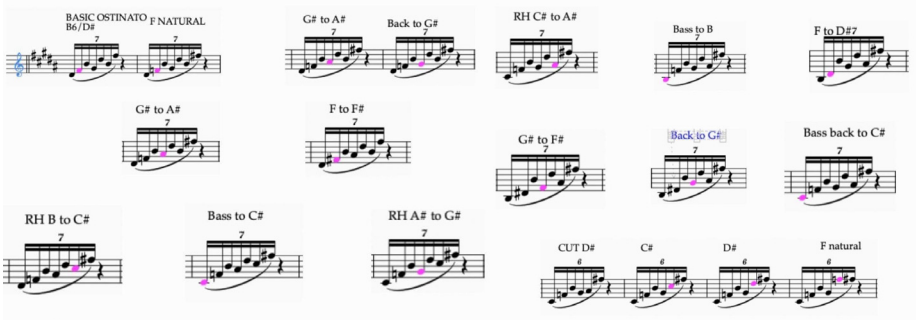

Figure 16: Score of the final piece

With undetermined time for each cluster to stay, the other musicians are then beginning to add long notes to the overall harmony creating a big mass of harmonious sounds. It is the final piece that gave my decision to let the whole show be kept in 'the path' of this lydian scale. This, in turn, has created two other most important moments of the show: the prelude 'duet' and the 'reveal' to the ensemble.



Figure 17: improvisation with my 'ghost' on the screen

The opening act from the show has both the pre-recorded pianist and himself improvising at the same time while having amplified sound of the piano coming from the front set of speakers and the sound of pre-recorded coming from the back. With occasions of moving the sounds freely from each pair of speakers, creating effects similar to the stereo illusions where it became harder to tell which speaker is playing which pianist's sound. A fragment of the ostinato in the final piece made its way to become a leitmotif in a way, using the first 5 notes of the second chord. Slowly, each musician starts to appear on the screen one by one with blurred out faces, while their actual selves appear from behind the screen. Once everybody is present, the first composition *'Opening Ensemble'* is played.

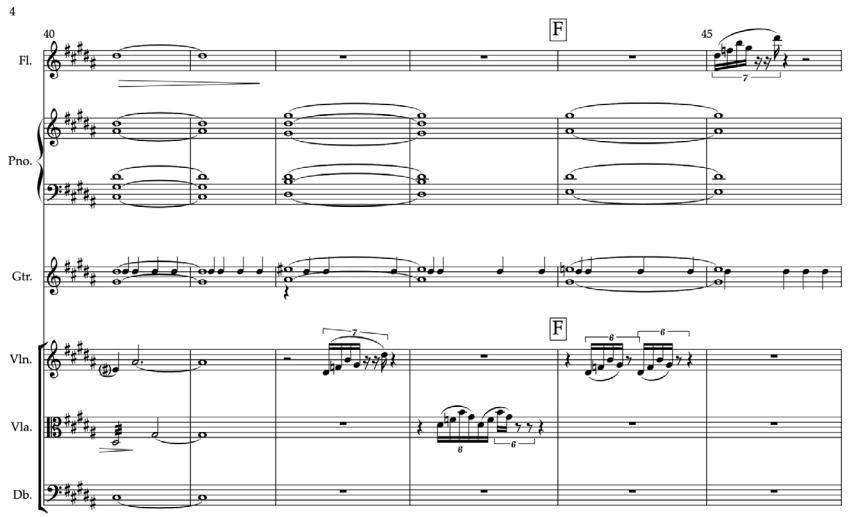

Figure 18: Page 4 of *Opening Ensemble* where it shows the violin, viola, and flute all have the fragmented motif

The second piece 'Rhythmic Section' started with repetition of 5 notes still staying in the same mode and a relative sound world, though perhaps arguable that it made the impression of going away to stay in pentatonic scale instead.

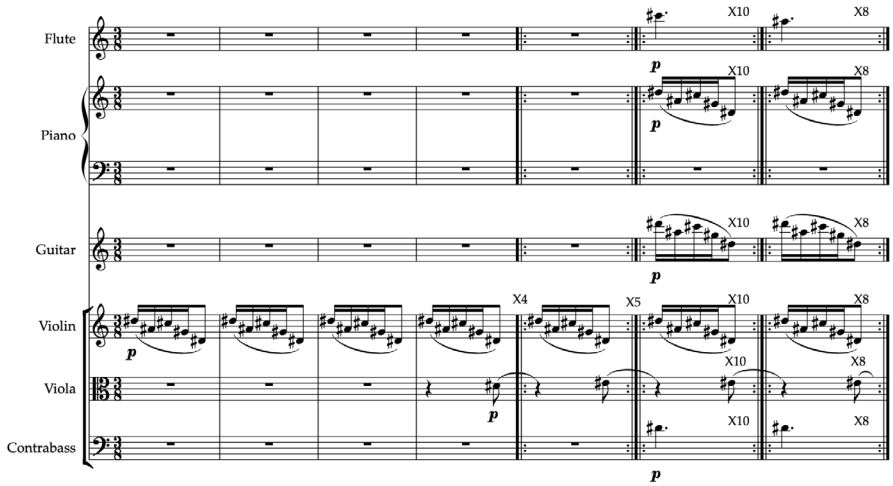

Figure 19: Fist page of rhythmic section

Following the quiet conclusion of Rhythmic Section, the final performer makes his appearance. The mime enters the stage looking confused and uncertain of what is happening around him. He stumbles about briefly before realising that each step he takes produces a sound on the piano, all within the B Lydian scale. Delighted by this discovery, he runs, jumps, and dances across the stage, exploring the colourful sounds he can create. The sequence culminates in a dramatic split, coinciding with the music's arrival at a new tonal centre.

The mime then struggles to stand and eventually pulls himself upright using a rope. After a series of encounters with seemingly endless invisible doors, he finds himself confined within an invisible box. Upon escaping, he pauses and looks back on his adventure. Finally, he releases the weight he has been carrying in his heart, setting it free as he appears to age before the audience's eyes. He then quietly retreats into the shadows.

The rhythmic section gets a reprieve. The ghost pianist returns to play the five notes, this time without the rhythmic gap after the final note. The violin and flute improvise harmonies above the piano, intertwining with one another. Soon after, the ensemble begins playing the final piece.

One by one, the band members appear on the screen, taking their sound back as each member slowly leaves the stage. Eventually, only the pianist remains. At

the very end, he reunites with his "ghost" on the screen, bringing the performance to a close.

It is in the nature of people to want to exchange ideas with each other. And I believe that, basically, every artist wants nothing more than to tell his fellow people what he has in mind. With all expressions of art, whether it is music, literature or visual arts, it is first and foremost a matter of: communicating to the outside world and make sensory perceptible a personal thought, a striking idea or an inner emotion.

M.C. Escher

The idea of telling a story through voiceover emerged after considering the overall sequence of the performance. The show needed something that could guide the audience through my thought process and provide a thread connecting its various elements. The voiceover proved to be an effective and relatively straightforward way of achieving this within the available timeframe. It allowed me to tell a particular story while, at the same time, encouraging the audience to reflect on and perhaps re-examine their own stories, realities, and relationships with the world around them as they understand it.

In the end, the greatest trick I pulled that day was perhaps just the fact that there were no tricks at all. Only music, ideas, techniques, inspirations, and a handful of hope, as much as I could've provided. Humans hear what they want to hear and see what they want to see. It is solely depending on the individual upbringing and experience that persuades our own mind to perceive things to our reality and sometimes reality can probably be a bit too much. So we fooled ourselves into looking the other way or perceive a little differently. There will always be a believer, and there will always be a doubter. The choice is ours to make how we would like to be. How everything WILL be.

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