

BA Creative Music Production

Professional Project

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**Exploring Wassily Kandinsky's Colour-Sound Associations Through An
Interactive Music Installation**

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Abstract

Wassily Kandinsky is widely regarded for his pioneering work in abstract art and also for his synaesthetic colour-sound associations. This project explored Kandinsky's colour-sound associations through an interactive music installation and addressed a gap in the audiovisual industry, this gap being the use of still artwork in interactive systems. To achieve this, Kandinsky's 'Composition VIII' was chosen as the visual foundation, and through the use of Max and Ableton, motion detection and audience-driven interactivity became the primary creative input and were used to turn this painting into a playable instrument. This installation was showcased to 19 participants who were invited to interact with it and then answer a survey which included questions about immersion, geometric mapping and colour-sound associations. The survey findings presented the installation in a positive light, with 100% of users finding themselves immersed and 89.4% of users experiencing colour-sound connections. The findings suggest that the installation effectively communicated Kandinsky's colour-sound associations, while providing experiential learning opportunities for a largely uninformed audience.

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Introduction

This thesis explores how Wassily Kandinsky's colour-sound associations can be reinterpreted through an interactive music installation. Kandinsky, a Russian painter and art theorist, is considered to be one of the pioneers of abstractionism in the modern art world (McMullen). Kandinsky is widely believed to have experienced synaesthetic experiences, which were then used to create abstract works of art. Synaesthesia is a rare condition in which the stimulation of one sense can automatically trigger another (Baron-Cohen, 2009). This condition led Kandinsky to create many artworks in which he attempted to translate musical ideas and concepts into art (Thomas). His painting, *Composition VIII*, forms the visual foundation of the interactive installation in this project and is often regarded as his most accurate attempt at integrating music into art.

Building on Kandinsky's synaesthetic theories, this thesis explores how contemporary music technology can transform a still artwork into an interactive musical installation. Through the use of motion detection, audience-driven interactivity becomes the primary creative input. The installation uses an iPhone camera, Max and Ableton Live to map motion to auditory parameters. Through the interconnectivity of these elements, the geometric elements of *Composition VIII* will trigger and shape sounds. This thesis positions itself within the thriving interactive audiovisual art and motion-capturing fields. This project explores the audience as a performer and contributes to the ongoing pursuit of interactivity in all forms of media. Through reimagining Kandinsky's work with modern-day technology, this project can extend the early conceptions of synaesthesia through digital means. This establishes the question which lies central within this project: How do users perceive and interact with Wassily Kandinsky's colour-sound associations in an interactive music installation?

To answer this question, the following aims were established:

1. Examine Kandinsky's relationship with synaesthesia and develop an advanced understanding of his colour-sound associations.
2. Create an interactive music installation using Ableton and Max, in which audience-driven interactivity is the primary creative input.
3. Assess user perception of colour-sound associations through a post-interaction survey.
4. Evaluate the effectiveness of audience-driven interactivity and geometric mapping as a form of communicating Kandinsky's theories.
5. Identify possible future developments based on user feedback.

This thesis is organised into six sections. Following the introduction, the literature review examines Kandinsky's artistic philosophies, synaesthesia and the continuous developments in the interactive installation space. The methodology discusses the technical and practical elements involved in preparing the interactive installation. This will include how each system will work interactively to detect motion and output audio. The methodology will also delve into the research methods chosen and the information to be extracted from the survey that each person undertook following their interaction with the installation. The analysis section evaluates user interaction and outcomes, followed by the discussion section, which compares the findings from the survey with the findings in the literature review. The conclusion summarises the research and proposes options for future work.

Literature Review

Kandinsky and Theories of Synaesthesia

Wassily Kandinsky was a Russian painter most known for his pioneering work in abstract art. Kandinsky was exposed to art and music throughout his childhood, which allowed his appreciation for these art forms to develop into adulthood. In 1895, Kandinsky's abstract interpretation of Claude Monet's "Haystack" inspired him to pursue his own artistic identity. The following year, a performance of Richard Wagner's "Lohengrin" further influenced his exploration into the idea that music could evoke art and colour, and that the two were symbiotic. He then moved to Munich, where he began studying at the Academy of Fine Arts (McMullen).

In 1911, Kandinsky published his book 'On the Spiritual in Art', in which he describes his theories about the correlation between sound and colour. This seminal text features Kandinsky's argument against "art for art's sake". (Kandinsky, *Spiritual* 3). In 1922, Kandinsky accepted a teaching role at Bauhaus, a state-funded art and design school in Weimar, Germany. It was during this period that Kandinsky began experimenting with geometric shapes in his artwork. In his attempt to escape the view of materialism, he became a pioneer of modernism and, more specifically, abstractionism. Throughout Kandinsky's artistic career, his works maintained a steady improvement, with his latest work always being his most complex and ambitious. This constant improvement is often partially credited to Kandinsky's close observation of the Austrian composer Arnold Schoenberg (McBurney), who featured dissonance at the heart of his symphonies throughout his whole career. This was a quality that Kandinsky aspired to translate onto the canvas through abstraction and compositional tension, especially in his later years. The theme of dissonance, which Kandinsky spoke about often, lived at the core of this project throughout its formulation. Incorporating themes like dissonance into the work allowed this project to accurately explore Kandinsky's theories of colour and sound through digital means.

Composition VIII, an abstract oil painting made in 1923, is widely regarded as one of Kandinsky's most significant works and acts as the visual foundation for this project (figure 1). This artwork is part of Kandinsky's ten compositions, a series of paintings which were created over thirty years, the first being created in 1909 and the last in 1939, five years before his death. By the time VIII was created, Kandinsky's method of creation was increasingly theoretical and systematic, with every colour and stroke having a meaning behind it. Composition VIII represents a shift in Kandinsky's work toward geometric abstraction.

Kandinsky's theories about the connection between colour and sound are directly translated into this painting. It can be read as a visual score, and each geometric shape can be interpreted as a certain sound, timbre or rhythm.

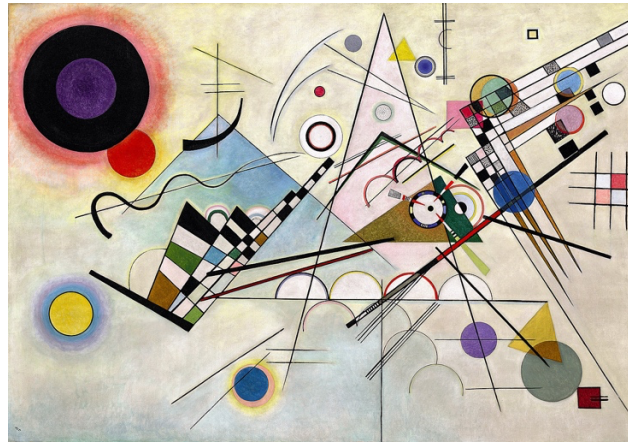


Fig. 1

The relationships between the geometric shapes develop different themes throughout the painting, like dissonance, as previously mentioned or consonance. The standout shape included is the circle in the upper left of the painting. This shape acts as a reference point and, according to Kandinsky's theories, can be interpreted as a deep, sustained note, in comparison to the sharp lines, which represent rhythm and motion in some cases. This geometric concept translates directly into the mapping¹ approach taken in this project and is particularly suitable for the interactive installation, as each element that was chosen was clearly defined, allowing the user to instinctively understand how their movements activate individual musical elements.

Kandinsky frequently described synaesthetic associations and felt there was an underlying connection between the characteristics of colours and those of sounds (Listening In). He lived his life based on the assumption that the ultimate state of the universe was spiritual. Being in the midst of renowned physicist Ernest Rutherford's displacement of the previous hypothesis that an atom was entirely a material unit led Kandinsky's belief in his theory of spirituality to increase tenfold, subsequently leading to his hatred of materialism and loyalty to abstractionism (Ashmore, 329). Although his work followed a theoretical and logical creative process, Kandinsky always ensured that these processes stayed in subordination to inner necessity, which arises from feeling, according to the artist (Ashmore, 330). Inner necessity and soul vibrations are constantly referenced throughout Kandinsky's writing. It is noted that inner

¹ Mapping refers to the correspondence between "control parameters and sound synthesis parameters" (Hunt)

necessity is “affective not logical” (Ashmore,331) and that “words, musical tone and colours” (Ashmore,331) possess the power to evoke soul vibrations; never does he define either term. Kandinsky said, “the greatest external difference becomes the greatest internal similarity” (Kandinsky, Essays 29), which perfectly sums up Kandinsky’s theories of synaesthesia, the ties between music and art and spirituality. Relating to the idea that underneath the physical domain of the world, there lies a spiritual one, which acts as the true foundation of life and establishes the connection between concepts like colour and sound.

The artist’s belief that each colour had a direct correlation to a certain sound, volume and timbre is apparent in his works. Kandinsky acknowledged that finding a universal definition for each specific colour is not possible, but went on to say, “the sound of colours is so definite that it would be hard to find anyone who would try to express bright yellow in the bass notes” (Kandinsky, Spiritual 25). His theories of art and music are also described in his book “Point and Line to Plane”. The concept of composition is compared to a law-abiding organisation of elements (Kandinsky, Point 92). The comparison of colours to sounds is discussed; however, the book goes more in-depth through the discussion of what dynamic characteristics some lines have: fine lines correlating to a violin, flute or piccolo, and a thick line translating to a cello or a tuba. The characteristics of the borders are also taken into consideration in Kandinsky’s creative process. In Kandinsky’s eyes, the upper and leftmost borders represent looseness and freedom, while the bottom and rightmost borders represent condensation and constraint (Kandinsky, Point, 136-145).

Synaesthesia in Art and Music

Synaesthesia can be defined as “the translation of attributes of sensation from one sensory domain to another” (Marks, 303). Although variants of the term date back to the ancient Greeks, at that point in time, the term “synaesthesia” was used. This term was made up of two Greek words, “syn” meaning union, and “aesthesia” meaning sensation (Rupčić). The first medical account of Synaesthesia came from Georg Tobias Ludwig Sachs in 1812, a study based upon his own relationship with synaesthesia. There are many types of synaesthesia, though throughout the last two millennia, there have been some forms which are more common than others. Synaesthetic experiences are made up of two components, imagery and sensation, and as the condition has been studied, the description of the type of synaesthesia has become two hyphenated words: visual-auditory, auditory-tactile, and visual-olfactory (Simpson, 141). The most common form of synaesthesia is visual-auditory, more commonly known as

chromesthesia². Artistic conceptions of synaesthesia have varied throughout history, as although the condition is rare, some cases produce different experiences than others. Therefore, artists began to use synaesthesia as a metaphor rather than the actual neurological condition. This metaphorical apprehension is the conceptual inspiration for many audiovisual experiments, which, naturally, inspired this project. The link between art and music, however, is one that many artists, authors and philosophers have considered deeply. JL Hoffman, for example, compares the setting of a palette to the tuning of an instrument (Cage, 185).

Similarly, Franz Marc argued that each musical note in a symphony was like the discrete patches of paint surrounded by white canvas (Cage, 236). Being a co-founder of The Blue Rider, the group of Munich-based artists who believed art should express inner spiritual truths, rather than depictions of realism. Marc was also a key figure in the early 20th-century emergence of visual music, which can be defined as “non-narrative and non-representational. Visual music can be accompanied by sound but can also be silent” (Evans, 11). The emergence provided a wider global understanding and interest in the relationship between art and music. The visual music era saw two chronological periods. The first was paintings, which involved Kandinsky and other like-minded artists, such as Mark Rothko, who, similar to Kandinsky, believed shades resonated with each other to produce visual chords and had an influence on the soul (McBurney).

The second period, however, was film, both silent and accompanied by music. 1921 saw the first premiere of absolute film, with *Lichtspiel opus 1* by Walter Ruttmann held in Berlin. Artists like Hans Richter and Viktor Eggeling also pioneered this space, although there were clear differences in each of their works. *Lichtspiel opus 1*'s score, for instance, was written solely for that project, while *Symphonie Diagonale* by Eggeling was created with the intention of being silent, allowing the rhythm to be developed by the image alone. Film expanded the possibilities of visual music with the idea of activity and synthetic sound. But it wasn't until 1931 that Oskar Fischinger used the jagged ornamental patterns on the film's optical soundtrack to compose the sound for a film, creating the first synthetically created sound. This piece, titled *Ornament Sound*, inspired artists such as Mary Ellen Bute, Norman McLaren, and John Whitney to implement the same process. *Rhythm in Light*, released in 1934 by Bute, was one of her earliest ventures into visual music, in which she brought Edvard Grieg's 'Anitra's Dance' to life. This project was labelled as 'a modern artist's impression of

² “When perception of sounds give rise to imagery of colour” (Simpson,141)

what goes on in the mind while listening to music' (Bute). Bute went on to create abstract work until 1959. Like the work of Kandinsky, experimentation with synaesthesia was a prominent inspiration for artists at the time. By re-imagining the use of image and sound, the work of these artists laid the foundations for later audiovisual practise.

Following the work of Fischinger and Bute, a new movement titled expanded cinema emerged. This new genre pushed the boundaries of conventional filmmaking by making the experience immersive and multisensory, serving as a cornerstone to the audiovisual and immersive systems of today, which inspired this project. This goal was achieved through multiple projections rather than a one-way relationship between the audience and the screen. Locations shifted from commercial theatres to art galleries, warehouses, and other experimental venues. Artists such as Lis Rhodes became central within this avant-garde movement. In 1972, she released 'Dresden Dynamo' (Figure 2). Using the same technique as Fischinger, Rhodes placed patterns onto the optical soundtrack to create the sound. There is no divide between the image and the sound in this piece, Rhodes explains her intent, saying: "The image is the score is the sound. A composition noise" (Southbank Centre). Technological advancements throughout the 1970s and 1980s further enabled artists like Rhodes to continue to enhance their multisensory experiences.

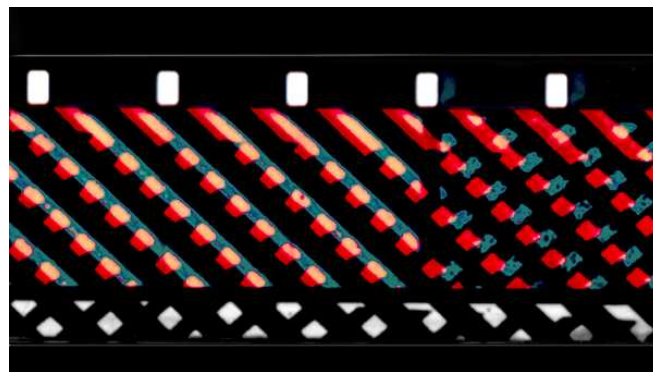


Fig.2

The 1980s saw the emergence of many new technologies that reshaped the audiovisual performance sector. The recording, processing and transmitting of audio and video shifted from analogue to digital. Analogue technology presented many limitations. Signal degradation and restricted flexibility when editing prevented many audiovisual artists from achieving their goals. The surge of digital electronics presented a more efficient way of recording, processing, transmitting and creating audio and video, expanding the preconceived limits of what artists could achieve in audiovisual work.

The technological developments during this era had a direct influence on how audio and video could interact in the context of audiovisual installations. The ability to alter the visuals in real-time created immersive interactions between media. Digital video creation enabled artists such as Nam June Paik to explore the audiovisual relationship in a more complex manner through the ability to layer, manipulate, or distort images in real time. Paik's first venture into audiovisual installations occurred in 1963 with 'Magnet TV', in which he placed an industrial-sized magnet on top of a 17-inch TV set; the magnetic field disrupted the TV's electronic signal, displaying a distorted image that changed when the magnet moved. However, Paik's largest installation would not come until 1988, with 'The More, The Better' (Figure 3). This installation included 1,003 monitors and confirmed the potential of digital technologies being used to enhance immersive audiovisual experiences, subsequently laying the foundations for the generative performance systems that would develop in the coming decades.



Fig 3.

This project builds upon the building blocks placed by these artists. From static art by Rothko to the creation of generative systems by Paik, the audiovisual industry is under constant pressure to grow. Through combining synaesthetic metaphors with a motion-based system, this project expands on the practice of visual artists into a participatory frame of reference.

Generative and Interactive Audiovisual Systems

This section analyses modern-day audiovisual systems to provide context for the practical, technical and conceptual elements of this project. From the experiments of Wassily Kandinsky

to the installations of Nam June Paik, the artists within the audiovisual industry have never ceased in their search for new ways to express themselves. The work of these early pioneers laid the groundwork for modern interactive performance systems. These systems differ from regular audiovisual works, with the addition of real-time feedback loops between the artist, the system and the output. Real-time audiovisual mapping is a mechanism at the core of these systems, in which auditory features such as rhythm, amplitude and tempo are converted into visual parameters. The emergence of software environments such as MaxMSP/Jitter and Ableton between 2000 and 2003 gave audiovisual artists the ability to create real-time generative audiovisual work, thus enabling performances in which audio and visuals react dynamically to the artist, the audience or the computational processes. Since then, other software platforms, such as Unity³, have expanded the possibilities of these systems by creating 3D environments, further developing the immersive quality of the performances.

For this research, the interactivity has been categorised into three core modes (Salter, 303-310). The first mode, performer-driven interactivity, involves the performer directly influencing the output. Audiovisual artist Daito Manabe has continually experimented with this mode of interactivity, particularly through his collaboration with Rhizomatiks (Rhizomatiks). Their joint exhibition, titled Multiplex, featured motion data from the dancers on stage, meaning the visuals were responding to the movements and gestures performed by the dancers. This mode of interactivity makes the audio easier to dissect, as the visuals accentuate the auditory features. Software environments such as TouchDesigner and MaxMSP are used within this mode to enable the connection between the gestures and the visual effects.

The second mode, system-driven interactivity, analyses auditory features such as tempo, amplitude and rhythm and converts them into complex visual patterns. Ryoji Ikeda, a Japanese visual and sound artist, creates his work through this mode “by means of both mathematical precision and mathematical aesthetics” (Almine Rech). This mode of interactivity can guide the emotional and cognitive responses of audience members through evoking certain emotions based on the visuals on display.

The third mode, audience-driven interactivity, is the most relevant mode for this project. It integrates the audience into the performance. Audiovisual artist Golan Levin created many

³ Unity is an industry leading game engine and development platform (Unity Technologies)

audience-driven interactive systems. In 2001, he performed *Dialtones: A Telesymphony*, a concert in which the sounds were produced through the ringing of the audience's own cellphones (Levin). This mode of interactivity increases audience engagement through a sense of ownership over the audiovisual outcome.

Sound to Visual Mapping in Audiovisual Systems

Mapping is a technique that lies at the foundation of all instrumental systems, though not all examples are digital or complex. Some acoustic instruments' mapping is inseparable, like a guitar and the plucking or strumming of the strings. This relationship is commonly known as 'one-to-one mapping' (Hunt, 1). This example lies at the most foundational level of mapping, and as technology has improved, so have the capabilities of mapping. Nowadays, mapping can refer to the correspondence between 'control parameters and sound synthesis parameters' (Hunt, 1), and can be differentiated as one-to-one, one-to-many and many-to-one. The endless possibilities of complex mapping have proved to be difficult to comprehend for many. For this reason, it was proposed that the use of geometric shapes could reduce the cognitive load of these systems (Mulder et al). This concept lies at the heart of this installation. Through mapping the geometric shapes of *Composition VIII* to different sounds, a person of any age or education could understand how to interact with the installation's mapping style. Relieving the pressure of fully understanding the inner workings of the installation allows the user to become immersed and focus on the sound design.

Sound-to-visual mapping is a technique that is synonymous with audiovisual installations, in which visual parameters such as colour, size, and geometric shapes are assigned to sound parameters such as velocity, timbre, and pitch. According to Barry Stein and Terrence Stanford, "it is the synergy, or interaction, among the senses, and the fusion of their information content, that is described by the phrase 'multisensory integration'" (Stein, Stanford). Mapping can come in many different forms, as artistic preference varies from person to person. Though naturally, some forms are more common than others. Parameter mapping, metaphorical mapping and data mapping lie at the core of audiovisual art. Parameter mapping is the foundation for all audiovisual systems and is what all other forms of mapping build off. In the context of this project, one visual element is mapped to and controls one sound parameter. This was appropriate due to the desire to allow each geometric shape to have its own composition, based on Kandinsky's colour-sound associations. Metaphorical mapping is a technique that artists can use to convey a message through their work; for example, the colour red may

produce an aggressive timbre. This form of mapping is seen throughout many systems, particularly in Golan Levin's work, especially in *The Audiovisual Environment Suite*⁴. The *Audiovisual Environment Suite* is made up of seven interactive systems, based on the metaphor of an 'audiovisual substance' (Levin). Gesture is the primary input for these systems, not only controlling basic parameters, but conveying energy and intensity through different creative means. Lastly, data-driven mapping uses visual data, such as motion tracking, and converts it into MIDI and maps it to sound parameters. This form of mapping is closely linked with system-driven interactivity, with works from Ryoji Ikeda being at the forefront.

For this project, the mapping features inherited a combination of data-driven and metaphorical mapping. Data-driven mapping enables the use of motion tracking to be the primary input for the installation, providing the user with a sense of ownership and immersion. While metaphorical mapping allows Kandinsky's theories of sound, colour and synaesthesia to be brought to the forefront of the installation. In the context of this project, sound-to-visual mapping provides the capability to explore Kandinsky's theories of sound and colour through a different perspective. Though many audiovisual works focus on visuals being generated through sound, fewer systems focus on still artwork generating sound through interaction. This project addresses that unfilled gap in the audiovisual space by reversing the traditional sound-to-visual relationship.

⁴ This is a series of interactive systems developed by Golan Levin.

Methodology:

Installation Creation

The methodology for this study employed a practice-based, qualitative research approach. A practice-based approach comes in many different forms. The commonality that links these forms is that creating a piece of work or art is intended to inform the research (Scalar). The research derives directly from the creation process, and the analysis of the creation process is part of the reflection. This approach was suitable for this project, as the interactive media industry is predominantly a practical industry involving constant developments in innovative interaction design. This allowed primary qualitative research to be collected through audience participation and subsequently through their feedback. Participation was voluntary; audience members were asked to sign a consent form before engaging in this project, and anonymity was assured.

The purpose of this project was to digitally explore how users perceive and interact with Wassily Kandinsky's colour-sound associations in an interactive music installation. At the visual foundation of this installation is Kandinsky's 'Composition VIII', an artwork composed of geometric shapes and patterns that is widely considered Kandinsky's best attempt at conveying music through art.

The tools used throughout the creation process included three industry-standard software platforms. Firstly, Ableton is a digital audio workstation software for creating and performing music. For this project, Ableton was used in the creation of the musical composition, which was composed based on Kandinsky's colour-sound associations and enabled playback for the installation. Secondly, Max is a visual programming language for music, multimedia and interaction. Lastly, Max for Live (M4L). M4L is a version of Max integrated into Ableton Live that allows you to edit and create across both platforms without interruption. This interconnectivity is seen throughout the industry today and is the ideal chain for real-time interaction, which makes the methodology appropriate for this project (Figure 4).



Fig.4

The physical element of the installation was set up using an iPhone 14 camera, a laptop, a large screen and stereo speakers. The camera was placed below the screen, facing the user (Figure 5). The screen was projecting Wassily Kandinsky's painting Composition VIII. The stereo speakers were on either side of the screen, directly facing the user.



Fig. 5

The camera tracked the hand movement of the user, which was processed on the laptop through a hand motion detection sensor in MaxMSP, titled jweb-hands-landmarker (Lysdexic-audio). This hand detection Max patch was downloaded via the internet and enabled the user's hand movement to be tracked within the context of Kandinsky's painting. The user interface, which represented the user's hand on screen, was a red circle created using the object jit.gl.gridshape⁵ (Figure 6). This object allows different shapes to be inserted into the jit.world⁶, and therefore visible on top of the painting. This red circle allowed the user to see where their hand was within the painting at all times.

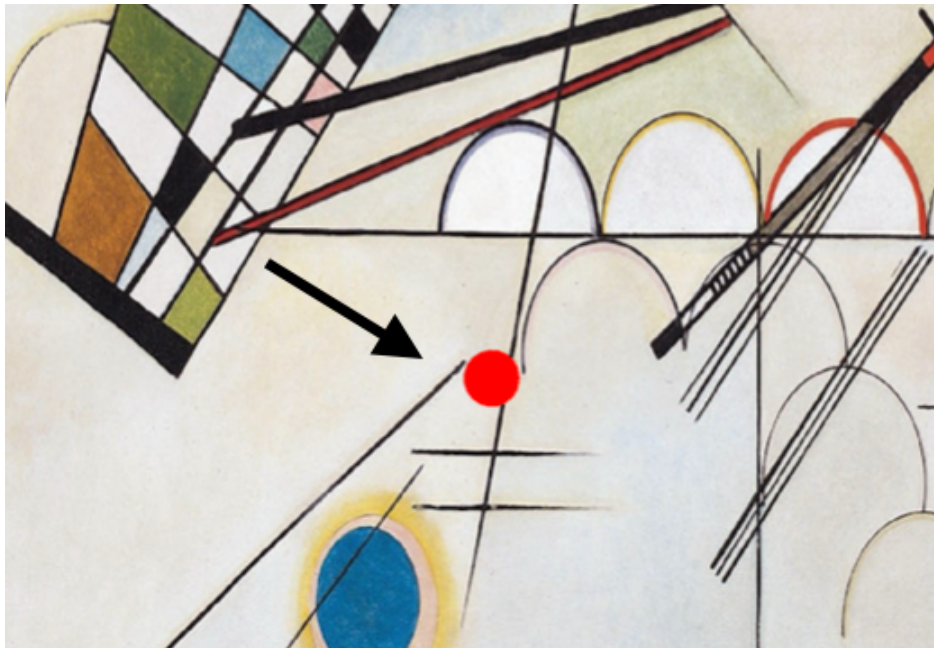


Fig.6

17 circles were identified in the painting, so inside MaxMSP, 17 individual collision zones were placed around each circular shape seen within the painting (Figure 7). This was achieved through the use of the object titled 'cartopol'⁷. This object "converts Cartesian coordinates into polar coordinates" (Cycling '74). Cartopol collects each circle's centre X and Y co-ordinates. This data is then added to the hand motion detection section of the patch, resulting in each circle within the painting having an individual trigger-sensitive collision zone around it.

⁵ This object enables the use of shapes in Max, the dimensions of which can be altered (Cycling '74)

⁶ This object creates a separate Max tab, in which Composition VIII was displayed (Cycling '74)

⁷ This object created invisible collision zones around each of the 17 circles in the painting.

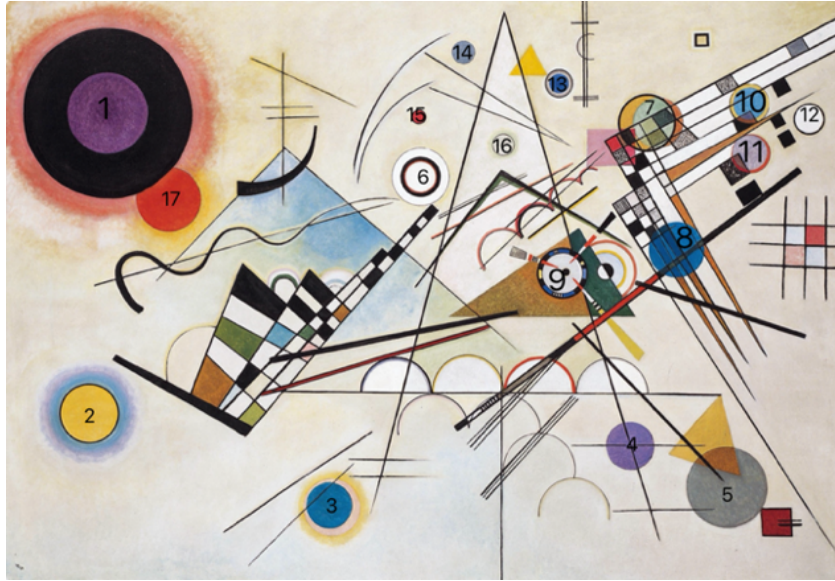


Fig. 7

Through the use of an ‘if’⁸ object, upon the user’s hand colliding with these zones, two things occur. Firstly, the red circle turns into a green circle, enabling the user to know exactly when they are triggering an interactive zone (Figure 8).



Fig. 8

Secondly, a bang message gets triggered inside of Max through the use of a button object (Cycling ‘74). These messages are converted into MIDI using the object ‘ctloud’⁹ and sent to Ableton, where they are mapped to trigger the playback of the corresponding audio file, thus allowing the user to play Kandinsky’s painting as if it were an instrument. To ensure the

⁸ An ‘if’ object, “Evaluates input according to a conditional statement specified in an if-then-else form” (Cycling ’74)

⁹ Ctloud is the object used to send data from Max to Ableton seamlessly. (Cycling ’74)

installation ran smoothly, a delay system was inserted after the button. This two-second delay ensured a smoother interaction as each sound wouldn't be triggered constantly on top of each other (Figure 9).

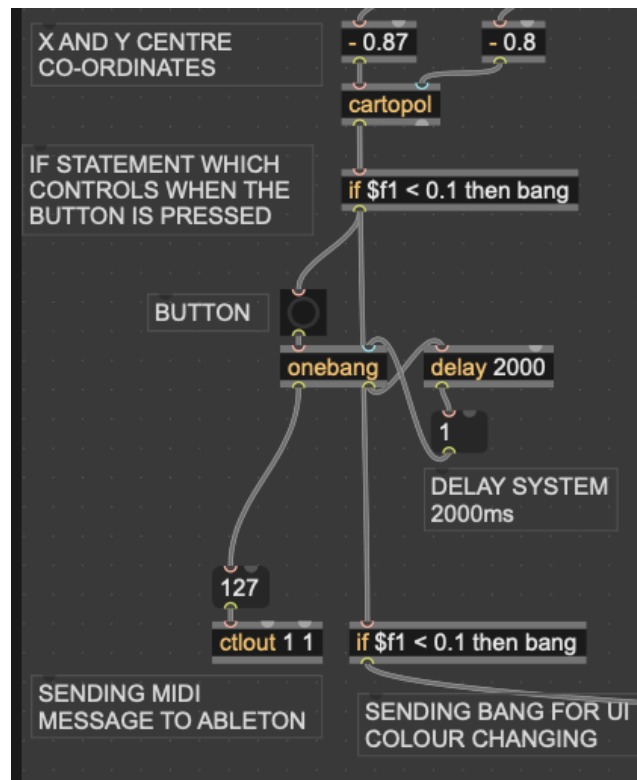


Fig.9

The circles were chosen to be the interactive zones of the painting after a conversation with Mark Joyce, a lecturer in the Visual Arts Department of IADT. As someone who has studied Kandinsky's work in great detail throughout his career, Mark suggested that "the circles act as the reference points within the painting, while the sharp lines, angles and other geometric shapes fulfil the role of transporting the viewer from circle to circle" (Joyce). Through incorporating this methodology, music was composed for each circle individually. Then, to represent the rest of the painting's complex elements, a background instrumental was created that played throughout the whole interaction and wasn't dependent on the user to activate. The creation of the musical compositions for each element was based upon Kandinsky's theory that each colour and sound had an underlying connection. The table below was created to show Kandinsky's associations between each colour and sound (Figure 10). This table was created through the analysis of Kandinsky's work and writing, particularly 'Concerning The Spiritual In Art', in which Kandinsky goes into detail about his relationship with synaesthesia and his associations for each colour.

Colour	Timbre	Instrument Example
Yellow	Sharp, Aggressive, High Register, Piercing	Trumpet
Blue	Mellow, Deep, Low Register, Inward	Cello, Organ
Red	Strong, Confident, Big Middle Register	Brass, Tuba
Green	Static, Balanced, Restful, but Stagnant	Violin
White	Pause, Charged Silence	Silence
Black	End of Piece, Final Silence	Silence
Purple	Deep, Inward, Slightly Sad	Horn, Bassoon

Fig. 10

Testing

There were two occasions in which users interacted with the installation. The first being held on the 23rd of March, and the second, and primary round of testing was held on the 13th of April. On the 23rd of March, three candidates were selected to interact with the installation and then fill out the survey, which was created through Microsoft Forms. The questions within the survey were carefully curated to ensure that the data collected was relevant and detailed.

This first round of testing acted as a run-through to troubleshoot the system and ensure each element of the installation was working in tandem with the others, so that when the second, and primary occasion, took place on April 13th, it went smoothly, and all necessary data was collected efficiently. After the first round of interaction, some issues arose, including compositional clashes, signal-flow interruptions, and user interface issues. This first round of testing proved to be crucial to the overall project, as there was time to fix these errors before the primary round of testing. The process of fixing these errors included re-composing some sounds to enhance the overall composition, changing the user interface from a mouse icon to a circle, which changes colour upon triggering, and ensuring the laptop used was powerful enough to support this system.

On the 13th of April, the primary round of testing took place. Each of the problems that arose on the previous occasion was eliminated, and the installation was ready. It was set up, and 19 people were invited to interact with it. Each candidate was invited into the room and received the same contextual introduction, which consisted of a brief rundown of Kandinsky's work and his theories of colour-sound associations, an explanation of synaesthesia and a short demonstration of how to most efficiently interact with the painting. Following this introduction, candidates were invited to interact with the painting for as long as they chose to. Each user interacted with each circle, and some attempted to create a unique composition by triggering multiple sounds in quick succession (Figure 11).



Fig. 11

Following the interaction with the installation, the users were asked to carry out a qualitative research survey, administered through Microsoft Forms. In this survey, choice questions, Likert-style questions, and open-ended questions were asked about the overall execution of the installation and about how the addition of music and interactivity altered their experience with the painting. These questions were based on emotional response, perception, immersion and the overall impact of the installation. As the questions were subjective to each person, a qualitative research approach was more suitable than a quantitative one. Once the survey was complete and all the data had been accumulated, the data was thematically analysed and used to create the final survey results. The data was grouped into recurring themes. These themes were then compared to the secondary research that was carried out for the literature review, in the hope of finding some links, and ultimately discovering how users perceive and interact with Wassily Kandinsky's colour-sound associations in an interactive music installation.

Analysis:

The data analysed in this section comes directly from the digital survey, which was completed by all 19 users immediately after their interaction with the installation. Each candidate was either a student or a lecturer at IADT.

To efficiently analyse the data collected from the survey, it was crucial to gain an understanding of each candidate's prior knowledge of Kandinsky's work and his theories of colour-sound associations. Though Kandinsky was a pioneer of abstractionism, question two revealed that 74% of candidates were completely unaware of Kandinsky and his work, 11% knew of his work alone, and 16% knew of his work and his colour-sound associations together (Appendix C.1). These percentages were important to establish in the beginning, as they ensured that for the majority of candidates, the installation was the primary introduction to Kandinsky's theories, making their answers pure and unbiased.

Perception lay at the heart of this project; thus, it was important to establish whether the candidates perceived a genuine connection between the colours and sounds within the installation. In question three, 89.4% of users agreed or strongly agreed that there was a connection, with 10.6% neutral on the subject (Appendix C.2). Discovering whether the installation increased the number of connections a user noticed was also an important metric to measure. 79% of users agreed or strongly agreed that the installation made them notice colour-sound associations more than before. 15.8% remained neutral, with 5.3% (one person) disagreeing with the statement (Appendix C.2).

Throughout the compositional process of this project, the connection between colour and sound remained at the forefront of all decisions. Undertaking the task of bringing Kandinsky's theories to life comes with the expectation that due diligence is given to each sound, to ensure Kandinsky's reputation as an artist and theorist is upheld. When asked about times when the colours and sounds felt connected or disconnected in question four, the candidates had a wide variety of answers, though there were some recurring themes present. Many users mentioned certain colours suited their sound, such as blue, grey and purple, with yellow producing divided responses among candidates. One user noted that, though the trumpet sound attached to the yellow circle was unexpected, it was still welcomed. Notably, another user noted that "the red and yellow colours having sharp aggressive tones suited the description of the artist's condition, and made sense to me", and that "the blue bringing out mellow tones is how I would have expected the blues to sound, and so I felt that also suited each other." This directly matched

Kandinsky's own colour-sound associations, outlined in the colour-sound table in the methodology (Appendix C.3).

Discovering whether users felt fully in control of the music in the installation was another important metric to measure, as a sense of ownership over the musical output was crucial and continued to be at the forefront of the installation's design. Subsequently, in question five, 78.9% agreed or strongly agreed that they were in control, with 21.1% being neutral (Appendix C.4). The immersion response was one of the most significant findings from the survey, with 100% of users agreeing or strongly agreeing that their time spent interacting with the installation was enjoyable and immersive (Appendix C.4). Despite some negative comments prior, not one candidate expressed any complaint about their experience. Continuing with the theme of how control over the installation's musical output influences user experience, the responses were positive for the vast majority. For question six, candidates noted that having control made them more "aware of the details in the painting". One participant commented, "I felt like I was composing my own music, rather than listening to pre-made sound" (Appendix C.5).

A prominent aim of this project was to enable each candidate to fully understand Kandinsky's theories of colour-sound associations through their interaction. 89.5% of users agreed or strongly agreed that the installation helped them understand the theories better, with 5.3% being neutral and 5.3% strongly disagreeing (Appendix C.6). The survey also measured whether the installation effectively displayed consonance and dissonance within the musical composition. 89.5% of candidates noted that consonance and dissonance were displayed effectively throughout the musical composition, with 5.3% remaining neutral and 5.3% strongly disagreeing, once again (Appendix C.6). Users proceeded to comment further on how their experience with the installation affected their overall understanding of Kandinsky's ideas. A user mentioned that it made them understand synaesthesia well, and they could understand how individuals can develop associations between sound and colour. Others commented on how the installation prompted them to think about how we perceive colours "via our emotions" (Appendix C.7). This section of the survey provided valuable qualitative data, as many users reflected deeply on the meaning behind the installation.

When evaluating the efficiency of the installation system, the hand motion detection is very significant. 95% of candidates said that the hand-controlled interface felt natural, with 5% saying it felt unnatural (Appendix C.8). The next metric to evaluate for the system is whether

the interactive zones were easy to understand. This refers directly to the geometric elements inside the painting. 94.7% of users agreed or strongly agreed that the geometric shapes in the painting made it easy to understand how the interaction worked (Appendix C.9). When asked to expand on this, some noted that they “felt like buttons”, while some noted that the change of colour from red to green within the user interface was a great aid. One user specified that the geometric elements not being interactive would not have affected their immersion, as the soundscape itself was immersive on its own (Appendix C.10).

The data gathered and analysed from the survey present the installation positively. This includes its effectiveness in communicating Kandinsky’s theories, overall immersion, and perceived connections between the colours and sounds. These findings will be examined and compared in great depth in the following discussion section.

Discussion:

The following discussion section evaluates the findings from the post-interaction survey against the five aims established in the introduction and the existing work and literature in the interactive media industry. The findings indicate that the installation was successful in communicating to candidates about Kandinsky's theories, his relationship with synaesthesia, and the use of the audience as the primary creative input for an interactive installation.

Discovering how successful the installation was in communicating Kandinsky's theories was central to this research. To gain a perspective of the users' awareness, it was uncovered that 74% of users did not know Kandinsky's work or theories before the installation, which ensured that, for the vast majority of candidates, the installation was their primary introduction. This figure becomes significantly more relevant when considered alongside the fact that 89.5% of candidates agreed that the installation helped them understand Kandinsky's colour-sound associations. This figure relates directly to aims one and four, with the vast majority of users confirming the installation's effectiveness in communicating Kandinsky's theories and the success of audience-driven interactivity and geometric mapping as the tools for doing so. One user noted that "being able to hear and see the sounds with the colours and shapes let me understand the ideas much better, rather than reading about it or having it explained to me" (Appendix C.7). This directly relates to Kandinsky's theory of inner necessity in the first section of the literature review. Inner necessity remained at the forefront of Kandinsky's work throughout his whole life, stating that music and colour possess the power to evoke soul vibrations and allow the spiritual domain to flourish within people. This statistic and comment suggest that this installation conveyed Kandinsky's theories through feeling and emotion, allowing the user to be immersed and develop a deeper understanding of his theories.

As stated in the previous section, upon taking on this project, it was vital that the compositions for each colour were given the due diligence they deserved, to uphold Kandinsky's reputation and pioneering work. Aim 3 was addressed through question three of the survey, with 89.4% of users perceiving a connection between the colours and sounds in the installation, a striking figure, and one that strongly supports Kandinsky's theories. One candidate mentioned that red and yellow being represented by sharp tones, and blue being represented by a mellow tone, was what they would have expected. This comment was made independently, suggesting that the compositional choices made throughout the creative process were suitable and effective for this user. This finding also relates to the metaphorical use of synaesthesia, mentioned in the second

section of the literature review, and metaphorical mapping, mentioned in the fourth section. Conveying a message through colour and sound can be a powerful tool in installation design, and it was what Kandinsky spent his life trying to achieve. Though Kandinsky had theories of colour-sound associations, the artist understood that there could never be a universal definition of a particular sound, which was mentioned in the second section of the literature review. This concept proved to be true as one participant noted that the trumpet, which was used to represent the colour yellow, was unexpected and harsh in the circumstance.

Placing the audience in the role of performer and enabling them to control the musical output for the installation is an approach employed throughout the interactive media industry, particularly in the work of audiovisual artists such as Golan Levin. This audience-driven interactivity gives the user a sense of ownership over the installation. One participant noted that, as they interacted with the painting, they felt as though they were composing their own music, rather than listening to pre-made sounds. Another participant mentioned that it was quite an interesting way to travel through a painting, noting that they could still recall it clearly in their mind after their time interacting. This demonstrates a very high level of immersion, which is confirmed by 100% of users stating that the installation was immersive and enjoyable. This statistic directly confirms the second aim, as the installation placed audience-driven interactivity as the primary creative input.

To address aim four, in a study undertaken by Mulder et al, the conclusion reached was that the use of geometric shapes could be used to reduce the cognitive load of interactive systems, which allows all users to engage with complex systems. 94.8% of participants agreed or strongly agreed that the geometric shapes being the interactive zones made it easy to understand how the overall interaction worked, with 5.2% of users being neutral. Through discussing the interactivity with Mark Joyce, it was decided that the circles would be the interactive zones, as they act as reference points throughout the painting, with the sharp lines and angles acting as a mode of transport around these circles. One participant mentioned that the circles stood out in the painting, as the rest was made up of sharp lines and angles, directly mirroring Joyce's reasoning outlined in the methodology. Another user noted that the circles felt like buttons, which suggests a sense of ownership around the installation. This was central to the installation's design, with the goal of each user feeling at ease and open to being immersed in Kandinsky's world.

The lack of systems being designed around still artwork was a key reason as to why this project was undertaken. With the development of technology in recent times, systems have become very complex, with generative audio sculpting generative visuals, which in some cases, then re-sculpt the audio. This project positions itself in this gap within the interactive installation industry. From the pioneering work of Fischinger and Bute to Paik's innovations, to where the industry is now, this project sought to honour the artists who didn't have the technological resources available to them, with Kandinsky being the key figure. One user wondered what work or technologies Kandinsky would have created or used had he been born in a different era. This question will never be answered, but this project may be the closest thing to that answer.

In relation to aim five, despite the overwhelmingly positive responses, there were some critical responses. The sound that represented yellow was described as harsh and unexpected on three occasions. One user also mentioned a slight delay on some triggers, creating a disconnect between the user's input and the sound triggering, with another user stating it felt difficult to move their hand fast enough to make a composition for themselves. These critical responses were analysed as areas for development and refinement for future versions of this type of installation, especially the composition representing the colour yellow, and the response time between the hand gesture and the sound trigger.

Conclusion:

This project was undertaken to explore how users perceive and interact with Wassily Kandinsky's colour-sound associations in an interactive music installation, guided by five established aims. Through creating an interactive installation, showcasing it to peers and receiving analytical data through a digital survey, the findings were positive for the vast majority. With 74% of users completely unaware of Kandinsky, statistics such as 89.4% of users perceiving a connection between the colours and sounds, and 100% of users finding the installation immersive, are quite profound. The data collected suggested that the installation efficiently communicated Kandinsky's theories to a largely uninformed audience. This project positioned itself within the ever-growing interactive installation industry, specifically within the underdeveloped industry sector of still art integration. Kandinsky's theories were explored through digital means, offering users a new perspective on his work and mind. As one participant noted, what technologies or artwork Kandinsky would have created in this era will never be known, but this installation provides the closest thing to that answer. Though the data presented overwhelmingly positive responses, some limitations were identified. The colour yellow's auditory representation was mentioned as unexpected and harsh, with the response time of the hand gesture also being called into question once. These criticisms present opportunities for development in future interactive projects undertaken.

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Appendices

Appendix A – Consent Form

Exploring Kandinsky's colour-sound associations through an interactive music installation 86

Study Title: Exploring Wassily Kandinsky's colour-sound associations through an interactive music installation.

Purpose of the Research: To investigate how users perceive and engage with Wassily Kandinsky's colour-sound associations in an interactive music installation.

Invitation: You are being invited to consider taking part in this research study. This project is being undertaken by Matthew Madigan. This study is being conducted in pursuit of a bachelor's degree in creative music production from the Institute of Art, Design and Technology. Before you decide whether you wish to take part, it is important for you to understand why this research is being done and what it will involve. Please take time to read this information carefully and discuss it with friends and relatives if you wish. Ask if there is anything that is unclear or if you would like more information.

Do I have to take part? You are free to decide whether you wish to take part or not. If you do decide to take part, you will be asked to indicate your consent through completion of a short form. You are free to withdraw from this study at any time and without giving reasons.

What if there is a problem? If you have a concern about any aspect of this study, you may wish to speak to the researcher(s), who will do their best to answer your questions. You should contact Matthew Madigan at N00221028@iadt.ie or their supervisor, Conor Brennan, Conor.Brennan@iadt.ie.

Thank you

Appendix B – Survey Questions

2. Were you familiar with Kandinsky's work and his colour-sound associations before this installation? *

- I knew about Kandinsky's work AND his colour-sound associations
- I knew about Kandinsky's work only
- I was unaware of Kandinsky at all

3. Perception of Colour-Sound Mapping *

	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
I perceived a connection between the colour and sounds in the installation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The sounds suited the visual elements and felt natural in the circumstance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The installation made me notice colour-sound associations more than before.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. Please describe any moments where the colours and sounds felt connected or disconnected. (E.G. Were there any colours that triggered an unexpected sound?) *

Enter your answer

5. Engagement with the Installation *

	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
I was in control of the music in the installation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My time interacting with the installation was enjoyable and immersive.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. Can you please explain how having control over the painting influenced your experience. *

Enter your answer

7. Kandinsky's Theories *

	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
This installation helped me understand Kandinsky's colour-sound associations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The installation effectively portrayed a sense of consonance and dissonance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. How did your experience with the installation affect your understanding of Kandinsky's ideas. *

Enter your answer

9. Did the hand-controlled interface feel natural when interacting with the painting? *

- Yes
- No

10. Interaction Design *

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The geometric shapes in the painting made it easy to understand how the interaction worked	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Please explain how. *

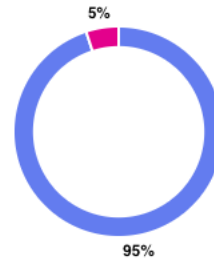
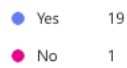
Enter your answer

Appendix C – Survey Answers

C.1

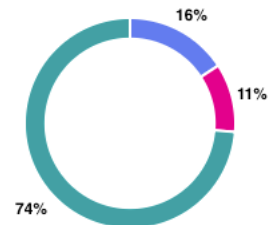
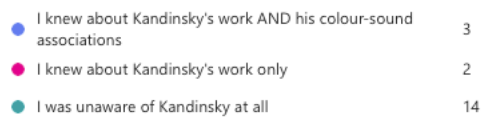
1. Do you understand the above and consent to take part in this survey? (0 point)

[More details](#)



2. Were you familiar with Kandinsky's work and his colour-sound associations before this installation? (0 point)

[More details](#)



C.2

3. Perception of Colour-Sound Mapping (0 point)

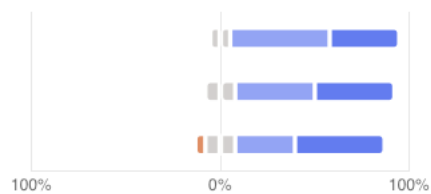
[More details](#)

● Strongly Disagree ● Disagree ● Neutral ● Agree ● Strongly agree

I perceived a connection between the colour and sounds in the installation.

The sounds suited the visual elements and felt natural in the circumstance.

The installation made me notice colour-sound associations more than before.



C.3



4. Please describe any moments where the colours and sounds felt connected or disconnected. (E.G. Were there any colours that triggered an unexpected sound?)

19 Responses

ID ↑	Name	Responses
1	anonymous	The blue circles did suit the low mellow sounds. The white and grey circles for me suited the static noise. Purple circles had an unexpected sound but I couldn't associate any other sound for it.
2	anonymous	The trumpet sound was unexpected but the synth sounds all fit the visuals
3	anonymous	Bottom right grey circle
4	anonymous	The grainy circle sounded like there was a granular synth, which suited the best. the yellow circle was a nice triumphant sound with trumpets i think but that suited really well. the unexpected sounds would be the blue circle, i didn't expect it.
5	anonymous	When connecting over a small red one the sound felt quite melodic, I think I expected a more aggressive sound with red typically but this wasn't a negative thing. There was sort of scattering foley for a white one which I felt was accurate. One circle which had multiple overlaps circles in the far right played a sort of scale which I felt was well suited due to the multiple overlapping circles and it was quite melodic which worked nicely.
6	anonymous	I felt that all the circles and sounds were connected.
7	anonymous	The colour white having a more liminal and eerie sound felt extremely appropriate and appealing in to me As someone who studies liminal spaces intensely this association felt natural and real to what was shown as the composition of the track felt eerily empty but ever so present.
8	anonymous	there was a black and white circle that sounded like static which felt connected. the delay on the noise trigger made it feel a bit disconnected.
9	anonymous	The grey circle felt very connected to its percussion sound, white dotted circle also felt very connected to its sort of grainy sound, some of the loud circles were more unexpected sounds
10	anonymous	The yellow circle in particular was quite accurate in what my brain would associate with that colour. The synth used was very suitable.
11	anonymous	the big purple one on the top left felt suited
12	anonymous	A lot of the colours such as the grey one produced sounds I wouldn't have expected but felt very natural once I heard them.
13	anonymous	I felt that all the sounds really matched the colours and hectic nature of the painting, it was a really cool installation.
14	anonymous	The red and yellow colours having sharp aggressive tones suited the description of the artists condition, and made sense to me. The blues bringing out mellow tunes is how I would have expected the blues to sound and so I felt that also suited eachother colour and sound very well.
15	anonymous	The grey circle made sense but it was a bit jarring
16	anonymous	The small red circle near the top left triggered a surprising but pleasant sound. None of the colours and sounds felt disconnected.
17	anonymous	I believe all the circles had this desired affect
18	anonymous	The small yellow circle was unexpected as the sound was harsh
19	anonymous	For me i loved the Purple in black and the small red circle, it made an abstract sound that perfectly connects both of these colours into brilliant melody tha fits both of them greatly

C.4

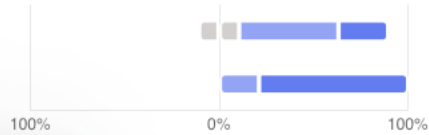
5. Engagement with the Installation (0 point)

Mon

● Strongly Disagree ● Disagree ● Neutral ● Agree ● Strongly agree

I was in control of the music in the installation.

My time interacting with the installation was enjoyable and immersive.



C.5

6. Can you please explain how having control over the painting influenced your experience.

19 Responses

ID ↑	Name	Responses
1	anonymous	The abstract visual of the painting made me enjoy finding the circles in order to make the sounds. And so, having control over the sounds through the painting allowed me to compose a little bit with the sounds.
2	anonymous	being able to control the painting made it more immersive, it also made me more aware of the details in the painting itself
3	anonymous	I felt like I was composing my own music rather than listening to. Premade sound
4	anonymous	it was cool that when i triggered the circles, i heard what they are. then, i was able to make it seem musical with the interaction
5	anonymous	It was cool to just play around with the sounds being made. I felt that rather than trying to play something that worked with the backing music that I was more so just playing around with seeing what every sound did. I went back and forth a bit to try make something sound interesting. I think upon first time trying it it was more so just playing around and seeing what happens but I can definitely see how with more time spent learning what each circle and colour did you could probably get an interesting composition going
6	anonymous	This influenced my experience by using my hand to interact with the sounds
7	anonymous	It allowed me to associate that little bit more with the painting along with addressing colour formation on an audiovisual level more clearly alongside feeling a sense of creativity flooding from the screen not just purely from an audiovisual level

19 Responses

8	anonymous	it made me make connections between certain shapes and colours that I wouldn't have made without my hand guiding my sightline. it also made parts of the painting more memorable.
9	anonymous	It felt more interactive and I felt more immersed in it, however it was difficult to move my hand fast enough to make a composition
10	anonymous	Having control over what sound was played allowed me to feel more in control and engage more.
11	anonymous	you could make sounds you like repeat like a melody
12	anonymous	It was very fun to feel like I was making my own music with the colours and sounds provided.
13	anonymous	It was a really interesting way to travel through a painting. After my short time interacting with the painting I can still recall it very clearly in my mind.
14	anonymous	I felt more in control of the music, and I enjoyed trying to get multiple sounds to trigger at the same time or close to the same time, to try make compositions of my own.
15	anonymous	Yellow also didn't feel great

16	anonymous	It allowed me to trigger sounds in a combination that suited well with the backing track.
17	anonymous	I felt more immersed within the piece
18	anonymous	It made me feel like I was creating the sounds like playing an instrument
19	anonymous	I felt like a conductor at an opra in space controlling the sounds of colours

C.6

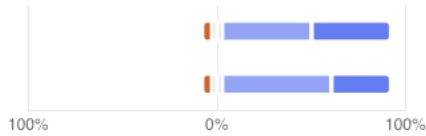
7. Kandinsky's Theories (0 point)

[More detail](#)

● Strongly Disagree ● Disagree ● Neutral ● Agree ● Strongly agree

This installation helped me understand Kandinsky's colour-sound associations.

The installation effectively portrayed a sense of consonance and dissonance.



C.7

8. How did your experience with the installation affect your understanding of Kandinsky's ideas.

19 Responses

ID ↑	Name	Responses
1	anonymous	The installation made me understand what sounds are associated with lighter colours such as yellow and white. Kandinsky's ideas for colours such as blue and purple also make sense.
2	anonymous	it gave me a better understanding of his work and how he perceived his art, it helped me understand how his colour-sound association worked
3	anonymous	It made me understand the theory better
4	anonymous	it made me understand synthaesia well. especially for some colours and patterns. i understood how people can develop the sound of colour
5	anonymous	I felt it was an interesting way of thought the way he associated colours and visuals with types of sounds. I didn't notice myself paying as much attention as I could have to some of the correlation between the sounds and their colors but I think a good job was done for the ones which I did notice.
6	anonymous	Different sound effects
7	anonymous	It contributed to a more clear sense of understanding allowing a sense of perception between my own feelings and someone else's on a more personal level
8	anonymous	it helped to understand the perception of the artist - I wonder what work / technologies Kandinsky would have made if he was making work today!! liked the sounds the circles produced, but the background music was slightly distracting / didn't seem to connect to the painting as a whole.

9	anonymous	I understood the connections between colours and sounds more, and it made me agree with some of his opinions on how certain sounds should sound
10	anonymous	It allowed understanding of kandinskys condition and the idea of visualizing sound
11	anonymous	it helped me understand his psychological diagnosis and how he may perceive colours
12	anonymous	It made me think a lot about the connection between colour and sound and how we perceive them via our emotions.
13	anonymous	It really created an immersive experience of Kandinskys ideas. Being able to hear the sounds alongside the colours was really fascinating.
14	anonymous	I feel practically being able to hear and see the sounds with the colours and shapes let me understand the ideas much better, rather than reading about it or having it explained to me.
15	anonymous	Not really
16	anonymous	His ideas and projections make sense
17	anonymous	I was able to gain a better grasp of his condition and his ideas on colours and sound relating
18	anonymous	It made me understand who he was
19	anonymous	It gave me more of a knowledgable understanding of his condition and how his ideas and theory's were completey right

C.8

9. Did the hand-controlled interface feel natural when interacting with the painting? (0 point)

[More detail](#)

● Yes 18
● No 1



C.9

10. Interaction Design (0 point)

[More det](#)

● Strongly Disagree ● Disagree ● Neutral ● Agree ● Strongly Agree

The geometric shapes in the painting made it easy to understand how the interaction worked



C.10

11. Please explain how.



19 Responses

ID ↑	Name	Responses
1	anonymous	The circles themselves were massive indicators for sounds being triggered. The green light change also helped indicate the triggered sounds
2	anonymous	the use of geometric shapes gave a clear outline of where the different sounds were mapped, making it easy to interact with
3	anonymous	Very simple to see where the intractable shapes were
4	anonymous	the circles in the painting are very easy to detect since the rest of the painting uses straight and sharper lines.
5	anonymous	It was explained quite clearly that hovering over the circles in the painting was how you'd trigger different sounds, it was demonstrated where the best spot to stand was for the camera to recognize your movement. he also demonstrated how having one hand behind your back helps to track accurately. There was a red circle as a cursor to show where your hand was moving and it turned green when you hovered over a playable circle. It was very easy to follow
6	anonymous	By creating different sounds
7	anonymous	The circular design and cue for sound allowed a sense of repetition, a shape with no concrete ending, allowing a state of motion within a more surface level with the shapes but also a deeper dimension in terms of an inner conscious
8	anonymous	the circle cursor made it clear that it was only the circles that could be interacted with
9	anonymous	Some did like spots or different circles within circles, others were neutral
10	anonymous	Via the explanation before the experiment started.
11	anonymous	the simple shapes that stand out
12	anonymous	I think it makes a lot of sense to have the circles act as buttons almost to produce sound but it would have been great to have every shape be a button but I understand that would make things much more complicated also.
13	anonymous	The shapes and colours felt like a representation of a song and being able to travel through the circles on the painting made it clear how the interaction would work.
14	anonymous	It was clear and obvious the circles were interactive, and that nothing else was, that had been explained in the beginning well by Mathew.
15	anonymous	They felt like buttons
16	anonymous	Having outlined shapes helped me to understand the concept better
17	anonymous	I don't think it would've matter to me what the shoes were I would've been immersed because of the soundscape and the interactive element already
18	anonymous	.
19	anonymous	It gave me a understand of how diffent shapes can also add onto the colour, aka like a sound having a filter