



A University of Sussex MPhil thesis

Available online via Sussex Research Online:

<http://sro.sussex.ac.uk/>

This thesis is protected by copyright which belongs to the author.

This thesis cannot be reproduced or quoted extensively from without first obtaining permission in writing from the Author

The content must not be changed in any way or sold commercially in any format or medium without the formal permission of the Author

When referring to this work, full bibliographic details including the author, title, awarding institution and date of the thesis must be given

Please visit Sussex Research Online for more information and further details

**The exploration of a triadic model of
contest-complementation-conformance
over innovative musical and visual
forms of expression.**

Epameinondas Fassianos

Candidate for MPhil taken by Musical Composition

Critical Commentary

**The exploration of a triadic model of contest – complementation – conformance
over innovative musical and visual forms of expression.**

ABSTRACT

The relationship between music, moving images and colour is one that has long exerted a fascination over artists, practitioners and theorists. It is a compelling topic now because this question very directly illuminates ideas in the area of digital music and performance as laptop performance gives opportunities for real time work with visuals and sound.

In this project I explored this rich field by creating six works (including two compositions and four experimentations), closely related to each other, which dramatised tensions between the natural and industrialized world through different audio, visual and musical treatments, but always beginning with the same source visual material.

My processes were informed by the insights of three theorists, and finding ways of applying and interpreting them in performance contexts. The three theorists whose ideas most concerned me were Michel Chion (France, 1947), Raymond Murray Schafer (Canada, 1933) and Nicholas Cook (Greece, 1950).

To explain the relationship between music and visuals in my project, I utilized Nicholas Cook's triadic model of contest, conformance and complementation, as described in his book *Analysing Musical Multimedia* (Oxford University Press, 2000).

My six works are presented below:

<p>1. A stone in the water. This work consists of (1a) one composition and (1b) four experimentations emerging from the initial composition. A Max/MSP patch called 'Alpha Patch' was used over the four experimentations. In addition, a different patch called 'Beta Patch' was used in 'Experimentation A – Second Version'.</p>
<p>1a. A Study in Disturbance. In this piece, the visual sequences were pre-defined and the music followed the pace of the visuals. Slow musical sequences were placed over natural imagery and fast musical sequences were placed over fast-forward photo stills of the city/industrial world.</p>
<p>1b. Experimentations A – D: In these experimentations, music defined what would occur on screen. Visuals were not pre-defined. The piece started with the viewing of the natural landscape and once the music volume exceeded a specific threshold, there was an automatic transition from the natural world to the industrialised world.</p>
<p>– <i>Experimentation A – First Version</i> (Viola with Live Delay Effects + Background Track + Max/MSP Alpha Patch and – <i>Experimentation A – Second Version</i> (Recorded Viola with Live Delay Effects + Background Track + Max/MSP Beta Patch).</p>
<p>– <i>Experimentation B</i> (Time-Stretched Viola + Processed Pre-recorded electroacoustic track with Live Delay Effects + Max/MSP Alpha Patch).</p>
<p>– <i>Experimentation C</i> (Processed pre-recorded electroacoustic track + Max/MSP Alpha Patch).</p>
<p>– <i>Experimentation D</i> (Viola with Live Delay Effects + processed pre-recorded electroacoustic track + time-stretched viola + Max/MSP Alpha Patch).</p>
<p>2. Aerial (electroacoustic composition + processed pre-recorded viola sounds) The piece consisted of fifteen one-minute sections of visuals, swapping from natural imagery to industry photo stills (section 1 contained natural footage, section 2 contained industrial photo stills, section 3 contained natural footage, section 4 contained industrial photo stills, and so on). The visuals were pre-defined and music followed what happened on screen. Natural sounds were placed over city footage and processed machinery sounds are placed over nature footage. The processed viola is audible throughout the piece, representing an element of stability.</p>

The works created for this project displayed at least one strongly differentiated musical component in each of the pieces. For the visuals I decided to use (1) my own footage from natural landscapes and (2) footage from cityscapes to create a sharp visual juxtaposition. For the processing of the natural images, I made reference to Stan Brakhage's experimental film 'The Dead' (1960 – 11 minutes, 16 millimeters). It's a deathly, evocative walk through a cemetery through the non-attached, deviating camera of Brakhage, accompanied with a wide range of film effects such as superimpositions, solarized film fragments and overexposures (loss of highlight detail). In "The Dead", the images are tightly crossfaded (layered), a technique which prevents the viewer from focusing on a specific image yet still being in context of the film content. In addition, material objects can be located in The Dead. Statues are dominant in it, and Brakhage's sloping angles, solarization, and superimpositions with the noble mausoleums illustrate them as evil spirits that haunt these large tombs rather than supervising them in protection.

What I have learned from Brakhage's work is that experimenting with film techniques such as image superimposition, color inversion, and overexposures over a series of visuals which are related to each other thematologically, and applying these techniques on the film in an appropriate way, leads to a more poetic representation of the visuals where the film's context is not a result of the primitive visual material but of the way the visual techniques are applied. In other words, the meaning of the film is not defined by its primitive content but by the techniques applied. This eases the filmmaker to focus on different aspects of the film. For instance Brakhage in his film "The Dead" made use of the techniques mentioned above (image superimposition, color inversion, and overexposures) to depict the world from the viewpoint of a spirit. In addition, he combined these techniques with camera swerving so as to imitate the movement of the spirit itself.

Learning from this, I crossfaded water images with color-inverted mountain images in the natural video sections, creating a similar effect that Brakhage creates in "The Dead" with the use of his layering techniques. Thus, I indicated my artistic decision of the presence of harmony in nature with the use of color inversion, color correction

and image superimposition versus the intense footage from urban centers where I kept the imagery unprocessed and in black and white.

Any stretched sound used in this project was created with “Hypermammuth Paulstretch”; a software applying time-stretching algorithm on any .wav, .ogg or .mp3 sound input.

Paulstretch is freeware software that I got from the website:

<http://hypermammut.sourceforge.net/paulstretch/>

Paul Nasca was the developer of this software. His webpage is:

<http://www.paulnasca.com>

As it is clearly described in his website: <http://www.paulnasca.com/open-source-projects#TOC-Paul-s-Extreme-Sound-Stretch>, this program produces high quality sounds without the presence of any ‘artefacts’ even if the original source sound undergoes extreme stretching. This is the reason why I decided to use this software. The output stretched sound is very clear and depending on the original source, the processed sound either retains some characteristics of the original or it has a completely different texture. This can lead to the production of a wide variety of processed sound effects that I was very interested in exploring in my project.

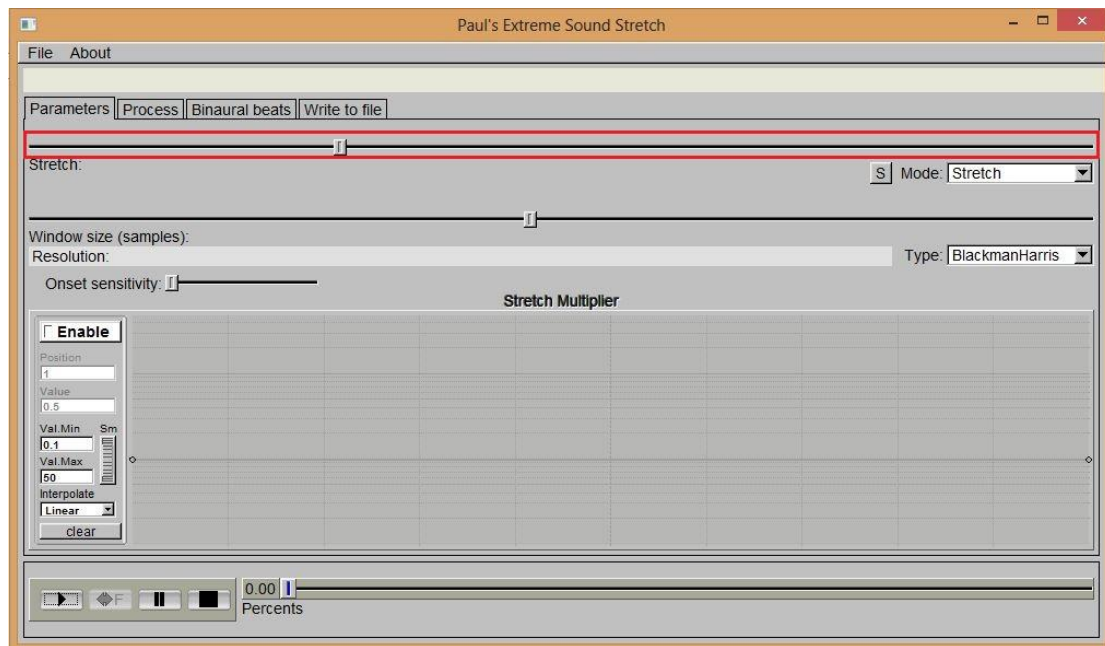


Image 1: The main window of Paulstretch. A *stereo* or *mp3* file can be inputted. From the 'Mode' selection, a Stretch, HyperStretch or Shorten options are available. The function of the indicated red slider is to extend/diminish the length of the stretched sound. The output file can be produced from the 'Write to file' window.

Submission

1. A USB stick including:

a. All the submitted compositions and Max/MSP Patches:

- I. **A Study in Disturbance:** Audiovisual Work. This file is included in the 'A Stone in the Water – A Study in Disturbance' folder of the already submitted USB Stick.
- II. **Experimentation A – First Version:** Music files + Visual File + Max/MSP Alpha Patch. This file is included in the 'A Stone in the Water – Improvisation Ia' folder of the already submitted USB Stick.
- III. **Experimentation B:** Music files + Visual File + Max/MSP Alpha Patch. This file is included in the 'A Stone in the Water – Improvisation Ib' folder of the already submitted USB Stick.
- IV. **Experimentation C:** Music file + Visual File + Max/MSP Alpha Patch. This file is included in the 'A Stone in the Water – Variation I' folder of the already submitted USB Stick.
- V. **Experimentation D:** Music files + Visual File + Max/MSP Alpha Patch. This file is included in the 'A Stone in the Water – Time Travel' folder of the already submitted USB Stick.
- VI. **Aerial:** Audiovisual Work. This file is included in the 'A Stone in the Water – Variation II' folder of the already submitted USB Stick.
- VII. **Experimentation A – Second Version:** Music files + Visual Files + Max/MSP Beta Patch. This work is included in the 'Max/MSP - B Patch' folder of the already submitted USB Stick.
- VIII. **Experimentation A – First Version – Live Performance:** Video of the live performance (When the piece was performed, it was still a work in progress.) This file is included in the 'Basement Performance' folder of the already submitted USB Stick.
- IX. **A brief explanatory audiovisual file** on how to use the Max/MSP Patches. This file is included in the 'Commentary' folder of the already submitted USB Stick.

2. A printed version of the Resubmission of the Critical Analysis
(in colour)

Table of Contents

ABSTRACT	1
Submission	6
SECTION A: Introduction	11
SECTION B: Project Description	13
B1. Research Background	13
B2. Cook's triadic model of contest -complementation-conformance – Examples of works	14
B3. Analysis.....	17
1: A Study in Disturbance (Duration: 18 minutes, 04 seconds)	17
1a: Introduction.....	17
1b: Influences	22
1c: Analysis with the use of Cook's triadic model.....	23
2: Experimentation A – First Version (Duration: 10 minutes, 08 seconds)	33
2a: Influences.....	33
2b: Technical Documentation for Max/MSP Alpha Patch.....	34
2c: Overall Structure.....	40
2d: Examination of the transition effect depending on the volume threshold value.....	42
2e. Analysis with the use of Cook's triadic model	43
Section 1: Ticking [00:15 – 01:58] - Motif 1: Large Note Durations.....	43
A. Internal Structure of Layer 1 of Section 1	43
B. Implementation of Cook's triadic model	44
Section 2: Flange [01:58 – 02:53] - Swelling Notes	47
Section 3: Drunk [02:53 – 03:27] - Wood-Tapping, Pizzicati	48
Section 4: Tremolo [03:27 – 03:40] - Long held pitches.....	49
Section 5: Reverse [03:40 – 04:07] - Short fast glissandi	50

Section 6: [04:07 – 05:11]: Tremolo.....	51
Section 7: [05:11 – 05:47]: Reverse	51
Section 8: Chorus [05:47 – 07:35]: Sul-Ponticello Attacks.....	51
A. Internal Structure of Layer 1 of Section 8 and analysis with the use of Cook’s triadic model .	51
B. The solid representation of cityscape imagery.....	52
Section 9: Flange – Chorus Two [07:35 – 08:32]: Scalic Sequences	53
Section 10: Flange – Chorus – Chorus Two [08:32 – 08:48] - Percussive	53
Section 11: Drunk – Chorus [08:48 – 10:05] – All above combinations.....	54
Experimentation A – Second Version (Duration: 10 minutes, 08 seconds).....	56
- Implementation of Cook’s triadic model on ‘Experimentation A – Second Version’	56
-Technical Documentation of ‘Experimentation A – Second Version’	59
3: Experimentation B (Duration: 09 minutes, 02 seconds)	66
3a: Overall Structure.....	66
3b: Detailed Structure	67
3c: Effects grouping	68
3d: Analysis with the use of Cook’s triadic model	69
3e: The depth factor.....	70
4: Experimentation C (Duration: 12 minutes, 30 seconds).....	71
4a: Structure.....	71
4b: Analysis with the use of Cook’s triadic model	72
4c: Influences	74
5: Experimentation D (Duration: 10 minutes, 37 seconds).....	76
5a: Structure.....	76
5b: Analysis with the use of Cook’s triadic model	76
6: Aerial (Duration: 15 minutes)	78
6a: Description	78

6b: Structure	78
6c: Time Duration Tables	79
6d: Influences	80
6e: The ‘pitched processed sound’ characteristic	82
6f: Analysis with the use of Cook’s triadic model.....	84
SECTION C: Final Conclusions	86
Discography	88
References	90

SECTION A: Introduction

Nature of the work: The coexistence of live, electronic and processed sounds was of vital importance for me as I was interested to examine how the relationship between music and visuals was changing with the use of sounds of different origin and texture. Even though the compositional decisions for each work were different, I elected to either maintain certain music elements from one piece A to another piece B, altering their significance, or relate one piece to another by processing specific musical structures of piece A and utilizing them in piece B. This decision, in combination with the fact that the visual sequence was the same for all the works, hopefully gave a unified perception of the whole project. As a result of this decision, I perceive my whole project as a unified polymorphic entity with harmonious relationships between its pieces but with many contrasting elements, either within each piece, or between the pieces. These elements do not deconstruct the solidity and unified form of the project but instead they enhance it. The use of different forms of antithetic effects under specific rules could lead to a harmonic result and could even enrich the solidity of the whole project. Below I present a list of all my works with the works which influenced me at each case. During the project description of my works, in Section B, I give the reasons for my choices and I explain how each composer's work influenced my pieces.

1. A study in disturbance: An electroacoustic composition inspired by Gabriel Yared's work in the world of film music (his score for "The English Patient" was of significant importance for my composition).
2. Experimentations A and B: Michel Chion: "Etude D'Apres Beethoven".
3. Experimentation C: Michel Chion: "Le Grand Nettoyage"
4. Experimentation D: This work is a combination of Experimentations A and C.
5. Aerial: Chris Watson: "El Tren Fantasma" - "El Divisadero"

Contribution: I hope to have contributed as follows: I made use of Nicholas Cook's triadic model of Conformance, Complementation and Contest to interpret the relationship between music and visuals at each one of my audiovisual works.

According to Cook's triadic model, in any audiovisual work, music always forms a specific relationship with the visuals. The conformance model is present when the meaning of music and visuals is exactly the same; The contest model is present when music and visuals apparently contradict each other; The complementation model is present when music and visuals are working on different levels, but music depicts an emotion emerging from the visuals. Experimentations A – D had the following characteristic: their visual content was dependent on the music; in other words music was causing alterations in the visuals in real time. Thus I examined the impact of Cook's triadic model on audiovisual works where the relationship between music and visuals was *dynamic* and not static. This led to new results because the utilization of a live or recorded or electronically processed musical input could act as a live entity which would define what the type of relationship between music and visuals would be; thus cause dynamic changes to Cook's model, which will be examined in this project.

SECTION B: Project Description

B1. Research Background

The autonomy of music is a term referring to the analysis of a musical piece merely in terms of music, without the intervention of visuals. In his book *Analysing Musical Multimedia*, Nicholas Cook reconsidered the perception of ‘music alone’ and aimed to extend music analysis in the world of multimedia, rather than hold to the relations within the music. His main goal was “to contribute to the current reformulation of music theory in a manner that loosens the grip on it of the ideology of musical autonomy” (Cook, 2000) In other words, his primary aim was to disengage from the theory of musical autonomy.

In the chapter *Music and Meaning in the Commercials* Cook explored numerous British television commercials concerning automobiles among others. He discussed the structure of music and video respectively, and their interactive impacts on sensory and semantic levels. Cook claimed that the interaction between music and media led to innovative interpretations of audiovisual works. For instance, in an automobile advertisement discussed in the book, the elements and characteristics of the music are reflected in the automobile itself; the vivacity and accuracy of the musical score turn out to be the dynamism and accuracy of the car.

From the above information it is clear that music always has a meaning by itself. This meaning emerges from the style of music, the dynamics used, the compositional techniques applied, the use of tempi, the utilization of timbres, the nature of the work itself, even the personality and musical, theoretical or educational background of the composer himself in certain occasions. This meaning of ‘music alone’ could be perceived differently by each listener. But when a musical selection is related to a visual selection, the musical selection has “a *potential* for the construction or negotiation of meaning in specific contexts. It is a group of generic attributes in search of an object. Or it might be described as a structured semantic space, a privileged site for the negotiation of meaning.” (Cook, 2000) In other words, new meanings can evolve when music is related to visuals, since visuals form a bridge

between the musical selection and its meaning.

B2. Cook's triadic model of contest -complementation-conformance – Examples of works

Cook has described that multimedia are “established on a distinctive combination of similarity and difference”. (Cook, 2000) The models of conformance, contest or complementation can describe any audiovisual work and they can be associated with each other via the ‘similarity and difference test’. There are two types of similarity: consistency and coherence. First of all the similarity test is applied to decide whether music and visuals are consistent or coherent. Two entities ‘A’ (music) and ‘B’ (visuals) are consistent when their meaning is exactly the same. In other words, if the output of the similarity test indicates that music and visuals present exactly the same information, they are characterized as consistent, thus *conformant*.

In the conformant mode, images directly project the music and vice versa, thus music and visuals are invertible. If the output of the similarity test is positive, the conformance model is used and the test is completed. If negative, the relationship between music and media is coherent. Two entities ‘A’ and ‘B’ are coherent when each is part of the *same* idea ‘I’ but each highlights different sides of ‘I’ ’s range of meaning. When the relationship between music and visuals is coherent, a difference test is applied to decide if the model to be applied is complementation or contest.

When music and visuals apparently contradict each other, the *contest* model describes their relationship in the most accurate way. As Cook mentions in his book, when music and visuals follow the contest model, they are “vying for the same terrain” like being in competition with each other, each attempting to impose its own features upon the other. (Cook, 2000) In other words, each medium attempts to deconstruct the other, and thus create space for itself. Cook uses the *pun* example in an attempt to explain the contest model. A pun is a form of ‘word play’ which involves two or more meanings, by exploiting multiple meanings of words, or words sounding likewise, in order to create a deliberate enjoyable effect. According to Cook, puns “articulate a collision between the different levels of signification, with the lexical similarity

masking a semantic contradiction.” (Cook, 2000) A multimedia paradigm for contest, described in Cook’s book, is the following: placing classical music over a visual sequence depicting someone aiming to become a pop-musician. The forms of classical and pop music, interconnect with each other through the similarity of the concept of music.

In case music and visuals are working on different levels, then the model which best describes their relationship is *complementation*. An example for *complementation* is the following: In an audiovisual work, the visuals depict denotative information about an entity and the music responds by providing connotative, emotional information, and together they form the entire meaning of the multimedia work. A further example: At the beginning of the film *The Rock* (1996), the sections of Ed Harris’s character (called Hummel) getting dressed, are open to more than one interpretation, particularly in association with the soldier’s entombment scene, with which they are alternated. When turning the sound off, it is not easy to form a specific meaning to this visual sequence with the absence of music. Only hypotheses can be made; it cannot be said for sure if Hummel is responsible for the soldier’s death or whether Hummel made an attempt to save him or whether Hummel had no connection with the soldier. The music part is operating in *complementation* to the visuals and gives an answer to the possible interpretations given above. The melancholic soundtrack illustrates Hummel’s pain and the military radio chatter illuminates why he feels this way; he is upset because he is stigmatized by the reflection of the soldiers whose life ended under his command. The interaction between music and visuals set the tone for this opening sequence and the way music was used - in *complementation* to the visuals – contributed in the depiction of Hummel’s psychological status and the clear reasons for it. So if the key word in this sequence is ‘loss’, this is visually depicted with the use of intercut techniques between Hummel and the burial scene, and musically depicted with the use of a melancholic score which was reflective of Hummel’s catatonic status. The whole effect brings a huge dramatic impact on the screen.

A final example of the use of the complementation model in the relationship between music and visuals is the implementation of Cook’s approach to the opening scene of Anthony Minghella’s film *The English Patient* (1996). This is an example where the

relationship between music and visuals is formed gradually and require a second viewing to be fully understood. The use of Gabriel Yared's 'Szerellem' song over the visuals will be examined. As far as the use of this song is concerned, the key concept is the personality of Catherine (played by Kristin Scott Thomas) and the impact it had in the life of Almasi (played by Ralph Fiennes). The song is heard three times throughout the movie. The use of this song at the very opening of the movie makes no sense initially with the visual sequence on screen, which depicts someone painting a human figure. Later in the movie, it is revealed that Catherine was the painter. In a further romantic scene involving the two main protagonists, Almasi and Catherine, the same song was heard. At this point, the music part is operating in complementation to the visuals because this song depicts the emotional situation of the protagonists, which were involved in a romance. When Almasi finds Catherine dead at the end of the movie, the same soundtrack was used again, operating in complementation to the visuals, this time to depict the feeling of loss. When seeing the film for the second time, the use of the 'Szerellem' song in the opening credits makes full sense now. It operates in complementation to the visuals, depicting the strong impact that Catherine had in Almasi's life. When watching the film for the second time, the opening sequence speaks for the whole movie. In this example, what evolves is the fact that apart from music and visuals, the viewer is also an integral part of the relationship that is formed between them, since a second viewing is necessary for the dynamic relationship between music and visuals to be totally understood.

A representative example of the use of the triadic model of conformance, complementation and contest over different visual sequences but with the same soundtrack is the following: When placing the sound of a harsh wind over desert storm imagery, then the sound works in conformance with the image. When placing the same sound over the imagery of someone reflecting on the death of a beloved one, killed in a plane accident in the desert, thus depicting his emotional status, then the sound works in complementation with the image. When placing the same sound over imagery of a group of happy people, then the sound works in contest with the image because the wind sound implies the opposite meaning of the content of the imagery, where a happy family is presented.

B3. Analysis

1: A Study in Disturbance (Duration: 18 minutes, 04 seconds)

1a: Introduction

There are two musical layers in this composition: Layer A, which includes the electroacoustic piece and Layer B running smoothly only over natural imagery including sounds of nature in the background. Layer B is absent over industrial imagery, which intensifies the role of Layer A.

For the creation of Layer A, I firstly composed a Finale notated piece which was then converted to MIDI format and was used as input to Logic Pro 9, where electronic sounds were used for its final production. In Finale, I used the software's classical instruments for the initial production of the notated work. When I inputted the file in Logic though, I merely used Logic's electronic sounds for the final production. Two different Logic patches were used for the production of Layer A: LogicPatch1 and LogicPatch2. Each patch included a separate group of electronic instruments and was bounced separately. The superimposition of the two emerging wave files led to the production of the final piece of Layer A.

1	Two Way Mirror	R	M	S	Orchestra Flute
2	Ambient Synth Piano	R	M	S	Orchestra Oboe
3	Solo Star	R	M	S	Harp
4	Cosmic Reflection	R	M	S	Orchestra Violin Section 1
5	Pad 1	R	M	S	Orchestra Violin Section 2
6	Angelic Swirls	R	M	S	Orchestra Violin Section 3
7	Electric Piano	R	M	S	Orchestra Bass Section 1
8	Whirly	R	M	S	Grand Piano 2
9	Whirly	R	M	S	Grand Piano 2
10	Whirly	R	M	S	Grand Piano 2
11	Whirly	R	M	S	Grand Piano 2
12	Whirly	R	M	S	Grand Piano 2
13	Solace	R	M	S	Orchestra Flute
14	Solace	R	M	S	Orchestra Flute
15	Solace	R	M	S	Orchestra Oboe
16	Solace	R	M	S	Harp
17	Solace	R	M	S	Grand Piano 1
18	Angelic Organ	R	M	S	Grand Piano 2
19	Electric Piano	R	M	S	Orchestra Viola Section 1
20	Sunburst Electric	R	M	S	Orchestra Viola Section 2
21	Warped Nouveaux Disco...	R	M	S	Orchestra Cello Section 1
22	Sunburst Electric	R	M	S	Orchestra Bass Section 2
23	Solid State Suitcase	R	M	S	Orchestra Flute
24	Tranquil Horizon	R	M	S	Orchestra Flute
25	Tranquil Horizon	R	M	S	Orchestra Flute
26	Faster Thoughts	R	M	S	Flute Legato
27	Teardrop Guitar	R	M	S	Orchestra Cello Section 2
28	Hammer Synth Bass	R	M	S	Orchestra Bass Section 2

Image 2: Presentation of LogicPatch1 in Logic Pro 9. On the right side, the MIDI tracks inputted from Finale can be observed. The instrument names used in Finale can be noticed. Each Finale instrument was saved to a separate MIDI track, allowing the composer to use each track separately. Each MIDI track was used more than once. On the left side, the new Logic sounds are presented.
























1	 Rotary Vibraphone	R	M	S	Grand Piano 1
2	 Echo Piano	R	M	S	Orchestra Oboe
3	 Solo Star	R	M	S	Harp
4	 Classic Rock Organ	R	M	S	Grand Piano 1
5	 Solace	R	M	S	Grand Piano 2
6	 Swirling Droplets	R	M	S	Grand Piano 1
7	 Bottom Dweller Bass	R	M	S	Grand Piano 2
8	 Driving Synth Bass	R	M	S	Grand Piano 2
9	 Vocoder Synth Organ	R	M	S	Grand Piano 2
10	 Laser Kit	R	M	S	Grand Piano 2
11	 Swirling Electric Piano	R	M	S	Grand Piano 2
12	 Electric Piano	R	M	S	Grand Piano 2
13	 Mayday Generation	R	M	S	Grand Piano 2
14	 Solace	R	M	S	Grand Piano 2
15	 Solace	R	M	S	Orchestra Oboe
16	 Harp Cinema	R	M	S	Harp
17	 Romulan Raindrops	R	M	S	Grand Piano 1
18	 Ethereal Sunrise	R	M	S	Grand Piano 2
19	 Electric Piano	R	M	S	Grand Piano 2
20	 Classical Acoustic Guitar	R	M	S	Grand Piano 2
21	 Gregorian Ensemble	R	M	S	Orchestra Oboe
22	 Ambient Synth Piano	R	M	S	Grand Piano 1
23	 Backward Fifth	R	M	S	Grand Piano 2

Image 3: Presentation of LogicPatch2 in Logic Pro 9. In this patch, a selected number of MIDI tracks were used, in contrast to LogicPatch1 which included the entire number of MIDI tracks emerging from Finale.

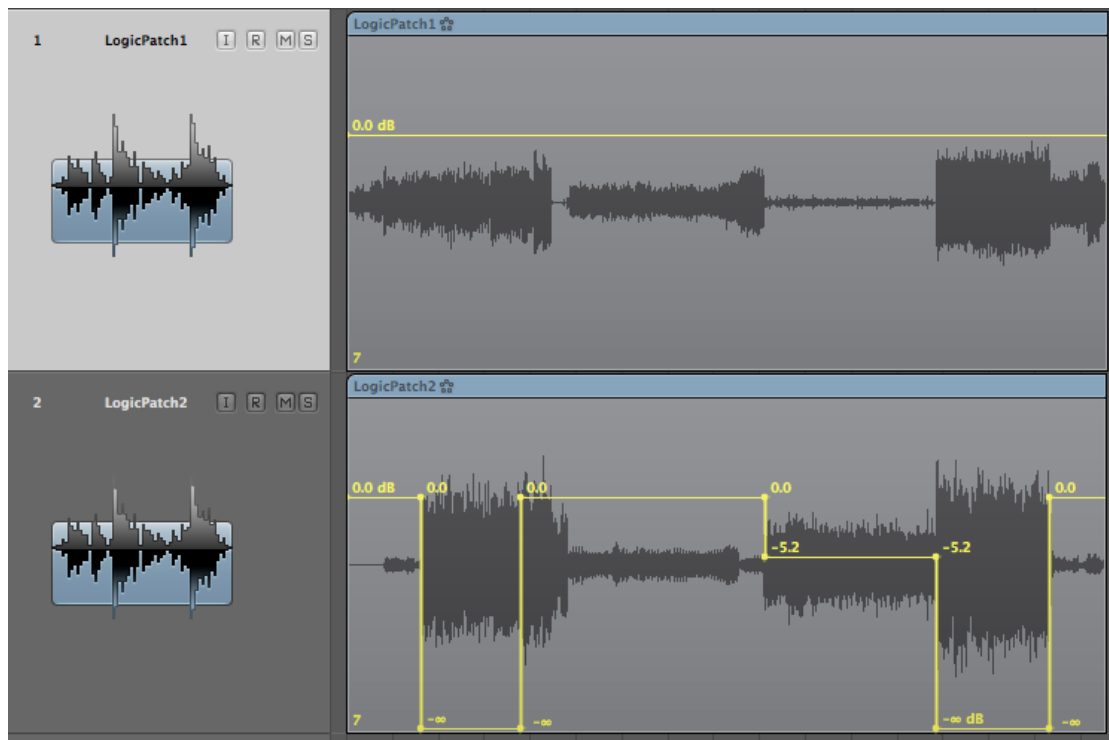


Image 4a: The two wave files emerging from LogicPatch1 and LogicPatch2 respectively were superimposed in Logic Pro 9 and this led to the production of Layer A. LogicPatch1 was audible through the entire piece. LogicPatch2 was audible during the following time sections: [00:00 – 01:44], [04:03 – 14:07] and [16:46 – 18:04]. The final piece was then inputted into Sony Vegas Pro 12 where Layer B and the visuals were added and the final bouncing took place. The image superimposition and processing also took part in Sony Vegas Pro 12 with the application of Vegas’s ‘Video FX’. LogicPatch1, LogicPatch2 and the final audiovisual piece were all bounced in Surround 5.1 format.

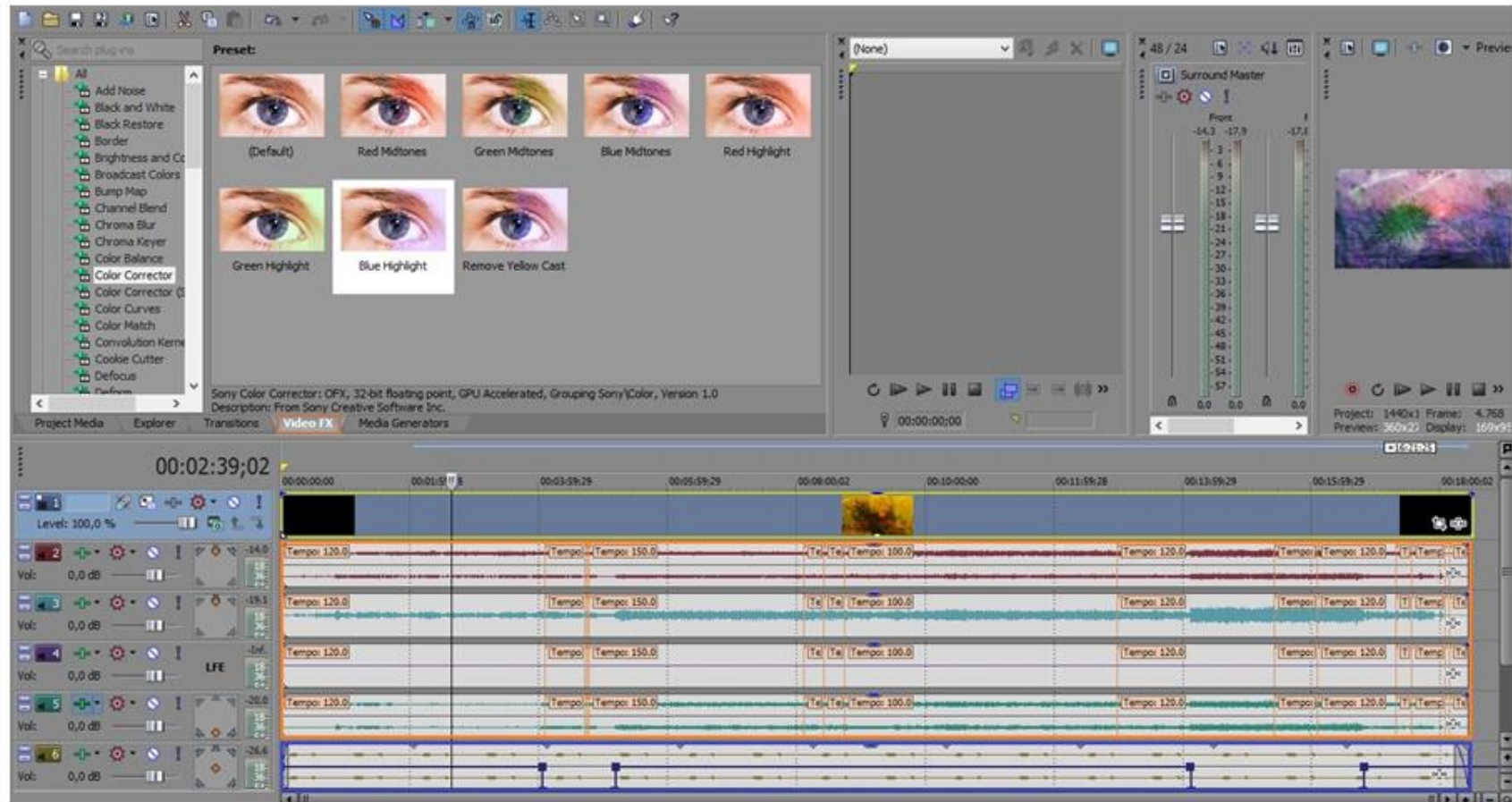


Image 4b: Sony Vegas Pro 12 main window. The yellow, orange and blue boxes depict the visual section, Layer A and Layer B respectively. Layer B was only present over natural imagery in sections: [00:00 – 04:04], [05:12 – 14:07] and [16:47 – 18:04]. For this reason, the intense blue line depicting the volume level in Layer B is set to 0dB over the industrial sections: [04:04 – 05:12] and [14:07 – 16:46]. The brown box indicates the 'Video FX' button. Natural Imagery: The 'Color Corrector' effect was used for image colorization techniques and the 'Invert' effect was used for color inversion techniques. Industrial Imagery: The 'Black and White' effect was used for the decolorization of the industrial photo imagery.

1b: Influences

I was influenced by the use of Gabriel Yared's musical score in Anthony Minghella's 1996 film "The English Patient". What I really found interesting in the English Patient score was the role of nature as a musical instrument throughout various shots involving the sound of the desert sand, the sound of the air in the aerial shots of the desert, or the sound of water in an oasis. These sounds were tied in a very gentle way to the orchestral soundtrack of the movie, like a dialogue between soundscapes and orchestral score.

My response to this approach was to develop a technique of embedding sounds of nature in a discrete way in the electroacoustic piece I composed for my abstract experimental non-diegetic film over the specific nature visuals I filmed. Inspired by Gabriel Yared's score, in "A Study in disturbance", I aimed to give a feeling that 'something' related to the visuals was present in the background, over natural imagery.

I was interested in exploring the interaction between a time-stretched electroacoustic piece and viola with live delay effects. For this reason I decided to create 'A Study in Disturbance' with the use of electronic sounds in Logic Pro 9. In addition, my aim was to create a tonal piece which would then contrast the 'Experimentations A-D'.

1c: Analysis with the use of Cook's triadic model

The relationship between Layers A and B and the visuals will be examined, with the use of Cook's triadic model of contest – complementation - conformance. Layer B ran only over natural imagery.

In Section I [00:00 – 04:04], which is the first time the natural imagery emerges on screen, Layer A works in complementation with the visuals, because it emphasizes on the harmony of nature and the emotions emerging from the observation of the natural imagery.



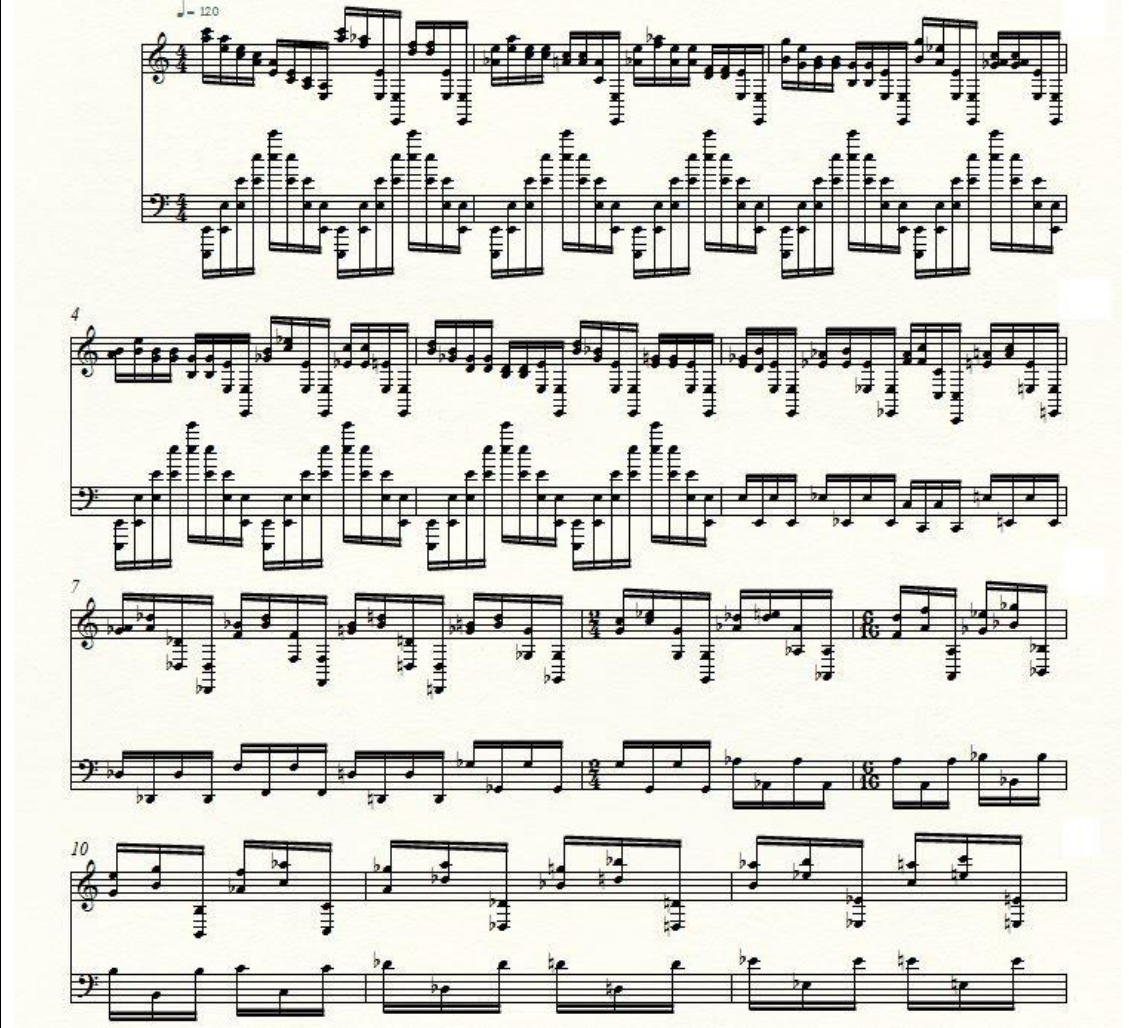
Image 5: The main musical motif of the entire composition is heard for the first time from: [00:00 – 00:52] and is written in D minor.

Image 6: From [00:52 – 01:44], the main motif makes its appearance for the second time but more enhanced, as seen in the above excerpt. The red frame indicates the main melody.

The sub-section that follows [01:45 – 04:04] emerges from the initial motif and is an ode to the harmonious way that the primitive elements of nature are related to each other.

In Layer B, there are sounds of nature heard parallel to the natural imagery, which denotes absolute similarity between music in this layer and visuals. Thus, the musical section in Layer B runs in conformance with the visuals.

In Section II [04:04 – 05:12] it is the first time that the industrial imagery makes a sudden appearance.



The image displays a musical score for a piece, identified as Layer A, Section II, measures 1 through 10. The score is written for two staves, treble and bass, in a key signature of one flat (B-flat). The tempo is marked as 120. The music is characterized by a high level of rhythmic complexity and contrast. Measures 1-3 feature a dense, fast-moving melody in the treble staff, while the bass staff provides a steady, rhythmic accompaniment. Measures 4-6 show a more complex interplay between the two staves, with the treble staff continuing its rapid, melodic line and the bass staff providing a more active, rhythmic support. Measures 7-9 show a further development of the musical material, with the treble staff maintaining its high, fast-moving line and the bass staff providing a more active, rhythmic support. Measure 10 is a final, concluding measure for this excerpt, featuring a more relaxed, melodic line in the treble staff and a steady, rhythmic accompaniment in the bass staff. The overall character of the music is industrial and contrasting, as noted in the caption.

Image 7: In Section II the musical score of Layer A is very contrasting compared to the natural imagery one which preceded, as it can be noticed in the above excerpt.

In Layer A of Section II, music works in complementation with the visuals for the following three reasons **R1-R3**:

R1. In terms of contrast, it hopefully interprets the juxtaposition between the natural and industrial imagery in a direct way.

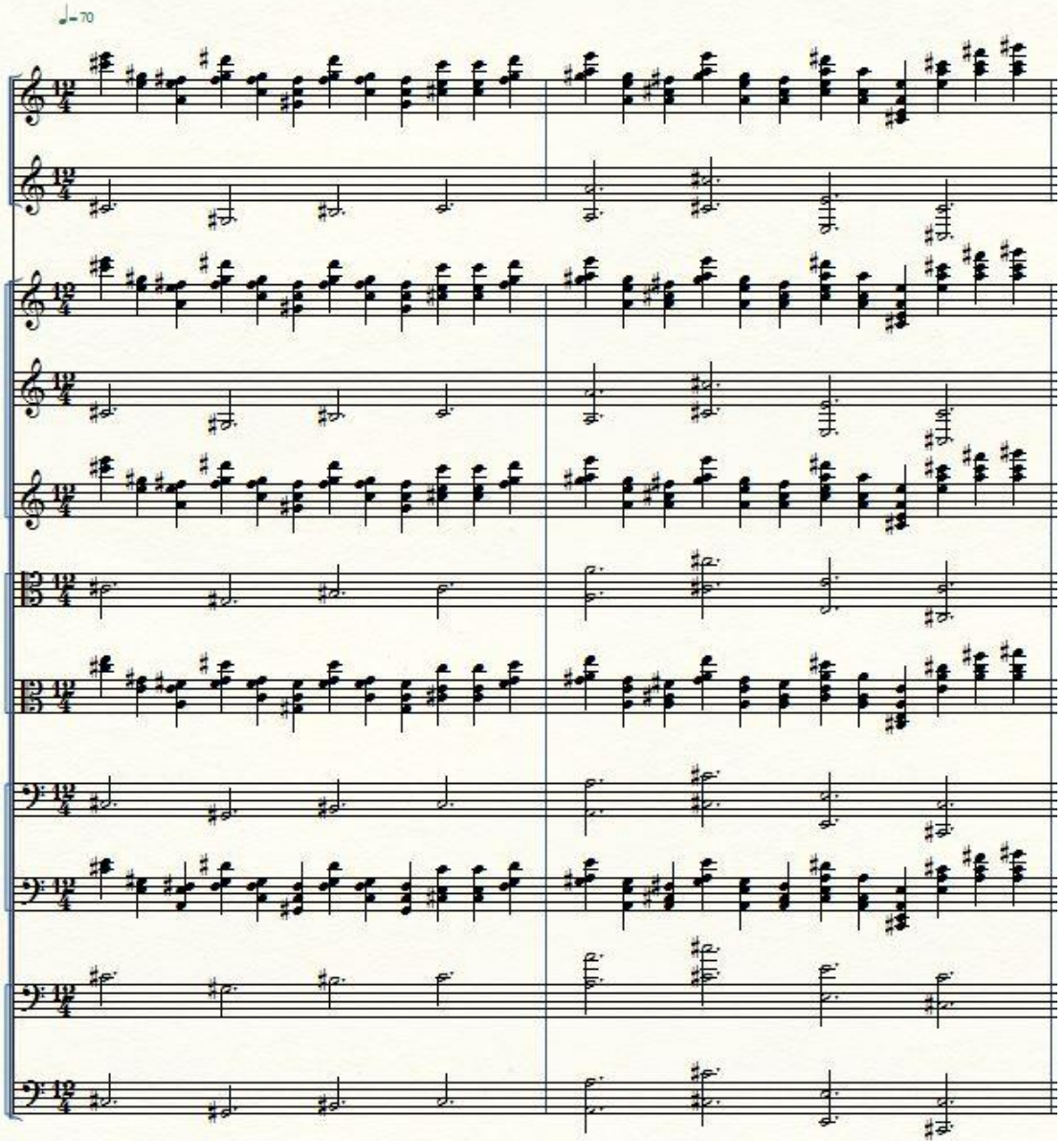
R2. In terms of the high speed in which the visuals change, the music hopefully corresponds by the presence of high-tempo sequences placed over the visuals. The high-speed concept forms a relationship between music and visuals.

R3. The speed in which the visuals change during this section is exactly the same. But depending on the upper melody of the musical score, an illusion is created that the images being on screen while the upper melody is heard are more dominant and the rest of the imagery appears as a reflection of the more dominant ones, even though there is no difference in lighting or speed in which the images change. This occurs because human brain tends to focus on the upper melody and relates the visuals to the melody.

In Section III [05:12 – 14:07], Layer A is divided into three sub-sections which focus on different aspects of nature and its elements, yet pertaining the same visuals all through.

The image displays a musical score excerpt for a piece in Gb Major. The score is written for two staves, with a tempo marking of 150. The key signature has two flats (Bb and Eb). The music is organized into measures, with measure numbers 5, 9, 13, 17, and 21 indicated at the start of their respective systems. The notation includes various note values, rests, and dynamic markings, all set against a light yellow background.

Image 8: The first musical subsection [05:12 – 08:49] presents a variation and development of the main motif in Gb Major. An excerpt is presented above.



The image displays a musical score for a 12-stem arrangement, likely for a film score. The score is written in C# Minor (three sharps: F#, C#, G#) and 4/4 time. A tempo marking of 70 is indicated at the top left. The score is divided into two systems of six staves each. The first system (measures 1-4) features a complex, rhythmic melody in the upper staves and a steady bass line in the lower staves. The second system (measures 5-8) continues the melody with more complex harmonies and a more active bass line. The key signature has three sharps (F#, C#, G#) and the time signature is 4/4.

Image 9: The second musical subsection [08:49 – 09:31] is composed in C# Minor and in a more upbeat tempo which hopefully gives an ambitious tone to the visual sequence. An excerpt is presented above.



Image 10: The third musical subsection [09:31 – 14:07], written in F# Minor, is leading to a more melancholic interpretation of nature. An excerpt is presented above.

The representation of a nature in a melancholic way adds a lot of dramatic elements to its perception and the emotional impact it has on the viewer may bring a deeper appreciation of its existence. Music runs in complementation with the visuals in Layer A.

In Layer B, music runs in conformance with the visuals for the same reason as in the first visual section.

In Section IV [14:07 – 16:46] the industrial world is present.

The image displays a musical score for Section IV, marked with a tempo of 120 and a key signature of one flat. The score is composed of multiple staves, including a grand staff at the top and several individual staves below. The notation is dense, featuring complex rhythmic patterns and melodic lines. The score is presented in a clean, professional layout with a light beige background.

Image 11: For Section IV, I aimed to create a musical score, which would focus on the architectural magnificence of modern buildings, yet pertaining the idea that imagery is interchanging in a fast-forward mode. Thus, music runs in complementation with the visuals. An excerpt is presented above.

In all the sections above [1-5], each musical layer has a specific relationship with the visuals: for instance in Section 1, Layer A runs in complementation with the visuals and Layer B runs in conformance with the visuals. Both Layers retain their individual relationship with the visuals without causing any alteration to this relationship; in fact the type of individual relationship between each musical layer and the visuals is enhanced with the presence of the second layer.

‘A Study in Disturbance’ sets the tone of what occurs in terms of applying Nicholas Cook’s triadic model in more complex audiovisual works where different music layers may form a different relationship with the visuals at the same time.

I consider these more complex musical forms as interdependent.

Conclusion: In case there are two Layers A and B, such as in “A Study in Disturbance”, Layer A can be considered as part of Layer B and vice-versa. Thus, Layer A and Layer B could be considered as part of a greater layer ‘C’ which describes the relationship with the visuals. In “A Study in Disturbance” - Section 1, Layer C runs in complementation with the visuals as far as the electroacoustic notated piece is concerned and in conformance with the visuals as far as the natural soundscape is concerned. Thus, layer ‘C’ retains all elements of its sub-layers and adds an overall meaningful relationship with the visuals. As it can be observed from the analysis above, the relationship between two or more musical layers is independent from the relationship of each musical layer with the visuals.

I had the full compositional responsibility for this electroacoustic piece. No live musicians were involved.

2: Experimentation A – First Version (Duration: 10 minutes, 08 seconds)

2a: Influences

For “Experimentation A – Version 1”, as well as for Experimentation B, I was influenced by French Composer Michel Chion (France, 1947) and his work “Etude D’Après Beethoven” from his album “L’Opéra Concret: *Musiques Concrètes* 1971-1997”. In this three-minute and thirty-three second piece, Michel Chion used, among others, piano and flute sounds and processed them with the use of tape recorder, producing a wide range of innovative electronic effects. Michel Chion made an extensive use of tape recorders for his *musique concrète* compositions because tape could capture the most internal and indescribable vibrations of a specific sound. In his book “L’Art des sons fixes”, 1991, Chion stated that: “I have to go with and against the sound, from time to time contrasting with its natural movement or creating a new conflict between sounds.” This effect is present in his work “Etude D’Après Beethoven”, where the piano and flute sounds produced with the use of a tape recorder were either heard as an electronic continuation of the natural instrument sounds or as a dramatic contrast where processed sounds were breaking the natural instrumental line in a very aggressive way resulting in the creation of newly made electronic sounds which sometimes didn’t even relate to the original instrumental source. In “Experimentation A – Version 1” I attempted to create a series of electronic delay effects with the use of Max/MSP Alpha Patch through a series of delay patches. I attempted to achieve what Michel Chion did in his work “Etude D’Après Beethoven” but with the use of Max/MSP Alpha Patch instead of electronic tape.

2b: Technical Documentation for Max/MSP Alpha Patch

Max/MSP Alpha Patch consists of two audio inputs. Input 1 is used for the file which will have an impact on the visuals; causing the transition to the industrial world when a threshold is exceeded. For Experimentations A-D, 'Layer 1' refers to the music file to be loaded in the first input of the patch, which is found in the 'Alpha_Patch' screen. From the same screen, the movie file is also loaded. Input 2 is used for the background music file, which does not interact with the visuals. For Experimentations A-D, 'Layer 2' refers to the music file loaded in the second input of the patch, which is found in the 'playback' screen. For further information, please refer to the 'Commentary' video, which is submitted in the USB drive. It is found in the 'Commentary' folder.

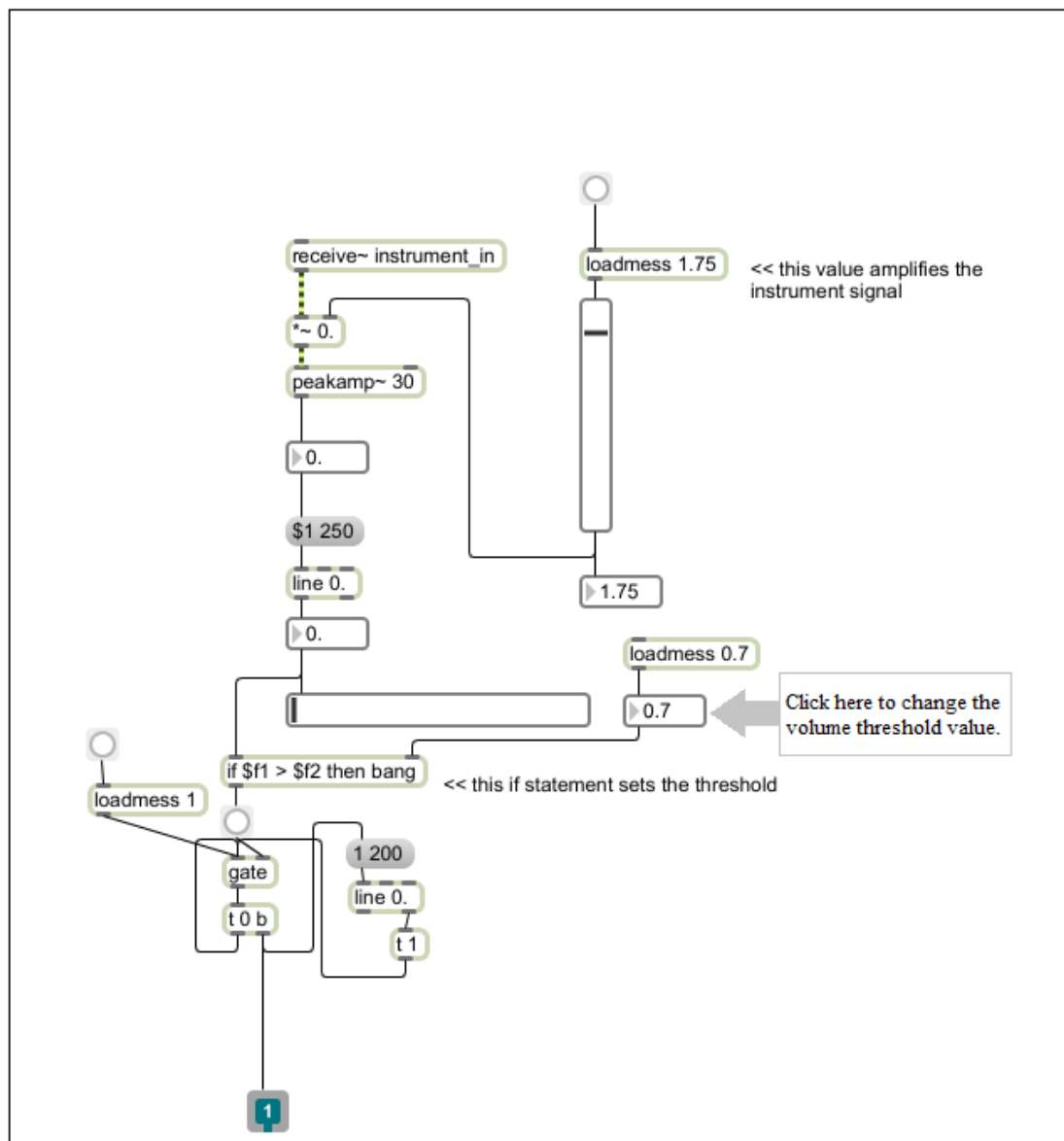


Image 13: For Experimentations A-D, a default volume threshold needs to be set. Every time the threshold value is exceeded, a transition from the natural to the industrial world is present. The volume threshold is located in the [amplitude_triggered_frame_changing_algo] screen of Max/MSP Alpha Patch.

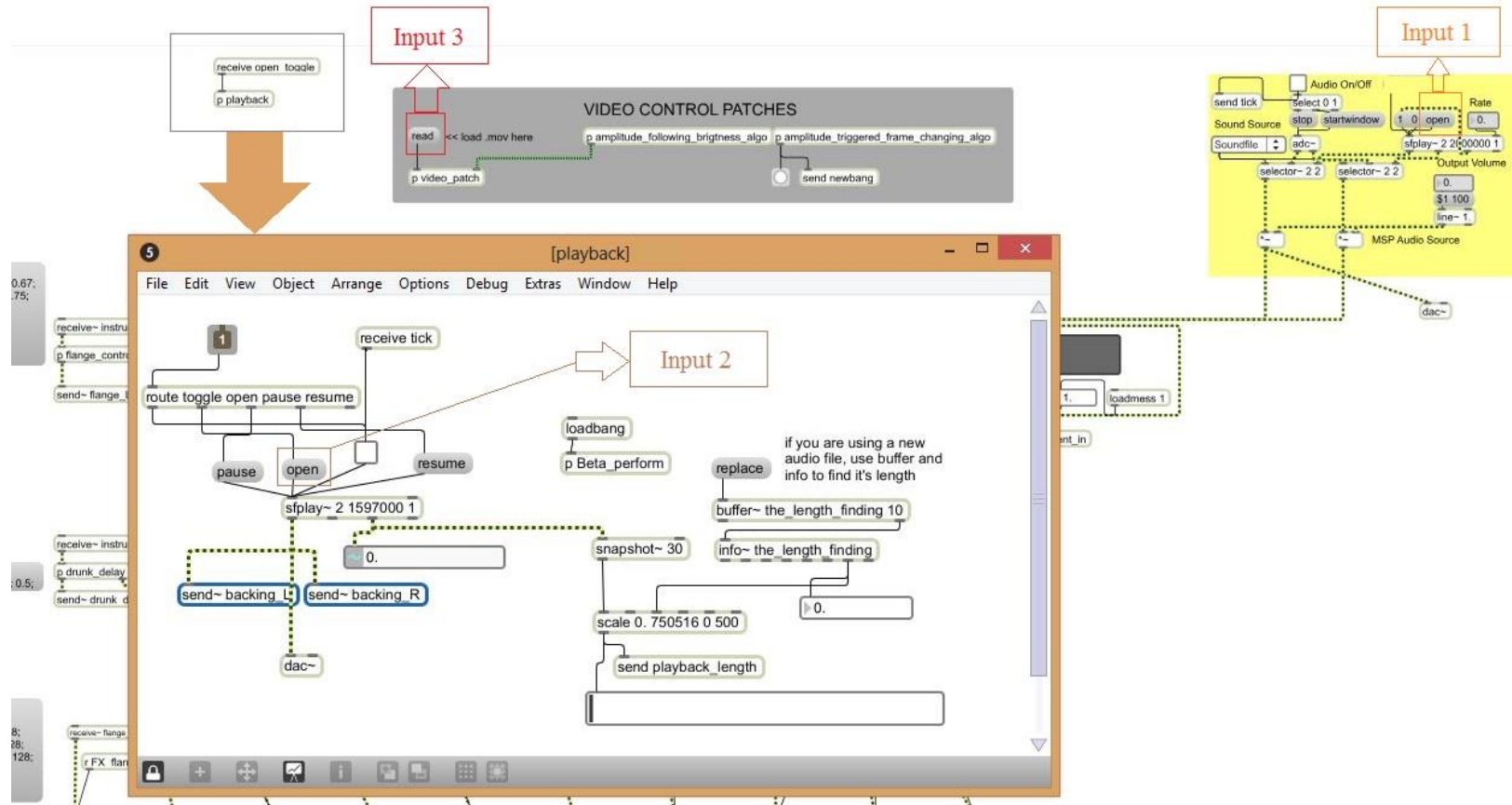


Image 14: In Input 1 the content of Layer 1 is loaded. In Input 2 the content of Layer 2 is loaded. The video file is loaded in Input 3.

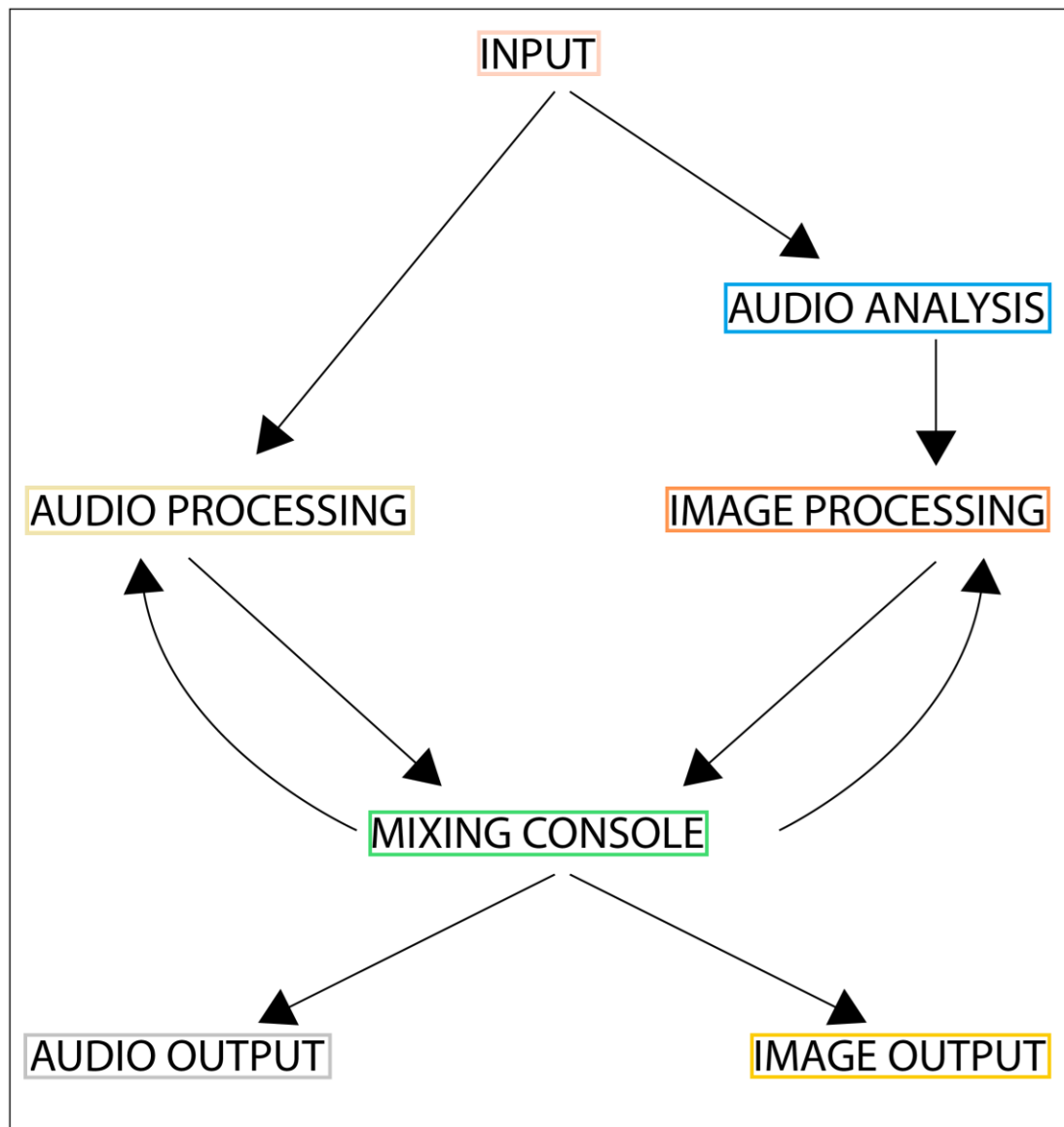


Image 15: In order to communicate the construction of the patch in a clear and concise manner I have abstracted the functions and processes of the Max/MSP Alpha Patch into seven headers: Input, Audio Analysis, Audio Processing, Image Processing, Mixing Console, Audio Output and Image Output.

<p>The <i>Input</i> header defines the audio signal entering Input 1 of Max/MSP Alpha Patch. The <i>Input</i> signal branches to two routines: <i>Audio Analysis</i> and <i>Audio Processing</i>.</p>
<p>The <i>Audio Processing</i> routine processes the incoming audio signal and outputs the resulting signal data to the <i>Mixing Console</i>.</p>
<p>The <i>Audio Analysis</i> routine analyzes incoming audio data and tests it for specific properties, the results of which are passed to the <i>Image Processing</i> routine.</p>
<p>The <i>Image Processing</i> routine tests the incoming data for specific properties. The results of which dictates the appropriate image processing to be passed to the <i>Mixing Console</i>.</p>
<p>The <i>Mixing Console</i> has bi-directional communication with the <i>Audio Processing</i> and <i>Image Processing</i> routine. It processes the input of both incoming routines and allows the user to change the parameters of the <i>Audio Processing</i> and <i>Image Processing</i> routine. The <i>Mixing Console</i> effectively controls the signal passed to the <i>Audio Output</i> and the <i>Image output</i> routines.</p>
<p>The <i>Audio Output</i> routine passes the incoming signal data to a real-world digital-to-audio converter for audio playback.</p>
<p>The <i>Image Output</i> routine passes the incoming image data to a real-world video playback device.</p>

The live delay effects were activated/deactivated through the Mixing Console of my patch.

The *Mixing Console* is a collection of *Max/MSP* Graphical User Interface (GUI) objects that allow the user to interact with different aspects of the Max Patch in real time.

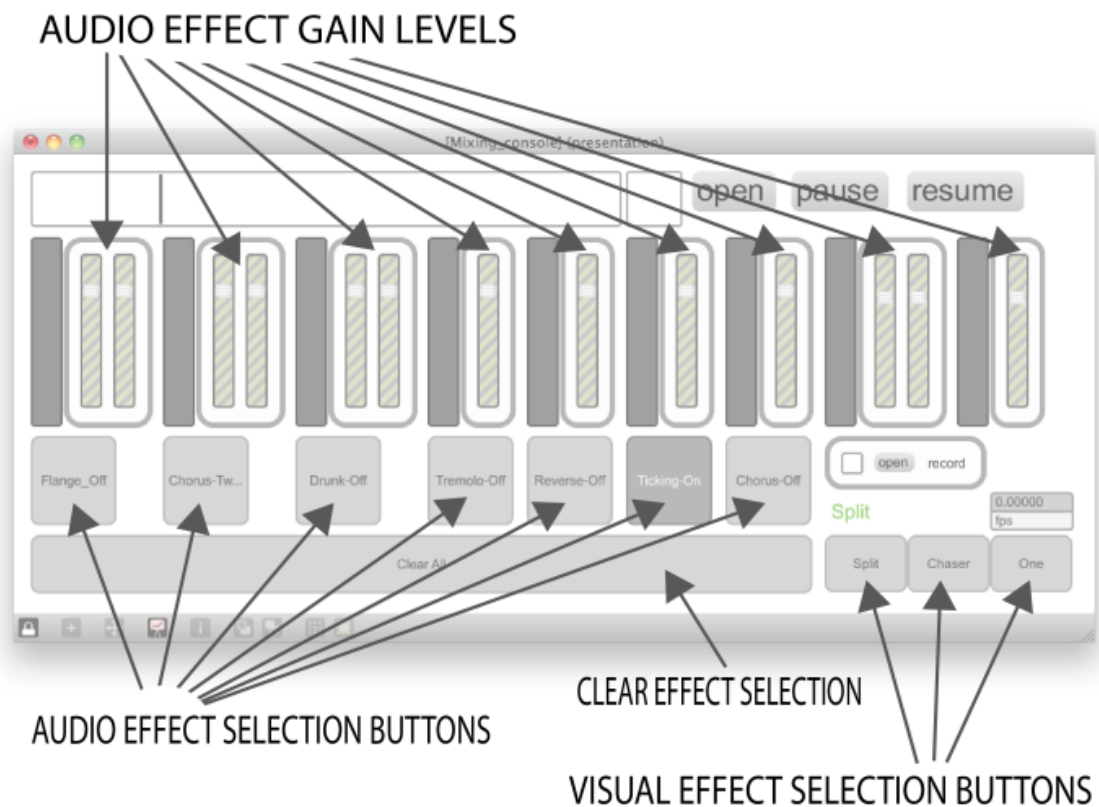


Image 16: The *Mixing Console* allows the user to control multiple parameters from a single *Max/MSP* patcher. These parameters include:

- ✓ Audio Effect Selection
- ✓ Audio Effect Gain Levels
- ✓ Visual Effect Selection

The *Mixing Console* also provides visual feedback. It clearly shows the user, graphically, what audio and visual effects are currently active.

2c: Overall Structure

In this composition, two musical layers are present: Layer 1, which includes the viola delay effects and Layer 2 which includes time-stretched sounds from three different sections of: ‘A Study in Disturbance’:

Section 1: [00:00 – 03:56]: A Study in Disturbance – Section I: [00:00 – 00:28], originally in D minor, transposed in F# minor. After time-stretching Section I, I inputted its waveform to Sony Vegas, which has the ability of transposing waveforms on any tonality. Section 1 is the smoothest of the three sections, with very few changes in harmony and a very ‘thin’ and ‘gentle’ melodic line, and continuous sound with no fade-ins or fade-outs.

Section 2: [03:56 – 08:47]: A Study in Disturbance – Section III – First musical subsection: [05:20 – 05:59]. More changes in harmony are present and the melodic line is more enhanced than in Section 1. The sound is less continuous than in Section 1, with fade-ins and fade-outs being present. Yet, the smoothness of the sound is pertained.

Section 3: [08:47 – 10:08]: A Study in Disturbance – Section III – Third musical subsection: [13:10 – 13:20], originally in A minor, transposed in F# minor with the use of Sony Vegas. More changes in harmony than in Section 2 are observed. Sound has a very ‘thick’ and ‘deep’ texture and fade-ins and fade-outs are present. As in Section 2, the smoothness of the sound is pertained.

Layer 1 starts smoothly and builds up gradually, until it reaches a ‘musical explosion’ point in Section 11.

Layer 2 is smooth and stable throughout the entire piece, as opposed to Layer 1. What I hope to have achieved is use Layer 2 as a contrasting element to Layer 1 but at the same moment make sure that Layer 2 gives a ‘boost’ to Layer 1 as the latest builds-up. This dramatises the relationship between the two layers. The ‘boost’ effect gets more intense from section to section.

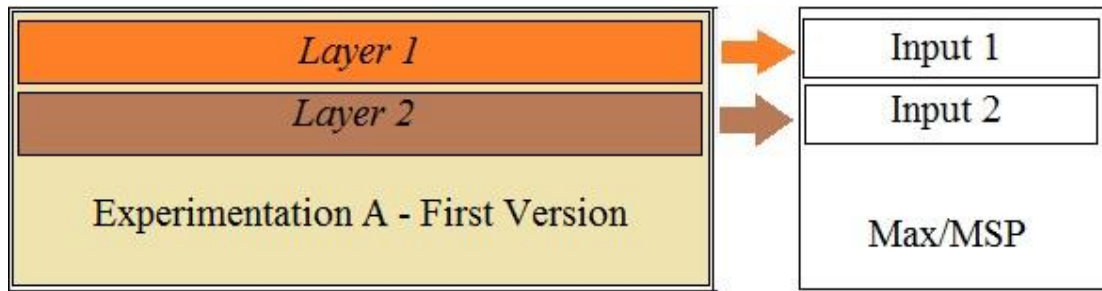


Image 17: Diagram visualizing the inputs of Layers 1 and 2 in Max/MSP Alpha Patch.

For the whole duration of this piece, Layer 2 runs in complementation with the visuals when running over natural imagery, because it represents the unified way in which the natural elements are tied. Even when Layer 2 runs over industrial imagery, it acts as a natural continuation of the harmonious way in which the natural elements are related. Thus, Layer 2 runs in contest with the visuals over industrial imagery throughout the entire piece.

2d: Examination of the transition effect depending on the volume threshold value.

The relationship between music and visuals will now be analyzed. As far as the transition from the natural to the industrial world is concerned, all the possibilities are examined at each section. In order to check whether there is a transition or not, depending on the threshold value applied, please refer to the table below:

	Transition between nature/industry (Y = Yes), (N = No)									
<u>Threshold Value</u>	<u>0.1</u>	<u>0.2</u>	<u>0.3</u>	<u>0.4</u>	<u>0.5</u>	<u>0.6</u>	<u>0.7</u>	<u>0.8</u>	<u>0.9</u>	<u>1.0</u>
Section 1	Y	Y	Y	Y	N	N	N	N	N	N
Section 2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Section 3	Y	N	N	N	N	N	N	N	N	N
Superimposition of Section 3 over Section 4 from: [03:27 – 03:30]	Y	Y	Y	Y	N	N	N	N	N	N
Section 4	Y	N	N	N	N	N	N	N	N	N
Section 5	Y	Y	Y	Y	Y	N	N	N	N	N
Section 6	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Section 7	Y	Y	Y	Y	Y	N	N	N	N	N
Section 8	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Section 9	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Section 10	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Section 11	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Table A

2e. Analysis with the use of Cook's triadic model

Section 1: Ticking [00:15 – 01:58] - Motif 1: Large Note Durations

During this effect, gradual sound repetitions, which fade out, are audible during each gesture.

A. Internal Structure of Layer 1 of Section 1

Five sub-sections are present in Layer 1:

1] Sub-section 1: [00:15 – 00:47]: <u>Smooth</u> viola sound which can get more intensified but gradually, without any sudden gesture.
2] Sub-section 2: [00:50 - 01:12]: More <u>sudden and aggressive gestures</u> starting at a very low sound level at: 00:50, followed by a crescendo and reaching the highest volume level at: [01:10 – 01:12].
3] Sub-section 3: [01:12 – 01:44]: <u>Smooth</u> viola sound - Same as in Sub-section 1
4] Sub-section 4: [01:44 – 01:47]: Two <u>sudden and aggressive gestures</u> with same sound texture as in Sub-section 2, but of higher volume level than in (01:10 – 01:12).
5] Sub-section 5: [01:54 – 01:58]: Viola <u>smooth</u> scratching sounds, acting as a short bridge leading towards Section 2.

B. Implementation of Cook's triadic model

A. When the viola sound is smooth, in Sub-sections 1 and 3, it represents the atmospheric landscape formed by the primitive natural elements displayed on screen and the emotions emerging from this depiction. Thus, when Layer 1 is displayed over natural imagery, music runs in complementation with the visuals and when it is displayed over industrial imagery, music runs in contest with the visuals.

B. The sudden and aggressive appearance of the city imagery can be musically related to the sudden and aggressive gestures in Sub-sections 2 and 4. Thus, when Sub-sections 2 and 4 are present, music in Layer 1 runs in complementation with the visuals over city imagery. On the other hand, when natural imagery is present, music runs in contest with the visuals because Layer 1 represents the intense presence of cityscape imagery in fast-forward.

C. Sub-section 5 is the final part of Section 1 and the sounds here are purposefully very smooth but intense as well, because of the scratching effect. I aimed to give a 'mysterious' feeling which would contrast Section 2. When running over the natural imagery, a feeling of 'mysterious exploration' of nature emerges; thus music runs in complementation with the visuals. In order for a transition to the industrial world to occur at this sub-section, the volume threshold needs to be set at 0.1. This causes two short transitions at [01:55] and at [01:56]. During these two transitions, the effect reaches its peak and the presence of industrial imagery is really short but intense. The visual transition is seemingly 'stepping' onto the two short musical peak events at [01:55] and [01:56], thus music runs in complementation with the visuals. If the volume level is higher than 0.1, there is no transition observed and the whole sub-section runs over natural imagery.

Conclusions on Section 1:

1. The relationships between music and visuals with the use of Cook's model can be formed in three different ways:

a) In terms of the content of the visuals. Example: If music represents an emotion emerging from the natural world, this can lead to music running in complementation with the visuals.

b) In terms of the rhythm in which the visual imagery changes, independently from its content. Example: A dramatic and high-speed music sequence applied over the fast-forward industrial imagery can lead to music running in complementation with the visuals.

c) In terms of musical intensity. Example: When a short gesture of high volume exceeds the volume threshold and causes a short transition to the industrial world, this causes a dramatic effect to both music and visuals. Thus, it can be admitted that music runs in complementation with the visuals over the industrial section, because the sudden appearance of the industrial imagery caused an unexpected effect and a feeling of surprise which can be related to both music and visuals.

2. An alteration of the volume threshold value can cause differences in the relationship between music and visuals. For instance, in Sub-section 5, there is no transition into the industrial section if the threshold has a higher value than 0.1. In addition, when the threshold has the value of 0.7, there is no transition to the industrial world at all during Section 1. Thus, music in Layer 1 runs in complementation with the visuals throughout the entire section. The lower value the threshold has, the more transitions are likely to occur. This leads to the production of the following effects:

a) When the threshold has a low value (0.1) the transitions occur very frequently, because this value can be easily surpassed. This gives a feeling that the fast-forward industrial imagery is following the pace of the musical gestures and seemingly 'stepping' on the music.

b) When the threshold has a high value (between 0.7 and 1.0), the transitions occur more rarely than in the above case, but this has two advantages:

- The presence of industrial imagery is more intense and dramatic because it makes shorter appearances over the longer lasting natural sequences.
- The presence of industrial imagery occurs frequently only when the viola gestures are extremely intense. A good example for this, is Section 11, the last section of the experimentation. This creates a hopefully interesting contrasting effect for the entire piece, as in Section 1, no transition occurs when the threshold is 0.7, and in the last section, very frequent transitions occur because of the intensity of the musical piece.

c) When the threshold has a medium value (0.5), the transitions neither occur as often as in (a) nor as rarely as in (b). This leads to a more balanced representation of the entire piece.

3. The time-stretched sections of 'A Study in Disturbance' had a very 'classical' sound texture as opposed to the newly-emerging electronic effects produced in the viola section. Even though the sounds of 'A Study in Disturbance' were purely electronic and created in Logic Pro 9, the emerging time-stretched sounds were more reminiscent of sounds produced by classical instruments than electronic sounds. On the other hand, the viola sounds undergo significant changes when the electronic effect is applied and they obtain purely electronic characteristics.

Section 2: Flange [01:58 – 02:53] - Swelling Notes

The viola sound is undergoing significant modifications. A 'spiral' sound effect is present. There is a feeling that a 'swallowing' motion is in presence during this sequence.

In Layer 1, in the natural section, the sound produced with the use of the Flange effect actually prepares the audience for the transition in the industrial world, even though the natural imagery is still on screen. Thus, music in Layer 1 runs in contest with the visuals.

When Layer 1 runs over industrial imagery, there was a hopefully interesting effect which made its appearance: The impact this section had on me was that the buildings were somehow decomposed to their original materials, through the 'swallowing' motion effect emerging from the viola. From this section I realized that depending on the application of the delay effect, some new 'unseen' visual characteristics could be added on an audiovisual piece, which can have a very intense effect on the viewer. Music runs in complementation with the visuals in this section, as the 'swallowing' effect is successfully passed to the visuals and the desired dramatic effect is produced.

In the industrial section, the 'unseen' decomposition visual effect becomes more dramatic when listening to stable Layer 2 in parallel. Layer 2 gives the perception that 'something' is attempting to put this decomposition process on hold and this intensifies the effect produced in Layer 1.

The aggressive viola tone in Layer 1 sounds more dramatic with the use of the continuous background soundscape in Layer 2, for both nature and city sections.

Section 3: Drunk [02:53 – 03:27] - Wood-Tapping, Pizzicati

In Layer 1, the application of wood tapping and pizzicato sounds with the use of the Drunk effect over the natural visual imagery led to the presence of sound disturbance, which is related to the industrial world. This disturbance is pitched when emerging from pizzicato, or non-pitched when emerging from wood-tapping sounds. The fact that the wood tapping effects act as a reminder of the transition effect and this occurs over the natural imagery, leads to music running in contest with the visuals.

In Layer 1, when a transition to the industrial world is observed, the wood tapping, and pizzicati led to the illusion of 'something' pointing at distinct buildings. Music runs in complementation with the visuals as it leads to the human eye focusing on specific structures during the fast-forward sequence.

This is a very clear representation of the 'Stone in the water' effect where wood-tapping and pizzicati effects in Layer 1 act as 'Stones' and the effect present in Layer 2 acts as 'Water'. Thus a very interdependent 'question-answer' scheme is founded between the two layers. In addition, when focusing on the superimposed sea water depiction, the wood-tapping and pizzicati effects aid the human eye focus on the remainder of the natural material depicted on screen and the content of Layer 2 enhances the presence of water on screen.

The presence of Layer 1 leads to a sense of a series of vibrations created on the surface of Layer 2, without the latest altering its sound characteristics and this creates a striking effect.

Section 4: Tremolo [03:27 – 03:40] - Long held pitches

The Tremolo effect is similar to the Ticking effect. It results in the production of gradual sound repetitions but in much faster tempo than in the Ticking effect; so fast that they almost sound continuous. In addition, there is no audible fade-out during each gesture, in contrast to the Ticking effect.

The application of the Tremolo effect in Layer 1 brings a new dimension to the natural visual environment: It retains the characteristics emerging from the application of the ticking-delay effect described in Section 1, but the fact that each gesture ends in a sudden way without the existence of a fade-out, brings to the viewers a sensation of the 'unknown'. In addition, the fast but smooth repetitions bring a feeling of nostalgia and melancholy on the surface. When observing nature, emotions like that can emerge and they are dramatically augmented with the use of this effect over this visual sequence, thus, music runs in complementation with the visuals.

The application of this effect over the industrial visual material brings an atmospheric dimension to the visual sequence. In addition, the melancholic and nostalgic aspect emerging over the natural material is also transferred in the industrial sequence. The application of this effect makes the transition between the two worlds smoother and less dramatic, in a way it works as a visual equalizer between the two environments. Music in Layer 1 runs in complementation with the visuals in this section as well.

The presence of the background music in Layer 2 shapes and smoothens the melancholic and nostalgic aspects emerging from Layer 1.

For the first three seconds [03:27 – 03:30] Section 3 is superimposed over Section 4, acting as a bridge between the two sections. During these three seconds, Layer 1 is divided in two sub-layers: Sub-layer 1a which contains the wood-tapping sounds and Sub-layer 1b which contains the long-held pitches sounds. Both sub-layers retain their relationships with the visuals, over natural and industrial imagery, confirming for one more time that each layer retains its original relationship with the visuals in case of a layer superimposition. During these three seconds, a triple superimposition is observed: Layer 1 (Sub-layer 1a and Sub-layer 1b) and Layer 2. Both sub-layers of Layer 1 are 'stepping' on the smooth background emerging from Layer 2.

Section 5: Reverse [03:40 – 04:07] - Short fast glissandi

Each gesture is reversed in real time and heard from its end to its beginning. When the effect runs over natural imagery, the gestural shapes are a direct reference to the industrial world. Thus, the industrial world was 'present' in its 'absence'; meaning that even though the natural imagery was on screen, the fast gestures were a musical representation of the industrialised world during this sequence. For this reason, music runs in contest with the visuals.

When the gesture occurs over industrial imagery, music runs in complementation with the visuals, because it follows the pace of the fast-forward rhythm applied in the visuals but also because the sound and texture of each gesture is very reminiscent of a visual representation of the height of the buildings; as if those being drawn from bottom to top in real time. A similar effect can be noticed in Section 9. In that subsection, the scaling sequences are more continuous than the effect applied in this section. Thus, in this section, the bottom-to-top drawing effect is more distinct. There is the perception that each building is drawn individually, followed by a short interval before the next drawing occurs. On the other hand, in Section 9 the drawing effect seems more continuous, so no interval is interfered. After the end of each gesture, the reverse effect is heard.

The reverse effect acts as a reflection of the original one, with no loss of volume. Two different effects can be noticed when the reverse effect is active:

- 1) A feeling of reverse motion – from right to left - within each image could be present on screen.
- 2) Since the reverse effect acts as a reflection to the original one, a reflection of the image over which the original gesture occurred can still be present during the reverse effect, even though the reverse effect runs over a different image. When there is no gesture present or when there is a short interval between two consequent gestures, there is a short transition to the natural world.

During this section, the second part of Layer 2 emerges at 03:56.

Section 6: [04:07 – 05:11]: Tremolo: The reappearance of the tremolo effect of Section 4, but this time, over Section 2 of Layer 2. This results in a more enhanced dialogue between the tremolo effect and Layer 2, because of the characteristics of Section 2 of Layer 2. In addition, the tremolo effect is more intense in this section.

Section 7: [05:11 – 05:47]: Reverse: The reappearance of the reverse effect of Section 5 over Section 2 of Layer 2. This has new effects in the relationship between Layers 1 and 2, as described in Section 6.

Section 8: Chorus [05:47 – 07:35]: Sul-Ponticello Attacks

Sul – Ponticello attacks lead to a more dramatic entrance of the viola part at this section. The pitch-change effect sounds more continuous than in the section above; it sounds as a direct dry-sounded reflection of the fast sul-ponticello gestures.

A. Internal Structure of Layer 1 of Section 8 and analysis with the use of Cook's triadic model

Sub-section 1: From [05:47 – 06:25] the attacks are very smooth and the acoustic result is very mysterious at this point, giving the perception that a hidden unknown entity is present in the natural imagery, resulting in music running in complementation with the visuals over natural visual sequences. This 'hidden entity' feeling is also transferred in the industrial world, resulting in music running in complementation with the visuals over cityscape imagery as well. A similar feeling is emerging from Sub-section 5 of Section 1, when the smooth scratching viola effects are present. The difference is that in this Sub-section the acoustic result is more flowing than in Sub-section 5 of Section 1, where the scratching effects are more discrete.

Sub-section 2: From [06:25 – 07:13] the attacks are very aggressive. In Sub-section 2, the transition to the industrial world is present every time an attack occurs. The

absence of sound in Layer 1 during the short pauses of the viola creates a very intense effect between the two worlds.

Sub-section 3: From [07:13 – 07:30] the attacks are smoother than in Sub-section 2 but still intense.

Sub-section 4: From [07:30 – 07:35] the attacks become aggressive again, leading to Section 7.

Conclusion on Section 8: With the use of specific music textures, such as in Sub-section 1 of Section 8 of “Experimentation A – First Version”, the relationship between music and visuals can be the same over contrasting visual material. In the case of Sub-section 1, music runs in complementation with the natural and industrial visual imagery, even though these two visual worlds are highly contrasted.

B. The solid representation of cityscape imagery

When Sub-sections [2 – 4] run over industrial scenery, the use of this effect leads to a very solid representation of cityscape imagery; focus is given on the overall perception of the imagery and not in each building separately. In addition, a sense of solidity is also present as far as the fast-forward imagery is concerned. The images are seemingly following the pace of the gestures; if fast-forward image changes occur within each gesture, these are not so obvious. The unification feeling is present in this sub-section, regarding the industrial world. Music in Layer 1 runs in complementation with the industrial imagery.

When there is no gesture present, a short pause is observed, running over natural imagery. The presence of short pauses gives a lot of intensity to this section and provides the next gesture with a dramatic entrance effect.

Section 9: Flange – Chorus Two [07:35 – 08:32]: Scalic Sequences

The application of the combinatory effect led to a similar effect emerging from Section 2 but the acoustic result is a much dryer sound due to the presence of Chorus Two. The scalic sequences seemed to be surrounded with the combinatory sound effect produced. The acoustic result formed an acoustic scalic bridge leading to the pre-ending section that follows.

When running over cityscape imagery, the Scalic sequences are a very good representation of the various heights of the buildings in the industrial world; the higher the pitch, the bigger the height. When observing the visuals, human eye is focusing on higher buildings depending on the pitch that is audible during the musical sequence. Thus, in Layer 1, music runs in complementation with the visuals. In addition, the dry scalic sequences of the second half lead to the production of more complicated sounds which are really reflective of vehicle sounds in fast motion.

When running over natural imagery, music runs in contest with the visuals for the same reason as in Sections 5 and 8.

Section 10: Flange – Chorus – Chorus Two [08:32 – 08:48] - Percussive

The application of this combinatory effect over fast gestures producing percussive sounds by tapping on the viola's exterior surface led to the creation of 'thunder-like' sound effects, marking the beginning of the climax of the piece.

This section marks the beginning of the climax of the piece. At this stage the dynamics get very high. The main musical characteristics are the following: the 'dotted sound textures' emerging from the application of the two chorus effects and the intense wood-tapping sounds emerging from the application of the Flange effect. The combination of these two parameters leads to the most intense representation of the industrial imagery till now, pointing out its complexity and its volume. Music runs in

complementation with the visuals when running over industrial imagery. When running over natural imagery, it runs in contest with the visuals, as in Sections 5, 8, 9.

Section 11: Drunk – Chorus [08:48 – 10:05] – All above combinations

The epilogue of the piece is characterized by an extensive use of all techniques applied in the previous sections with the use of Drunk and Chorus 1 effects. The highest peak of the piece in terms of sound and dynamics occurs at: 09:04. Drunk and Chorus 1 were the two effects producing the most dramatic multiple pitch changes and their combination led to the creation of multiple ‘explosion’ effects, which marked the ending of the piece.

The epilogue of the piece is characterized by a use of all techniques applied in the previous section with the use of Drunk and Chorus 1 effects. The application of the Drunk effect brings a generative dimension to the finale of Experimentation A, and this gets more intensified with the use of the Chorus 1 delay effect. During this music sequence in Layer 1, there is a motion illusion within each photo still which occurs because of the extremely fast gestures used in this section and the fact that all the techniques applied over the industrial imagery visuals are used in this section to the maximum.

Music runs in complementation with the visuals over industrial imagery and in contest with the visuals over natural imagery.

In Section 11, Section 3 of Layer 2 emerges. The ‘boost’ effect emerging from Layer 2 dramatises the presence of Layer 1.

A short sudden diminuendo occurs from [10:03 – 10:05] marking the end of the piece. I opted for a dramatic ending with no long and smooth diminuendo and this is the reason why I elected to create a two-second diminuendo at the end of the section.

1. Max/MSP 'Alpha Patch' was constructed.
2. The Delay Effects were initially tested using live piano sound as input, so as to get an overall idea of the nature of the effects.
3. The Delay Effects were tested using downloaded viola samples as input, so as to get a clearer image of the gestures to be used for this work. This step aided me in judging which

Experimentation A – Second Version (Duration: 10 minutes, 08 seconds)

● Implementation of Cook's triadic model on 'Experimentation A – Second Version'

The musical part of this piece is exactly the same one used in Experimentation A – First Version. The only different element is the visual piece; fast-forward moving imagery is replaced by shadowy industrial imagery superimposed over natural imagery. It is worth mentioning that fast-forward imagery can be re-interpreted as ghostly industrial imagery superimposed over natural imagery and yet have a very similar impact. For this reason, the relationships between Layer 1 and the visuals, as well as Layer 2 and the visuals, remain the same as in Experimentation A – First Version.

In 'Experimentation A – Second Version', Max/MSP Beta Patch was used. A mathematical operation in jitter was used for displaying shadows of an image rather than displaying the image as it was. The viola sound was visualized and superimposed over the city photo stills and thus achieving a direct-to-screen visualization of the disturbance. There were two audio inputs in this patch: One for the recorded viola and one for the electroacoustic track. There were also two video inputs: One for the natural imagery and one for the industrial imagery – 'Nature' and 'Cities' respectively. In Beta Patch, two different video files needed to be inputted, in contradiction to Alpha Patch, where only one video file was loaded for the performance.

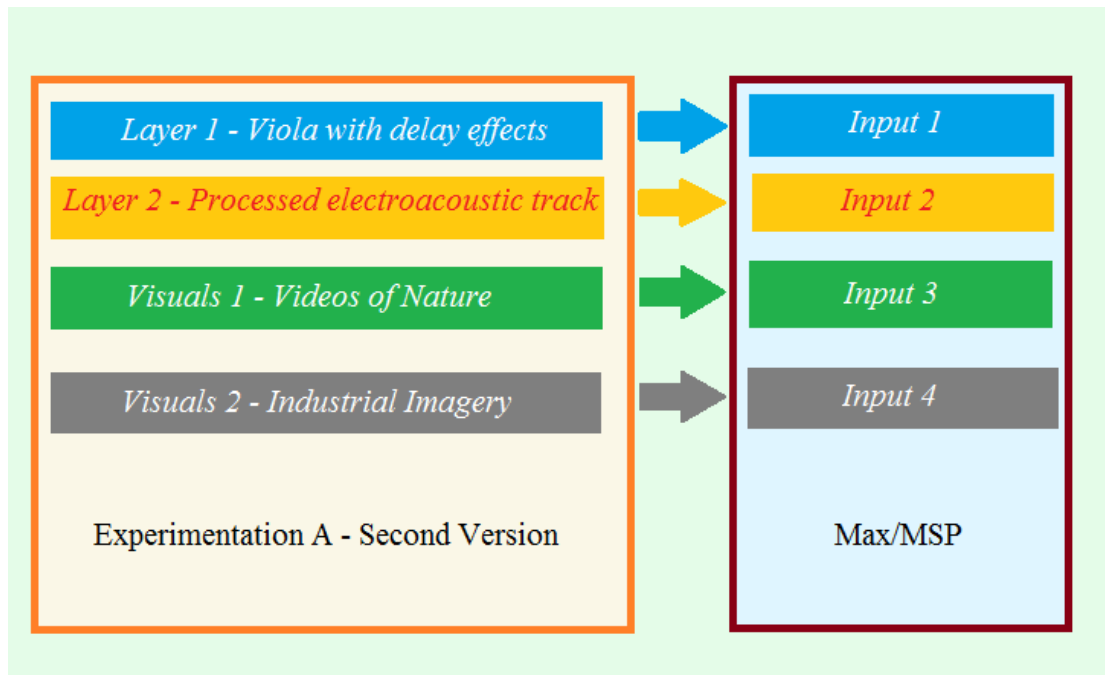


Image 18: Diagram visualizing the inputs of Layers 1 and 2 in Max/MSP Beta Patch.

In this work the industrial imagery gave a visible, almost materialistic shape to the viola delay effects on screen; in this piece the delay effects did not just trigger the visuals; they became part of the visuals, representing the disturbances in the natural world in a visual way, and at the same moment the industrial imagery hopefully became part of the musical score as the abstract way that it appeared gave the illusion that the delay effects were an extension of this optical representation of the city visuals.

In Experimentation A – First Version, Layer 2 always ran in complementation with the visuals when running over natural imagery. When running over industrial imagery, Layer 2 ran in contest with the visuals. What can be admitted in Experimentation A – Second Version is the fact that the complementation relationship formed by Layer 2 and the visuals over natural imagery, as well as the contest relationship formed by Layer 2 and the visuals over industrial imagery are superimposed one over the other because of the visual superimposition.

For example, in Section 1, when taking into account the fact that Layer 2 is a natural continuation of the emotion emerging over natural imagery, Layer 2 runs in contest with the visuals when placed over industrial imagery. At the same moment, Layer 2 runs in complementation with the visuals over natural imagery. For this reason, Layer

2 runs in both contest and complementation with the visuals and depending on how intense the presence of the industrial world is on screen, more focus is put either on the relationship formed between Layer 2 and the natural world or Layer 2 and the industrial world. When the presence of industrial imagery is equal to the presence of natural imagery, then both relationships are given equal fifty per-cent focus.

The same principle is followed for Layer 1. For example, in Section 2 of Experimentation A – First Version, Layer 1 runs in contest with the visuals over natural imagery and in complementation with the visuals over industrial imagery. In Experimentation A – Second Version, music runs in both contest and complementation with the imagery, depending on which visual imagery is more intense on screen.

In a way, in Experimentation A – Second Version, a verticalisation of the relationships formed between Layers 1, 2 and the visuals is observed. What is hopefully achieved is the continuous mutual intensification between the two visual sections. What was hopefully achieved musically in Experimentation A – First Version, is hopefully achieved visually in Experimentation A – Second Version.

Conclusion: What emerges from the above is the following: When two visual layers are superimposed over each other, Cook's triadic model can be implemented for each one of the visual layers separately. Each one of the musical layers forms a separate relationship with each one of the visual layers. The more intensely a visual layer appears on screen, the more focus is given in the relationship formed between this visual layer and the musical layers.

● Technical Documentation of ‘Experimentation A – Second Version’

The visual result of the main patch is depicted below (MAIN) in Presentation View.



Image 19: The main screen of Max/MSP Beta Patch. The volume of the recorded viola was used to trigger the fading between four screens of visual imagery (FADER). Each one consists of one screen containing the natural imagery and one screen containing the industrial imagery. Each matrix is unpacked into its basic colors W, R, G, B and each of these are connected to the right inlet of a separate gate object. The left inlet of the gate object is connected to a switch (toggle object). The switch needs to be on so as for the gate to be closed. The difference between each pair is the fact that I connected each outlet to a different gate object. This resulted in each matrix having a different color when packed. The Jitter jit.xfade object is responsible for the fading between a pair of two different matrices. Each jit.xfade object is connected to a slider which is actually controlled by the recorded viola. I attempted to enhance the natural imagery with a variety of colors versus the monochrome industrial imagery. When there is no presence (or little presence) of the industrialized world, the presence of colors in the four pairs is very intense. The more the industrialized world imagery gains presence, the less important becomes the variety of colors among the pairs. This symbolized the decolorization of nature by the industrialized world. This is depicted in Images 20 – 22 in *Edit View*.

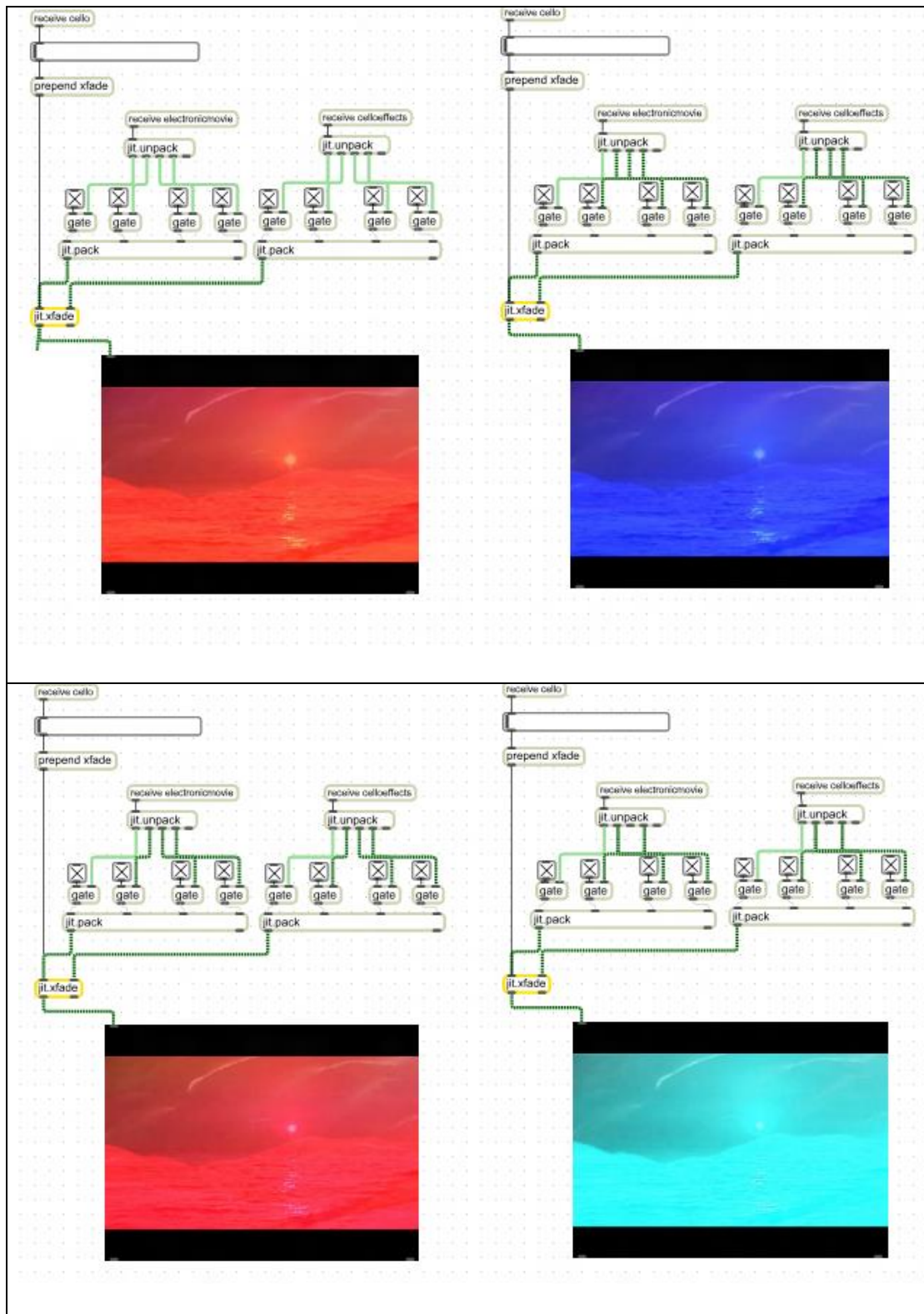


Image 20: Depiction of the natural world prior to the ‘disturbance’ of the city imagery. The different colors in each case were a result of the different joints between the ‘jit.unpack’ object and the ‘gate’ object.



Image 21: Gradual Decolorization of the natural landscape.



Image 22: Intense presence of the industrialized world with shadows of color in the background.

As far as “Experimentation A – First and Second Version” is concerned, I had the full compositional responsibility.

Layer 1: The contribution of the viola player was essential for the creation of Layer 1 of my work, as, after him being fully informed on the nature of the live delay effects emerging from the Max/MSP Alpha Patch that I had constructed, he suggested various innovative viola techniques which we examined in detail in order to decide which ones suited best to each delay effect. I recorded the selected choices. I edited each one of them in Sony Vegas Pro 12 so as to keep the sections which appeared more interesting to me. In the end, I combined the edited sections and this led to the creation of the final acoustic result of Layer 1 which was used in: “Experimentation A – First and Second Version” and as Layer 1 in “Experimentation D”.

Layer 2: There was no contribution of the player in Layer 2 as the latest emerges from sections of “A Study in Disturbance” which were time-stretched and used in “Experimentation A – First and Second Version”.

“Experimentation A – First Version” was performed live at a Sussex University Concert given at the Basement Venue, Brighton, on the 27th of April, 2012. In this concert, “Experimentation A – First Version” was still a work in progress. This performance was a first attempt to test the delay effects of ‘Max/MSP Alpha Patch’ in front of a live audience. The piece was performed by composer Tom Reid. A screenshot of this performance is presented below.



Screenshot 1: Photo still from the performance of “Experimentation A – First Version” at the Basement Venue, Brighton, on the 27th of April 2012.

During the MPhil course, I collaborated with British professional cellist and music technologist Dr. Alice Eldridge. We had a number of sessions where we worked on simple Max/MSP delay effects with live cello performance. These sessions helped me clarify what sorts of delay effects could be used efficiently for strings. This collaboration was a contributory factor in the structure of my project, as I created “Experimentation A – First Version” after understanding the significance of using a Max/MSP Patch for the creation of innovative delay effects for strings.



Screenshot 2: Photo still from my collaboration with Dr. Alice Eldridge in Silverstone Studios, Sussex University.

3: Experimentation B (Duration: 09 minutes, 02 seconds)

3a: Overall Structure

Layer 1: For the main input, three of the delay effects used on Experimentation A were selected: Flange, Drunk and Chorus. The processed electroacoustic track of Experimentation B, was used in Experimentation A as Layer 2. In Experimentation B, eight specific sections of the processed electroacoustic track were selected. The delay effects were implemented on these selected sections. Please refer to Table B.

Layer 2: I wanted this Layer to be smooth for the creation of a contrasting effect with Layer 1. For this reason, I applied the time-stretch algorithm on Sub-section 1 of the Ticking effect, in Layer 1 of Experimentation A: [00:15 – 00:47]

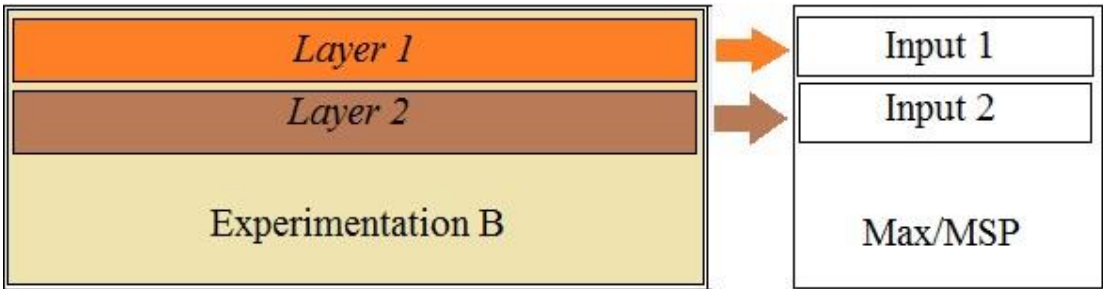


Image 23: Diagram visualizing the inputs of Layers 1 and 2 in Max/MSP Alpha Patch.

3b: Detailed Structure

<u>Delay Effect</u>		Sections of Layer 2 of <u>Experimentation A</u> , which were used for the application of the delay effects.	New position of the sections of the processed electroacoustic track in <u>Experimentation B</u> , now used as Layer1. The delay effects are already applied.	
<u>Name of Effect</u>	<u>Effect Used</u>		Pause/Silence	Presence of <u>Effect</u>
			There is a pause in Layer 1 and <u>only</u> Layer 2 is audible.	Both Layer1 and Layer 2 are audible.
EFFECT 1	Flange	00:00 – 00:45	00:00 – 00:45	00:45 – 01:30
EFFECT 2	Flange	01:45 – 02:15	01:30 – 02:00	02:00 – 02:30
EFFECT 3	Drunk	02:30 – 03:00	02:30 – 03:00	03:00 – 03:30
EFFECT 4	Drunk	04:00 – 04:30	03:30 – 04:00	04:00 – 04:30
EFFECT 5	Chorus	05:00 – 05:30	04:30 – 05:00	05:00 – 05:30
EFFECT 6	Chorus	05:30 – 06:00	05:30 – 06:00	06:00 – 06:30
EFFECT 7	Flange	06:15 – 06:45	06:30 – 07:00	07:00 – 07:30
EFFECT 8	Flange	07:00 – 07:30	07:30 – 08:00	08:00 – 08:30
Final Section (Smooth Diminuendo in Layer 2)			08:30 – 09:02	

Table B

3c: Effects grouping

When applying the delay effects over the processed electroacoustic piece in Layer 1, the effects can be grouped in the following categories:

<u>Fast - Tempo</u>	<u>Air Effect</u>	<u>Rhythmical Effect</u>
EFFECT 5	EFFECT 1	EFFECT 3
EFFECT 6	EFFECT 2	EFFECT 4
	EFFECT 7	
	EFFECT 8	

Table C

3d: Analysis with the use of Cook's triadic model

The volume threshold value for this section is set to 0.1

When Layer 1 is audible, there is always a transition to the industrial world.

In the Fast – Tempo category, emphasis is given on the high speed in which the industrial imagery is changing and on the intense emotion emerging from this approach. The use of the chorus effects is characteristic of the depiction of the industrial imagery and thus music runs in complementation with the imagery.

In the Air Effect category, a different effect of fast-forward motion is detected; this time more fluid and continuous than with the use of the chorus effect, yet the feeling of intensity, which characterizes the presence of the industrial world in fast-forward motion, is pertained. Thus, music runs in complementation with the imagery but the effect emerging from this category is very different from the one produced by the Fast-Tempo category. The acoustic result has a high resemblance to a hurricane effect.

In the Rhythmical Section category, multiple pitch changing in wide pitch range is observed, following a rhythmic-structured pattern. The rhythmic pattern gives the illusion that the fast-forward visual sequences are also following this specific rhythm. In addition, the rhythmic pattern symbolizes the fact that an architectural pattern is always implemented for the construction of a building. Moreover, when observing a group of buildings in the industrial section, they are interconnected with similar architectural principles and this is enhanced by the presence of the rhythmic pattern emerging from the application of the Drunk effect.

In this experimentation, the live delay effects were placed over sections of the processed electroacoustic track. This resulted in the production of totally different sound textures compared to the ones produced when applying the same effects over viola gestures. In addition, what is worth mentioning is the fact that in Experimentation A, the role of viola gestures was very important for the acoustic result of the applied effect, as well as for the transition to the industrial world and the impact this transition has on the viewer. In Experimentation B, the use of delay effects applied on Experimentation A's processed electroacoustic sound sections led to the creation of new sound textures of various depths.

3e: The depth factor

<u>Sound Effect</u>	<u>Depth Factor</u>
EFFECT 1	1
EFFECT 2	2
EFFECT 3	1
EFFECT 4	2
EFFECT 5	2
EFFECT 6	1
EFFECT 7	3
EFFECT 8	3

Table D

The depth factor is used as a comparison measure defining the perception of the depth of the sound. EFFECT 2, EFFECT 4 and EFFECT 5 have a greater depth perception than EFFECT 1, EFFECT 3 and EFFECT 6. EFFECT 7 and EFFECT 8 have the greatest depth perception in Experimentation B.

Conclusion: The application of the newly created sound textures in Experimentation B brought a new dimension to the visuals, where the perception of the depth of the image was highly dependent on the depth of the musical effect. Moreover, the deeper the visual perception, the more intense the presence of the industrial imagery.

I had the full compositional responsibility for this electroacoustic piece. I made the compositional decisions on the implementation of time-stretching techniques for both Layers 1 and 2 as well as the final editing, and no live musicians were involved.

4: Experimentation C (Duration: 12 minutes, 30 seconds)

4a: Structure

Layer 1 [00:10 – 12:30] contained time-stretched viola sections from the ‘Flange’ effect of Experimentation A [01:58 – 02:53] and smooth viola sections from Sub-section 1 of the ‘Ticking’ effect in Experimentation A: [00:15 – 00:47]. The sections of Experimentation C where the processed ticking effect was used were:

[A] [00:00 – 01:17] [B] [03:40 – 03:57] and [C] [11:42 – 12:30]

The sections of Experimentation C where the processed flange effect was used were:

[A] [01:17 – 03:40] and [B] [03:57 – 11:42]

Layer 2 [00:00 – 12:30] consisted of the following four parts:

1] Part 1 was exactly the same as the entire Layer 2 in Experimentation A, from [00:00 – 10:08] in Experimentation C.

2] In Part 2, a pause was present from [10:08 – 10:44]. This pause was purposefully not audible because of the much enhanced musical presence of Layer 1.

3] In Part 3, from [10:44 – 11:24] a short passage [10:08 – 10:12] from the third musical subsection of ‘Section III’ of ‘A Study in Disturbance’ was used. The original tonality of this passage was: F# minor from [10:08 – 10:10] and D major from [10:10 – 10:12]. It was then time-stretched with the use of Paulstretch. In Experimentation C, it was used from [10:44 – 11:04] in its original tonality. The tonality of F# minor was present from [10:44 – 10:54] and the tonality of D major was present from [10:54 – 11:04]. From [11:04 – 11:24] the same passage was transposed to: G minor [11:04 – 11:14] and Eb major [11:14 – 11:24].

4] In Part 4, from [11:24 – 12:30], the initial section of Layer 2 [00:00 – 01:06] was repeated, transposed from the original D minor to G minor.

Layer 3 contained a short section with water effects which enhanced the musical work and provided additional parameters to the relationship with the visuals [07:24 – 08:25]. In addition, it contained a section where a deep harmonic echo effect, with volume dryness elements, was used from: [08:41 – 10:45]. The effect was seemingly ‘travelling’ around the harmony:



and was a very intense gradual transition to the final volume peak effect of Layer 1: [11:05 – 11:28].

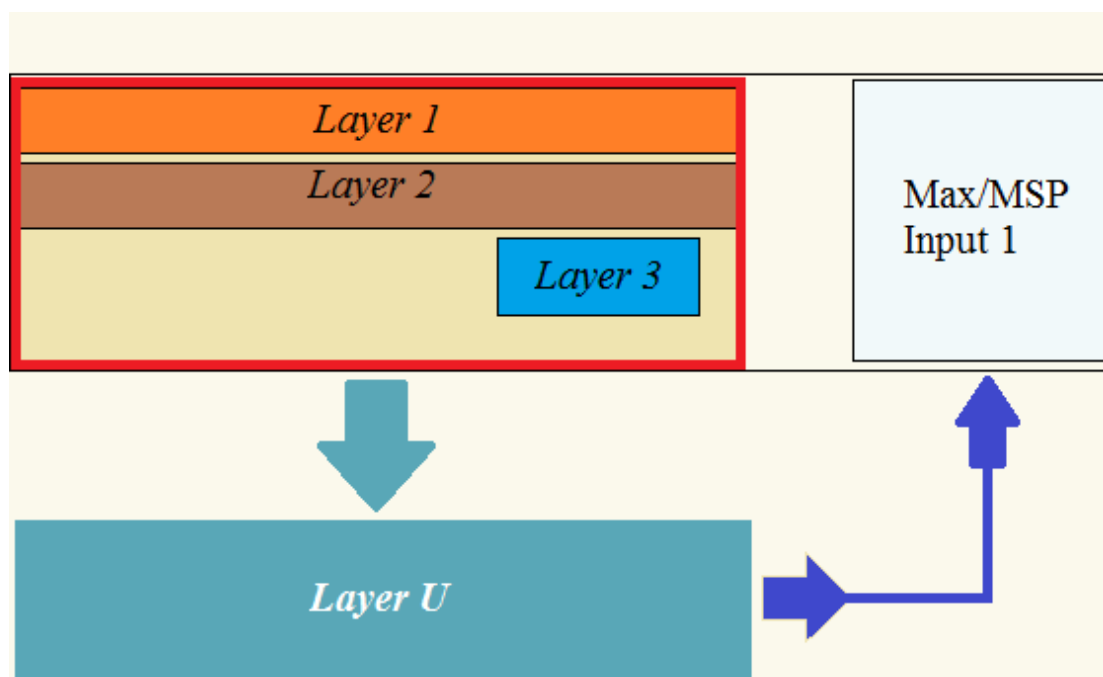


Image 24: Depiction of 'Layer U': A major difference between Experimentation C and Experimentations A and B was the fact that before using Max/MSP Alpha Patch, Layers 1, 2 and 3 were superimposed over each other with the use of Sony Vegas Pro 12.0 and a unified layer called 'Layer U' was created. The newly created piece was now used as the main input in Max/MSP Alpha Patch and no background track was present for this work. The inputted piece was responsible for all the changes occurring in the visual domain.

4b: Analysis with the use of Cook's triadic model

The volume threshold for this work was set to 0.2.

A basic characteristic of Layer 1 is the fact that in contradiction to Experimentation A and Experimentation B, there are no defined borders between the different sections, because each section gradually emerges from the previous one. In a way, the sound is transfiguring from one state to another.

In Layer 1, when the processed ticking effect was used, the sound was very smooth. When the processed flange effect was used, the sound was much enhanced, apart from the region from approximately [02:10] to [02:51] where the processed flange effect was used smoothly, as an element of suspense. The peak volume regions for the

processed flange effect in Experimentation C were: [A] [03:15 – 03:25] [B] [06:40 – 07:05] and [C] [11:05 – 11:28].

The most notable characteristic of the processed viola sound was the fact that it had very different characteristics from the original one. This is obvious in the sections where the processed flange effect was present; the viola sounds either resembled sounds produced by materials: [04:00 – 04:14] or it resembled sound of vehicles speeding up or slowing down: [02:29 – 03:40], [05:55 – 08:03] and [approx.11:12 – 11:37].

The smooth sound is a direct reference to the harmony of nature. Thus, when the sound emerges from the ticking effect, it runs in complementation with the visuals when running over natural imagery and in contest with the visuals when running over industrial imagery. When the processed viola sound emerges from the flange effect, it resembles vehicle or materialistic sound, thus music runs in contest with the visuals over natural imagery and in complementation with the visuals over industrial imagery.

In Layer 2, the relationships with the visuals are identical to the ones of Layer 2 in Experimentation A.

In Layer 3, the water sound effect runs over industrial imagery. In this case, this is the first time in the project that an ambiguity effect can be observed. If emphasis is given on the texture of the water sound itself, music runs in contest with the visuals because the content of the sound is a direct reference to natural elements. If emphasis is given on the speed of the sound, music fits the fast-forward visual imagery and enhances what is displayed on screen. In addition, the depth perception of the water sound is also transferred in the visual area; the viewer is seemingly penetrating the visuals when focusing on the water depth effect. Thus, music is a direct reflection of the visual intensity and it runs in complementation with the visuals.

As far as the deep harmonic echo effect is concerned, it is a direct depiction of the intensity caused by the fast-forward moving visual imagery. Even though the sound effect is stretched, when observing the fast-forward industrial imagery, there is an intense illusion that sound is continuously changing, even though it is stable. Music runs in complementation with the industrial imagery. When running over natural imagery, the same sound does not seem continuous, yet, a feeling of suspense is

present and the visual intensity caused by the interference of natural sections is also transferred in the musical layer. In this case, music runs in contest with the visuals.

Conclusion 1: When focusing on different aspects of a musical layer, the relationship between music and visuals with the use of Cook's triadic model can vary.

Conclusion 2: Music is highly dependent on the visual content. When a time-stretched sound is present, its perception can vary, depending on the speed in which the visuals change and also in the content of the visuals.

Conclusion 3: When a time-stretched processed instrumental sound is implemented, the newly produced sound can obtain entirely new characteristics, and in many occasions, independent from its original source. The vehicle-like sounds emerging in this work are characterised by realistic 'speed-up' and 'slow-down' effects, as well as thick and dry materialistic sound textures which are not at all reminiscent of viola sounds. The vehicle-like sounds as well as the dry materialistic textures can be considered as musique concrète elements.

4c: Influences

In “Experimentation C” the introduction to Michel Chion’s composition ‘Le Grand Nettoyage’ (Court-Métrage de Michel Chion, 1975, super-8) was important. Chion’s piece started with a dark time-stretched sound environment which led to a musique concrète composition. The smooth change from time-stretched musical environment to musique concrète contributed to the impact of this work.

When focusing on Layer A, an internal dialogue was formed between the processed viola sections where the Ticking effect was used (smooth sound) and the processed viola sections where the Flange effect was used (musique concrete sound). The smooth interaction between the two processed viola sections resulted in processed smooth viola sounds seemingly dissolving to musique concrete structures and vice versa.

I had the full compositional responsibility for this electroacoustic piece. As merely time-stretching techniques were implemented for Layer U, no live musicians were involved.

5: Experimentation D (Duration: 10 minutes, 37 seconds)

5a: Structure

In this work, Layer 1 of Experimentation A – First Version is superimposed over Layer U of Experimentation C. The latest becomes the background track whereas Layer 1 of Experimentation A becomes the foreground track. Because of the fact that the duration of Layer U is 12m 30sec and the duration of Layer 1 of Experimentation A is 10minutes 5seconds, an extension was added: A pause was applied in Layer 1 from [10:05 – 10:20]. From [10:20 – 10:37] the first seventeen seconds were reused [00:15 – 00:32], with a fade-out at the end. Thus, Layer 1 ends seven seconds after Layer U.

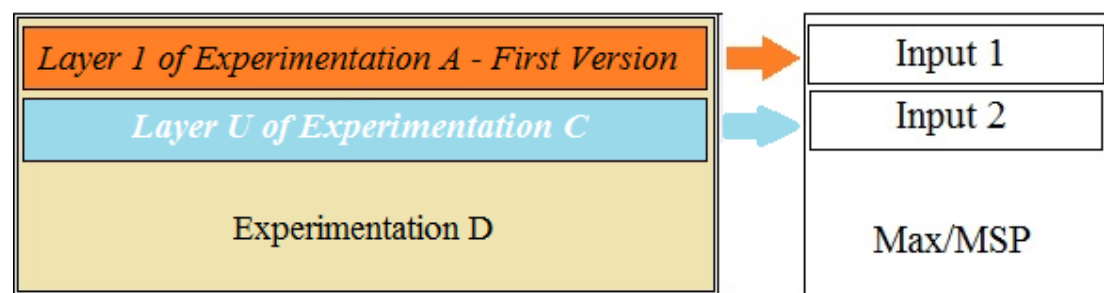


Image 25: Diagram visualizing the inputs of Layers 1 and 2 in Max/MSP Alpha Patch.

5b: Analysis with the use of Cook's triadic model

The relationship between Layer 1 of Experimentation D and the visuals remains the same as in Experimentation A – First Version.

As in Experimentation C, the volume threshold was set to 0.2, in order to get comparative results to Experimentation C.

The key point in this work is the fact that the relationship between the background track – Layer U – and the visuals undergoes significant changes because it no longer has an impact on the transition between the two worlds. The relationship between

Layer U and the visuals is dependent on Layer 1. An example is given for further understanding: In Experimentation C, when the volume threshold is set to 0.2, there is a continuous transition in the industrial world from [01:30 – 02:00]. A vehicle-like sound is present in this section, as a result of the processed flange effect, thus, music runs in complementation with the visuals, as explained in the Experimentation C section. In Experimentation D, during the same section [01:30 – 02:00], two instant transitions occur in the industrial world at: [01:44] and at [01:46], when two sudden viola gestures occur in Layer 1. For this reason, music in Layer U runs in contest with the visuals during this section, except the two short transitions at [01:44] and [01:46] where it runs in complementation with the visuals.

What emerges from the above explanation is the fact that when a specific music Layer changes from foreground to background, this influences the relationship between this Layer and the visuals.

Conclusion: Depending on the way a music Layer is used, the relationship between music and visuals can vary. The use of Max/MSP Alpha Patch had a significant impact in the relationship between music and visuals as it gave the possibility to explore the different interactions between music and visuals by changing the significance of a specific musical layer, transferring it from foreground to background and vice-versa.

I was fully responsible for the creation of Experimentation D, as it was based on my compositional decision on combining two previous Experimentations.

6: Aerial (Duration: 15 minutes)

6a: Description

The main purpose of this piece was to explore the possibility of vehicle sounds obtaining new characteristics after the application of the time-stretching algorithm. In addition, I was interested in examining the relationship between music and visuals when applying processed vehicle sounds over natural imagery and non-processed natural sounds over industrial imagery.

In “A study in disturbance”, the electroacoustic notated piece had the primary role and the natural sounds were used as background completion. On the other hand, in this piece, the natural sounds and stretched vehicle sounds obtained the most important role in the work.

6b: Structure

This work consists of two musical layers:

Layer 1: It contains the processed vehicle sounds and the non-processed natural sounds.

Layer 2: A separate layer including smooth processed viola sounds emerging from the ticking effect of ‘Experimentation A’ was used throughout the piece over both sections. These sounds are a direct reflection of viola sounds and do not sound like vehicles. The purpose of the use of these sounds was to define a unifying entity throughout the piece and also to juxtapose those sounds over the vehicle and nature sounds. With the use of processed viola sound throughout the piece, vehicle sounds as well as nature sounds sound are perceived more intensely.

6c: Time Duration Tables

In the following table, there is a presentation of the time durations of the appearance of the processed vehicle effects in Layer 1 of 'Aerial'.

Section 1 (00:00-01:00)	Section 3 (02:00-03:00)	Section 5 (04:00-05:00)	Section 7 (06:00-07:00)	Section 9 (08:00-09:00)	Section 11 (10:00-11:00)	Section 13 (12:00-13:00)	Section 15 (14:00-15:00)
Vehicle Effect 1	Vehicle Effect 2	Vehicle Effect 3	Vehicle Effect 4	Vehicle Effect 5	Vehicle Effect 6	Vehicle Effect 7	Vehicle Effect 8
00:23 – 01:00	02:06 – 02:59	04:19 – 04:59	06:06 – 06:57	08:03 – 08:54	10:05 – 10:51	12:00 – 12:55	14:06 – 15:00

Table E

In the following table, there is a presentation of the time durations of the appearance of the nature effects in Layer 1 of 'Aerial'.

Section 2 (01:00-02:00)	Section 4 (03:00-04:00)	Section 6 (05:00-06:00)	Section 8 (07:00-08:00)	Section 10 (09:00-10:00)	Section 12 (11:00-12:00)	Section 14 (13:00-14:00)
Nature Effect 1	Nature Effect 2	Nature Effect 3	Nature Effect 4	Nature Effect 5	Nature Effect 6	Nature Effect 7
01:00 – 02:00	03:00 – 04:00	05:00 – 06:00	07:00 – 08:00	09:00 – 10:00	11:00 – 12:00	13:00 – 14:00

Table F

6d: Influences

Canadian composer Raymond Murray Schafer (1933 –) was the author of the book: “The Tuning of the World”. In this book, Schafer analyzed the term “Acoustic Ecology”. This term implied that the world itself was a musical composition. Schafer adopted the theory that listening to music equals to listening to the world soundscape. Schafer’s writings concerned noise pollution and environmental sound. He has made deep research in the world of soundscape and his pieces were mostly related to environmental issues as well as the relationship between the environment and its beings. Acoustic ecology situates sound in the environment as part of the natural ecology and also as musical material.

Schafer considers the surrounding world as containing ecologies of sound. Each soundscape has its own ecology and sounds that are not inside the soundscape are not part of the ecology. From Schafer’s viewpoint, we are urged to treat the environments in which we can belong to as musical compositions. This turns us from pure observers into active listeners. When the environment produces sounds which emerge from data or events, we develop the ability to gain control by listening instead of viewing.

“Acoustic ecology explores the relationships between sound, environment, and society primarily from a phenomenological perspective, drawing our attention to the ways in which the acoustic environment or soundscape shapes our experiences and understanding of the world.” (Richard Oddie)

"A soundscape is any collection of sounds, almost like a painting is a collection of visual attractions," said composer Raymond Murray Schafer. "When you listen carefully to the soundscape it becomes quite miraculous."

A representative of acoustic ecology is contemporary English soundfield composer Chris Watson. He is a specialist in environmental sound recording. He has released four solo albums of field recordings: *Outside the Circle of Fire*, *Stepping into the Dark*, *Weather Report*, and *El Tren Fantasma*. Chris Watson has the ability to record sounds from different sources and combine them into one composition in a way that it is not likely to realize that his pieces consist of different elements combined altogether. He is considered as one of the world’s most important recorders of natural

phenomena and wildlife. He is also a master in editing his recordings into a filmic storyline. In his work “El Tren Fantasma” he combined recorded sounds of a railway, the people who rode on it, and the landscape through which it travelled. Apart from being considered as a work of field recording, this composition also focuses on the spatialisation, depth and three-dimensional perception of sound. The Sound Projector UK describes “El Tren Fantasma” as follows: “Another way in which Watson’s technique has evolved is the fact he now allows post- production treatments; the most noticeable is that the sound of the engine machinery has been heavily processed so that, for a good deal of the record, it doesn’t really resemble a train at all, but has been filtered down into a series of digitally-smooth clunks, thumps and clanks. To put it another way, we’re hearing digital music that is fashioned using the rhythm of the train as a trigger device, like a studio drum programmer with his “gated drums”. In like manner, train whistle recordings are heavily echoed and stretched until they turn into ambient drone music.[...] As such, these treatments succeed in rendering the train into a true ghost, an echo of its former self, and its phantom runnings through tunnels and over dusty tracks become that much more poignant thereby.”

Among the works included in “El Tren Fantasma”, I found “El Divisadero” particularly interesting because it treated *musique concrète* elements in a very unique way; the train whistle sound, which had pitched characteristics, was processed in such a way that it gave me the impression that it sounded like processed string sounds. These sounds were superimposed over recorded sounds of the train engine and this led to the creation of a very contrasting sonic effect: stretched train whistle sounds, sounding like processed strings versus very fast rhythmically floating train engine sounds. On the other hand, what I hopefully achieved in my composition was the fact that I processed vehicle speeding-up sounds without any pitched characteristic, yet the processed sound was characterised by sections where a pitch effect was present.

6e: The ‘pitched processed sound’ characteristic

When I implemented the time stretched algorithm I discovered that even if the original sound source had no relation to pitched material, the processed sounds obtained pitched characteristics, yet retaining the texture of a vehicle sound. The sound is seemingly ‘moving’ around a specific pitch in a smooth and harmonious way. This occurs in the following sections:

<u>Section 1 – Vehicle Effect 1</u>	<u>Pitched Characteristics</u>
[00:25 – 00:27]	F natural
[00:27 – 00:39]	F sharp
[00:40]	F natural
[00:40 – 00:42]	The processed sound is smoothly descending from F natural to E natural.
[00:42]	E natural
[00:44 – 00:57]	D sharp
[00:57 – 00:59]	The processed sound is oscillating smoothly between D sharp and E natural.

Table G

<u>Section 3 – Vehicle Effect 2</u>	<u>Pitched Characteristics</u>
[02:10 – 02:29]	The processed sound begins at E natural, smoothly ascends to F natural and briefly descends to E natural near the very end of this sub-section.

Table H

<u>Section 5 – Vehicle Effect 3</u>	<u>Pitched Characteristics</u>
[04:40 – 04:51]	The processed sound begins at G sharp and smoothly ascends to D natural.

Table I

<u>Section 7 – Vehicle Effect 4</u>	<u>Pitched Characteristics</u>
[06:06 – 06:57]	The entire processed effect is pitched in B natural.

Table J

<u>Section 11 – Vehicle Effect 6</u>	<u>Pitched Characteristics</u>
[10:05 – 10:33]	This sub-section of the processed effect is smoothly ‘shaping’ to A natural, although it cannot be determined which precise moment this shaping takes place.
[10:33 – 10:42]	The processed sound is smoothly descending from A natural to F sharp.
[10:42 – 10:51]	F Sharp

Table K

<u>Section 13 – Vehicle Effect 7</u>	<u>Pitched Characteristics</u>
[12:28 – 12:33]	G Sharp
[12:33 – 12:35]	A Natural

Table L

<u>Section 15 – Vehicle Effect 8</u>	<u>Pitched Characteristics</u>
14:17 – 14:19	G Sharp
14:20 – 14:30	The processed sound is smoothly descending G Sharp to G Sharp, an octave lower.
14:30 – 14:35	G Sharp – an octave lower than in [14:17 – 14:19]

Table M

6f: Analysis with the use of Cook's triadic model

Natural Imagery: In Layer 1, when focusing on the texture of the sound, processed vehicle sounds ran in contest with the natural imagery. The suspenseful feeling emerging from this audiovisual interaction leads to the hopefully powerful entrance and dominance of the industrial sections which interfere between the natural sections. On the other hand, when focusing on the 'pitched characteristic' of the processed vehicle sound, the processed sound is a direct reference to the harmony of nature, thus, it runs in complementation with the visuals. The ambiguous relationship formed between music in Layer 1 and the natural visual imagery is based on two different aspects of the sound: the texture and the 'pitched characteristic'.

As far as the relationship between music and visuals with the use of Cook's model is concerned, *a major similarity and a major difference* are present between music in Layer 1 over the *natural section* of 'Aerial' and music in Layer 3 over the *industrial section* of 'Experimentation C':

<u>Similarity:</u>	The first element which was taken into account for the establishment of the relationship between music and visuals was the <u>texture</u> of the sound.
<u>Difference:</u>	The second element which was taken into consideration for the establishment of the relationship between music and visuals was <u>the speed of the sound</u> in ‘Experimentation C’ and <u>the ‘pitched characteristic’ of the sound</u> in ‘Aerial’.

Industrial Imagery: As far as the natural sounds are concerned, the relationship they form with the industrial imagery is ambiguous and is very similar to the one formed by the water sounds of Layer 3 of ‘Experimentation C’. In this case, the presence of natural sounds is more intensified than in ‘Experimentation C’ and emphasis is given to the high speed in which the visuals are changing in this section. This leads to a dynamic presence of industrial scenery. When focusing on the content of the sound, which includes sounds of nature, music runs in contest with the industrial imagery. When focusing on the speed of the sound, music runs in complementation with the cityscape imagery. My aim was to provide dominant musical sequences over the industrial sections and I decided to present two different forms of sound textures, yet pertaining the intensification factor in both of them: In Sections 2, 6, 10 and 14, the sound is characterized by very discreet fast tempo sequences. In Section 14, there is a short sub-section [13:41 – 13:48] where sound is characterized by continuity and this forms an internal dialogue with the remainder of the section where the sound is discreet. In Sections 4, 8 and 12 it is more continuous, yet really dramatic and deep.

No instrument player was involved in this composition, as it was an electronic one.

SECTION C: Final Conclusions

1. The importance of using processed or recorded sounds from various sources, instrumental sounds with live delay effects or processed instrumental sounds, which were previously altered due to the application of delay effects over an audiovisual work, lays on the fact that various ambiguity effects can be achieved, depending on the focus given to specific sound characteristics, such as sound speed, the origin of the sound, the texture of the sound or specific sound characteristics emerging from the implementation of time-stretching algorithms. **(A) These ambiguity effects bring more dimensions to an audiovisual work, while different emotions can emerge depending on the aspect of the sound that is examined. (B) The fact that music and visuals can form same relationships over contrasting materials is another important achievement of the application of live delay effects over a visual sequence, as in Sub-section 1 of Section 8 of ‘Experimentation A – First Version’.** Results **(A)** and **(B)** would have been completely impossible to be drawn without the interference of delay effects on real instruments or processed sounds or the use of other sound processing techniques.
2. Using Max/MSP was extremely important, since it permitted the transition between natural and industrial world in the visual domain, depending on the volume threshold value of a specific music layer. Thus, Max/MSP Alpha Patch acted as a medium between music and visuals, allowing a real-time interaction between them. This would have not been possible without the use of Max/MSP software.
3. I managed to prove that Nicholas Cook’s triadic model can be used in more ambiguous forms of audiovisual relationships, where music and visuals do not necessarily form a unified type of relationship between them.
4. Each one of my works contained more than one musical layers. This allowed the creation of internal relationships within each layer, when more than one sections were present within the layer, and at the same time, it allowed the creation of relationships between the superimposed layers.
5. “A Study in disturbance” and “Aerial” were finished electronic compositions. On the other hand, “Experimentation A” involved the presence of viola, but it can be

admitted that this specific work would not be easily performed by an independent group as there is no notation provided but also due to the fact that the original recordings went through several editing processes before forming the final submitted work. Given that “Experimentations B, C and D” used elements from “Experimentation A”, I chose to name this group of works ‘Experimentations’.

6. The use of a fully-notated score with the use of the same delay effects is possible, allowing the work to be considered as a finished composition. This can involve a written composition for one or more instruments and the live performance of this work over the same series of visual media. The presence of a superimposed electronic work over the fully-notated score is possible but is not imposed.

7. “A Study in disturbance” was an electroacoustic composition, which was performed by the computer. The written score was originated for direct use with Logic electronic instruments. The possibility of involvement of real instruments was not taken into consideration for this stage of the work. The score itself allows modifications, such as transportation of sections of the score within instrument ranges, applications of techniques responding to the nature of instruments to be used and addition of gestural effects depending on the instruments used. The relationship between music and visuals could then be re-examined with the use of a live orchestral work instead of an electroacoustic work.

Discography

Chion, Michel – L'Opéra Concret: *Musiques Concrètes* 1971-1997

Label: MCE – MCE 001, INA-GRM – none

Format: CD, Album, Compilation

Country: France

Released: 1998

Schaeffer, Pierre – L'Œuvre Musicale

Label: INA-GRM – Ina C 1006/7/8, Electronic Music Foundation – EMF CD 010,
Musidisc – 292572, Musidisc – 292 572

Format: 3 × CD, Reissue, Compilation

Country: France

Released: 1998

Schafer, Raymond Murray – The Vancouver Soundscape

Label: Ensemble Productions Ltd. – EPN 186

Format: 2 × Vinyl, LP, Album

Country: Canada

Released: 1973

Watson, Chris – El Tren Fantasma

Label: Touch – TO:42

Format: CD, Album

Country: UK

Released: 09 Nov 2011

Watson, Chris – Weather Report

Label: Touch – TO:47

Format: CD, Album, Repress

Country: UK

Released: January 2008

Yared, Gabriel – The English Patient (Original Soundtrack Recording)

Performed by: Academy of St. Martin in the Fields

Label: Fantasy – 537 325-2, Polydor – 537 325-2

Format: CD, Album

Country: UK & Europe

Released: 1998

References

Chion, Michel. 1994. *Guide des objets sonores: Pierre Schaeffer et la recherche musicale*. Buchet - Chastel. France.

Cook, Nicholas. 1992. *A Guide to Musical Analysis*. W. W. Norton & Company. New York City, United States.

Cook, Nicholas. 2000. *Analysing Musical Multimedia*. Oxford University Press. United Kingdom.

Gorbman, Claudia. - Richardson, John. – Vernallis, Carol. 2013. *The Oxford Handbook of New Audiovisual Aesthetics (Oxford Handbooks)*. Oxford Handbooks. Oxford University Press. University of Oxford. Oxford, United Kingdom.

James, David E. 2005. *Stan Brakhage: Filmmaker (Wide Angle Books)*. Temple University Press. Philadelphia, Pennsylvania, United States.

Kerins, Mark. 2010. *Beyond Dolby (Stereo): Cinema in the Digital Sound Age*. Indiana University Press. Indiana, United States.

Laing, Heather. 2003. *Gabriel Yared's The English Patient, A Film Score Guide*. Scarecrow Press Inc. Lanham, Maryland • Toronto, Canada.

McPherson, Bruce R. 2001. *Essential Brakhage: Selected Writings on Film-Making*. McPherson & Company. Kingston, New York, United States.

Morton, Timothy. 2007. *Ecology Without Nature: Rethinking Environmental Aesthetics*. Harvard University Press. Cambridge, Massachusetts.

Porter, Stanley E. 1997. *New Testament Backgrounds: A Sheffield Reader (Biblical Seminar)*. Bloomsbury T&T Clark. Edinburgh, United Kingdom.

Reed, Alexander S. 2013. *Assimilate: A Critical History of Industrial Music*. Oxford University Press. University of Oxford. Oxford, United Kingdom.

Rothenberg, David and Ulvaeus, Marta. 2009. *The Book of Music and Nature: An anthology of sounds, words, thoughts*. Wesleyan. Middletown, Connecticut.

Schafer, Raymond Murray. 1981. *The Tuning Of the World*. University of Pennsylvania Press. Philadelphia, Pennsylvania, United States.

Stevens, Meghan. 2009. *Music and Image in Concert: Using Images in the Instrumental Music Concert*. Music and Media. Sydney, Australia.

Vernallis, Carol. 2004. *Experiencing Music Video: Aesthetics and Cultural Context*. Columbia University Press. New York City, United States.