Music and Creative Coding: A Minimalist Audio-visual Composition

Over the course of the past two semesters, I have been conducting research into the aesthetics of Minimalism in both music and visual art with the aim of producing a minimalist audio-visual composition through the use of creative coding tools and techniques. As part of this research, I have been learning to write and structure code using two integrated development environment (IDE) applications and their respective programming languages: **SuperCollider** and its eponymous language for algorithmic music composition, and **Processing**, which runs the Java language for dynamic visuals – some elements of which respond to audio generated by SuperCollider.

The music and visuals for this project draw influence from the aesthetics of visual and musical Minimalist art – in particular one Minimalist visual artist and one Minimalist composer: Frank Stella and Caterina Barbieri. According to Tate, Minimalism is a form of extreme abstract art developed in the USA during the 1960s and '70s. Typified by the use of simple geometric shapes, especially squares and rectangles, Minimalism is an extension of the abstract movement's idea that art should have its own reality and not imitate real world phenomena:

> "We usually think of art as representing an aspect of the real world (a landscape, a person, or even a tin of soup!); or reflecting an experience such as an emotion or feeling. With minimalism, no attempt is made to represent an outside reality, the artist wants the viewer to respond only to what is in front of them. The medium, (or

material) from which it is made, and the form of the work is the reality” (Tate, 2021).

Stella is seen as one of the early pioneers of Minimalist visual art. Having moved to New York City in 1958, Stella was immersed in the flourishing Abstract Expressionism movement, taking influence from painter Jasper Johns in the creation of his *Black Paintings* series (1958-1960) which helped pave the way for visual Minimalism (Artnet, 2021). While Abstract Expressionist artists such as Johns aimed to create art that was ‘abstract’ yet also ‘expressive or emotional in its effect’, the *Black Paintings* series present monochrome, symmetrical line patterns which are devoid of much in terms of immediate emotional impact (Tate, 2021).

Instead, paintings such as *Die Fahne hoch!* (Stella, 1959) from the series appear to ‘project off the wall, asserting its presence’. Stella’s famous explanation of the self-referentiality of his work: “What you see is what you see” encapsulates one of the aims of minimalism – that there is nothing to the work beyond the observable. Interestingly, according to Whitney Museum of American Art, the name of this painting translates as “hoist the flag” and is derived from the Nazi Party’s marching anthem “Horst Wessel Song”; the painting’s dark colour and flaglike proportions remind us of the ‘darkness and annihilation of the Holocaust.’ The phrase may also refer to the influence of Johns, who was well known for his expressional painting of the American flag in works such as *Three Flags* (Johns, 1958), and the movement from Abstract Expressionism to Minimalism (Whitney Museum of American Art, 2021).

Along a similar timescale as visual Minimalist art, musical minimalism emerged in the 1960s, according to Holmes (2012, pp. 382-396), when composers such as Terry Riley and

La Monte Young looked to push the boundaries of mid-20th Century avant-garde schools of composition including serialism, *musique concrète,* and electroacoustic (tape) music. During the 1950s, experiments in electroacoustic music using magnetic tape were taking place at Columbia-Princeton Electronic Music Centre, with composition using tape going on to play a particularly important role in the development of musical Minimalism.

One of the founders of contemporary-classical Minimalism, Steve Reich, discovered the tape-phasing process accidentally while playing tape loops of a street preacher he had recorded in San Francisco, resulting in *It's Gonna Rain* (1965)*,* in which the preacher's voice gradually fade in and out of phase. Reich continued to experiment with this phasing technique using repeating simple melodic patterns on *Piano Phase* (1967), and later rhythmic patterns using percussive sounds on *Clapping Music* (1972)*.*

According to Johnson (Winter, 1994), the main characteristics of the minimalist compositional technique are:

- Continuous formal structure

- Even rhythmic texture and bright tone

- Simple harmonic palette

- Lack of extended melodic lines

- Repetitive rhythmic patterns (including phasing)

- Long, harmonically static passages characterised by consonance and built from repeated patterns and pulses

The visual element of my audio-visual project is based upon Stella's *Lettre Sur Les Aveugles* I & II paintings (1974)*.* Both these paintings feature Stella's signature stripe style,

with squares converging from the perimeter to the origin of standardised width; the squares cycle through the colour spectrum, the only difference between the I & II being reversed order of the colours. According to FAMSF Stella sought to 'resolve the conflict he perceived among Abstract Expressionists who wanted to draw images, and yet also paint spontaneously without drawing' (FAMSF, 2021).

My visual composition features a 3D emulation of these converging squares, with a timer switching between the reversed colour orders. The user point of view rotates about this 3D emulation. Fast Furrier Transform (FFT) analysis of frequency-band amplitude values of the audio allows particular squares to protrude in relative measures out into 3D space. Mapped FFT values also control the speed at which the 3D emulation rotates in 3D space on the X and Y axes.

The musical element of my project is based upon "SOTRS" by Caterina Barbieri (2017). Barbieri is an Italian Minimalist composer who writes 'polyphonic, polyrhythmic music for a variety of analog synthesisers' (Spotify, 2021). 'SOTRS' uses three synthesiser sounds and is based around a repeating ascending five-note arpeggio, with a droning pad sound and sparse melodic notes gradually building the texture and tension of the track.

In SuperCollider, my musical composition plays the five-note arpeggio three times on the "BellArp" synth, followed by two sequences of randomly chosen notes from this sequence (or an above), followed by a further two iterations of the arpeggio. The "PulseStab" synth accompanies playing the random sequence from "BellArp" at 1/8 the relative speed. The "SawPad" bass line synthesiser pad accompanies these sequences similar to the pad on the

original, with its low pass filter resonance and cut-off controlled by mouse position on this synth and also on the "PulseStab" synth.

Whereas the arpeggio synth and pad on the original plays on each downbeat in its 5/4-time signature, my version of this piece switches between normal and double time every other bar, with a bar having a 1 in 4 chance of being played double time. This randomised rhythm is reflected also in the "SawPad" bass synth. Later in the piece, the "BellArp" sequence is duplicated slightly later so the two instances of this synth play slightly out of phase for an interesting Minimalist inspired harmonic and rhythmic effect.

Algorithmic composition using SuperCollider has proven to be a great tool for building Minimalist inspired compositions. The ability to use random generators to select from a series of notes and rhythms, and to loop sequences for determined or infinite durations sets up processes that can make the most of minimal instruments and tones, generating music that combines harmonically and rhythmically in unexpected and effective ways. Processing, meanwhile, has been a great introduction into the world of visual coding. Random generators and timers can be used to dynamically change colours and shapes in animations, while the ability to use FFT analysis to warp shapes based on frequency content has been fascinating. With basic 2D 3D primitive shapes available such as the 'box' sketcher used in my composition, creating sketches in a Minimalist style has proven to be ideal and intuitive using Processing.

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