

Articulating the Interstitial: Interpretive Responses in Digital Art Practice

Alison Clifford

Doctor of Philosophy

Glasgow School of Art

Forum for Critical Inquiry

July 2014

Articulating the Interstitial: Interpretive Responses in Digital Art Practice

Alison Clifford

A textual dissertation submitted to the Glasgow School of Art in partial fulfilment of the requirements for the award of Doctor of Philosophy

2014

Supervisors:

Dr. Ken Neil, Glasgow School of Art, Graduate School
Dr. Nicky Bird, Glasgow School of Art, Graduate School

DECLARATION

I hereby declare that all material in this textual dissertation is my own work and contains no material previously submitted for the award of degree by this or any other university. Submitted to The Glasgow School of Art for the degree of Doctor of Philosophy.

Alison Clifford, Glasgow School of Art, July 2014

CONTENTS

ABSTRACT	05
ACKNOWLEDGEMENTS	06
LIST OF ILLUSTRATIONS	07
1.0 INTRODUCTION	09
1.1 Research Questions and Areas of Study	09
1.2 Format of Study and Rationale	11
1.3 Contribution to Knowledge	13
1.4 Statement on Motivations/ Background to the PhD	15
2.0 THE INTERSTITIAL: DEFINITIONS + MAPPINGS	24
2.1 The Interstitial Moment	25
2.2 Interstitial Forms	27
2.3 Interstitial Spaces	31
3.0 LOCATING THE PRACTICE: CONTEXT + METHODS	36
3.1 Visual Music	36
3.2 Generative Art	48
4.0 THE INTERSTITIAL: ARTICULATIONS	56
4.1 Analysis and Discussion of articulation 1 - <i>Substratum</i>	57
4.2 Analysis and Discussion of articulation 2 – <i>Palimpsest</i>	65
4.3 Analysis and Discussion of articulation 3 – <i>Lux</i>	72
5.0 CONCLUSION	81
5.1 Conclusions	81
5.2 Future Directions	85
REFERENCE LIST	88
LIST OF EXHIBITIONS/ SCREENINGS	94
BLU-RAY DISC	
1. <i>Traces</i> (2008) Photographic Light Painting Series	
2. <i>Substratum</i> (2010)	
3. <i>Palimpsest</i> (2011)	
4. <i>Lux</i> (2012)	

ABSTRACT

The research investigates definitions and representations of the interstitial through digital art practice and through critical reflection and discussion in an accompanying textual dissertation. It began with a series of photographic light paintings which I argue via metaphorical mappings, are representations and definitions of the interstitial (or what Duchamp termed the *infra-slim*) in terms of moments, forms and spaces. Practice-based study then aimed to create new audiovisual interpretative responses that articulate the interstitial based on these definitions.

The investigation through practice encompassed a combination of two distinct approaches towards the creation of form, each with its own aesthetic. Firstly the use of generative systems and algorithms that allow for unforeseen visual outcomes, resulting in a more organic aesthetic; and secondly, direct manipulation of form through 3D modelling and montage techniques, leading to pre-defined visual outcomes that demonstrate an aesthetic that is more synthetic in nature.

Over the course of the study, both approaches were employed to create a series of motion-based audiovisual artworks that explored and negotiated tensions between these seemingly conflicting visual aesthetics in response to the source images. In doing so, a dialogue between these distinctive aesthetics unfolded, and a new interstitial aesthetic emerged.

The textual dissertation comprises:

Chapter 1 - *Introduction*: outlines the research questions, format and rationale for the study, providing a statement on personal motivations and background from prior works leading to the research.

Chapter 2 - *The Interstitial: Definitions and Mappings*: explains the conceptual framework for the research, analysing and interpreting the interstitial nature of the source images.

Chapter 3 - *Locating the Practice: Context and Methods*: provides the relevant contextual background for practice-based work, reviewing the fields of visual music and generative art.

Chapter 4 – *The Interstitial: Articulations*: analyses and discusses each artwork and its relationship to the interstitial, providing a reflective account on process and methods for each one.

Chapter 5 – *Conclusion*: summarises the research and identifies areas for future directions.

ACKNOWLEDGEMENTS

This research project would not have been possible without my PhD supervisor, Ken Neil, for the support and guidance he provided throughout the project. I would also like to thank my second supervisors, Nicky Bird, for her scrupulous criticism of the textual dissertation and Martyn Horner for his technical advice in the early stages of the project. I could not have produced the artworks submitted in this folio without my partner and collaborator Graeme Truslove, to whom I am truly indebted. I also wish to acknowledge the support I received from my employer, the University of the West of Scotland, and also to my family – David and Irene Clifford for their patience and support throughout this period.

LIST OF ILLUSTRATIONS

[fig.01] Clifford, Alison (2006) *The Sweet Old Etcetera*, [image from online artwork]

[fig.02] Clifford, Alison (2006) *Silhouette: A Dance* [image from Internet artwork]

[fig.03] Clifford, Alison (2001) *[citizen]* (stills from audiovisual interactive artist's CD-ROM)

[fig.04] Clifford, Alison (2008) *Traces* [Photographic Light Painting Series]

[fig.05] Marcel Duchamp (1920) *Rotary Glass Plates (Precision Optics)*

Image downloaded from:

http://www.marcel Duchamp.net/Rotary_Glass_Plates.php

Accessed: 4/12/09

[fig.06] Lye, Len (1935) still image from *A Colour Box* Directed by Len Lye
UK 1935, 16mm, color, 4 min.

Downloaded from: <http://hcl.harvard.edu/hfa/films/2007novedec/lye.html>
20/03/14

[fig.07] Elfriede Fischinger Trust, 1931-2005 Detail from display card by Fischinger
showing some of his "ornaments"

(n.d.)

Downloaded from: <http://www.oskarfischinger.org/Sounding.htm>

Accessed: 29/01/13

[fig.08] Whitney, John (1966) *Permutations* [still from film]

Image downloaded from:

<http://blog.sfmoma.org/2011/08/third-hand-plays-%E2%80%9Cpalimpsest%E2%80%9D-by-alison-clifford/>

Accessed: 20/08/11

[fig.09] Wilfred, Thomas (1965-66) *Opus 161* [Lumia composition]

Image downloaded from:

http://www.iotacenter.org/static/store/5Wilfred_5.jpg

Accessed: 12/08/12

[fig.10] Snibbe, Scott (1995) *MotionPhone*

http://www.snibbe.com/images/projects/motionphone/large/motionphone_3.jpg

Accessed: 27/03/14

[fig.11] Levin, Golan (1998 - 2000) *Audiovisual Environment Suite (AVES)*

Image downloaded from: <http://flong.com/projects/aves/>

Accessed: 28/03/14

[fig.12] Levin, Golan (1998) *Yellowtail*

Image downloaded from:

<http://flong.com/projects/yellowtail/>

Accessed: 14/04/14

[fig.13] Virginia Museum of Fine Art's certificate of authenticity for Sol LeWitt's *Wall Drawing #541*

Downloaded from: http://www.blackbird.vcu.edu/v8n1/gallery/smith_e/lewitt_541.shtml

Accessed: 03/04/14

[fig.14] Reas, Casey (2001) *Path 00* [print]

Image downloaded from:

http://www.reas.com/path_p/

Accessed: 10/06/14

[fig.15] Hébert, Jean-Pierre (1995) *Un cercle trop étroit*

Downloaded from: <http://www.nydigitalsalon.org/american-algorithms/gallery.php>

Accessed: 04/04/14

[fig.16] Clifford, Alison (2008) *Untitled Photographic Light Painting* (from the *Traces* series)

[fig.17] Clifford, Alison (2009) *Trace* [still from generative animation]

[fig.18] Clifford, Alison (2010) *Equilibrium* [still from generative animation]

[fig.19] Clifford, Alison (2008) *Substratum* [still from film]

[fig.20] Clifford, Alison (2008) *Untitled Photographic Light Painting* (from the *Traces* series)

[fig.21] Clifford, Alison (2008) *Flex* [still from 3D animation]

[fig.22] Clifford, Alison (2011) *Untitled* [Different views of 3D light-sculpture]

[fig.23] Clifford, Alison (2008) *Untitled Photographic Light Painting* (from the *Traces* series)

[fig.24] Clifford, Alison (2012) *Tube Layer* [still image from 3d animation]

[fig.25] Clifford, Alison (2012) *Ectoplasm Layer* [still image from 3d animation]

[fig.26] Clifford, Alison (2012) *Particle Layer* [still image from 3d animation]

[fig.27] Clifford, Alison (2012) *Composite Image (Layers 1-3)* [still image from 3d animation]

[fig.28] Haacke, Hans (1964 – 65) *Blue Sail*, [installation]

Image downloaded from:

<http://www.sfmoma.org/explore/collection/artwork/120791>

Accessed: 20/08/11

[fig.29] Clifford, Alison (2012) *Visual Notation/ Score for Particle Layer*

1.0 INTRODUCTION

Overview

The overarching conceptual focus of the research is the notion of the interstitial addressed through both components of the study - the textual dissertation and the portfolio of practice-based work. This introductory section aims to explain the different aspects of the project, covering the following areas: research questions and areas of study, format of submission, contribution to knowledge and lastly, a statement on the motivations and earlier work leading to the research.

1.1 Research Questions and Areas of Study

Definitions and articulations of the interstitial, the conceptual focus of the research, are addressed from a range of perspectives through practice and textual discussion broadly expressed in the following three areas: 1) *at the level of language(s) and meaning* – through interpretation, translation, to articulation (and the aesthetic implications this involves); 2) *as a process* – capturing the in-between state of both creative and thought processes; and 3) *through interdisciplinarity* – exploring the space between the domains of sound and image.

1) *Language and meaning*

Firstly, the research aims to define the interstitial by seeking new ways of expressing it beyond existing definitions in written language. This is realised through metaphorical and interpretive readings on a series of photographic light-paintings. Considering these images as visually embodying aspects of the interstitial, I propose why and in what sense they represent the interstitial in an interpretive essay (Chapter 2). Through such textual exploration of the source photographs, interstitial qualities are identified resulting in the interstitial conceptual framework that underpins practice-based study.

2) *Process – A) Interstitial aesthetic*

The second area of the research focuses on processes involved in ‘translating’ and remediating¹ forms from these images into new digital contexts to generate new artworks. Specifically, the art practice questions how photographic representations of the interstitial might be characterised and defined in terms of form to allow for their subsequent translation to another medium, for example a 3-dimensional time-based environment. I consider *how* unpredictable forms generated by photographic techniques might be recreated in different visual representations of space or time – from the 2-dimensional still photograph to the 3-dimensional moving image - to create new artworks. I then examine the aesthetic implications resulting from this, reflecting on what is lost (or added) in the translation and remediation process. From these reflections, I question whether these remediations could be considered as expressions of a new interstitial aesthetic located in-between these different systems of visual representation.

2) *Process - B) Interstitial methods and contexts*

A contextual review of relevant artworks from the fields of visual music and generative art is also encompassed in this area of the study. This aims at identifying conceptual relations and overlapping features from the global field of audiovisual media art examining how this compares with the artworks generated from the research.

¹ ‘Remediation’ is a term used to by Boulter and Grusin (2000) and will be discussed in the following section.

In addition to this, I consider the foregrounding of discussions and written reflections on the thought and creative processes involved in the realisation of the artworks as a further manifestation of the interstitial. In other words, the act of verbalising normally hidden processes in the creation of an artwork is an example of an interstitial research method.

3) Collaboration/ Interdisciplinarity

The third and final area of the research refers to the exploration of the interstitial through collaboration and interdisciplinarity. Having considered how the photographic light-forms might be translated to new visual contexts, I then imagine what they might 'sound' like by mapping relationships between audio and visual form. Collaborating with composer Graeme Truslove, sound is considered as a mode of structuring the viewer experience in time-based interpretations. As expressed above, any decision-making involved in these processes is thoroughly documented in the textual dissertation, thereby articulating the convergence of the artistic practice of two distinct disciplines – audio and visual.

Research Questions:

In summary, the research questions are as follows:

1. How might the interstitial be conceptualised through visual representation, beyond existing verbal definitions of it?
2. How might these visual definitions be translated to new spatial environments through digital art practice and what are the aesthetic implications of this?
3. What are the processes involved in the creation and documentation of practice-based responses? Could these then be described as interstitial methods?
4. How might interdisciplinarity or collaborative practice shape understandings of interstitial art practice?

1.2 Format of Submission

The questions posed in the research were addressed in two distinct components based on the source photographs (the light-paintings): through discussion and exploration in this textual dissertation and through practice-based inquiry.

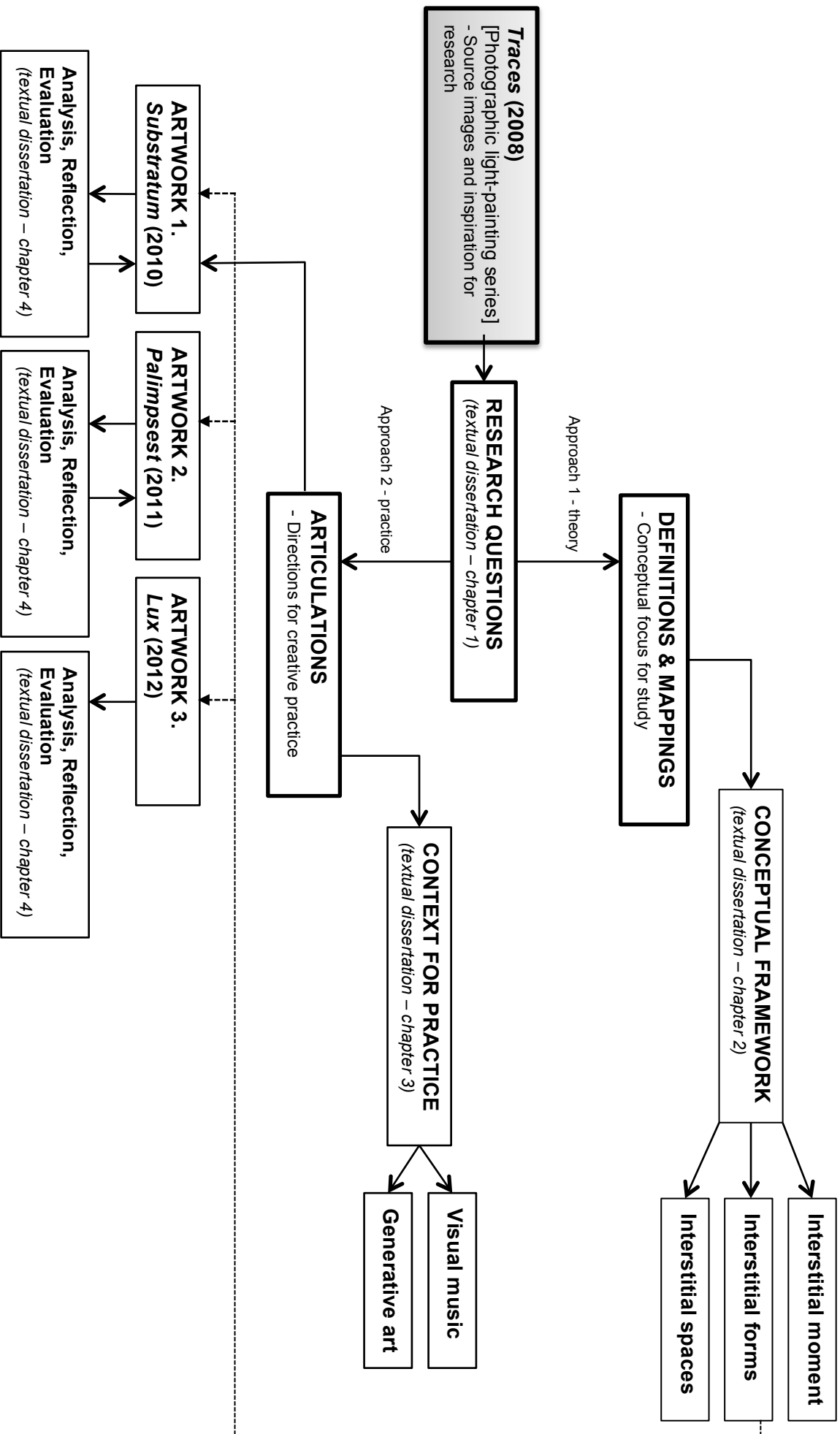
Firstly, the textual dissertation defines the conceptual framework for the study, whilst also exploring and critically reflecting on the creative practice. Chapter 1 consists of an introduction and overview to the research explaining the main areas of the study, research questions, format, motivations and contribution to knowledge. Chapter 2 documents the conceptual framework for the research, explaining mappings between textual definitions of the interstitial and the light-forms featured in the source photographs. Chapter 3 provides a discussion of relevant artworks and practice-based methodologies through a contextual review of visual music and generative art. Chapter 4 presents a critical discussion and evaluation of each artwork and finally, Chapter 5 concludes and offers pathways for further exploration.

The second component, practice-based inquiry, aimed to define new artistic processes and audiovisual responses based around the source photographs exploring mappings between textual and visual understandings of the interstitial as expressed in the conceptual framework in the textual dissertation (Chapter 2). These methods and processes are articulated through digital artworks, created and exhibited throughout the duration of the project.

The research project in its entirety then, consists of the following approaches based on the source photographs as indicated in the diagram overleaf:

1. The textual dissertation exploring **definitions and mappings** of the interstitial.
2. The artworks exploring **articulations** of the interstitial through creative practice.

The source photographs and artworks created in response to these images are included as both hyperlinks to online material cited directly in the text, and as HD quality versions of artworks included in the Blu-Ray disc with this text. Selected still images are also presented in the text where relevant to the discussion in the commentary. For the viva examination, hi-resolution versions of audiovisual works will be screened to allow the examiners to experience the work as large-scale projections as originally intended.



1.3 Contribution to new Knowledge

The original contribution to knowledge proposed by the research is in the creation of new definitions and ways of understanding the interstitial through audiovisual art. This is embodied through conceptual mappings between disciplines via metaphor and poetic interpretation: textual definitions are mapped through subjective interpretation to visual forms that are subsequently mapped to sonic forms. These mappings then provide the basis for further creative and imaginative exploration in each of the audiovisual artworks included in the submission.

Through practice-based investigation, processes involved in mapping and translating interstitial forms captured in one visual medium (still photography) and their reinterpretation in another (3-dimensional and time-based) are considered; I question what is lost through the translation process and how this might then inform further interpretations. The result is the creation of new audiovisual forms of expression that expand on and explore the interstitial in new imaginative ways. The research then, proposes new audiovisual understandings of the interstitial through the act of reinterpretation and remediation, thereby contributing to new ways of seeing the world.

The aim of this accompanying textual dissertation is to explain the conceptual focus of the research, together with documentation and disclosure of the methods involved in the creation of these new mappings and audiovisual responses. This directly addresses Lehmann's observations on new-media art practice:

In recent overviews of new media art, very little attention is paid to the actual production of the artworks discussed.... In the few instances where artists refer to their own practice, we get a notion of their presence behind the computer, yet we have no idea what they actually do with the computer.

(Lehmann: 2005)

An in-depth discussion of the methods involved in the production of each artwork is included in Chapter 4, along with a critical reflection and evaluation of it, explaining how issues arising from one work are addressed by the following. The act of making the creative and reflective processes involved in the artworks visible, (by disclosing the methods and subsequent critical reflections), foregrounds aspects of creative practice that normally exist in hidden, interstitial space between the idea and the final artwork. In this research, thought processes that act as a conduit for ideas to grow into the final work, are openly declared and as such, the disclosure of process becomes a research method² in itself.

The artworks resulting from practice-based research have been widely disseminated at a number of international new media and digital art festivals and exhibitions (a list of these are included at the end of the dissertation).³ In addition to this, works have been presented to both the visual music community and to the generative art community. The

² Reflective practice as a research method was introduced by Donald Schön in *The Reflective Practitioner* (1983), reflection-on-action refers to a practitioner analysing and exploring their reaction to the situation via a documented reflection.

³The artworks have also been exhibited to more general art audiences through initiatives such as San Francisco Museum of Modern Art's 'Open Space' and the Lumen Prize – an international prize for digital art.

contribution to knowledge lies mostly within the field of visual music, a field that is largely concerned with abstraction and 'pure' mappings between audio and visual form. The gap in visual music investigated by this research, occurs in the initial mappings between concept and image (via metaphor) and then in subsequent mappings between concept, image and sound to form the basis of the audiovisual compositions included in the folio. In this sense the artwork shifts from being a work of pure abstraction, as is the case in the majority of visual music pieces, to a work that explores sound-image relationships around the conceptual focus of the interstitial (that may or may not resemble aspects of abstract expression.) Similarly, it is the subjective and interpretive aspect of the research that contributes to the field of generative art. As will be explored later within the contextual review (Chapter 3), generative art is concerned with autonomous systems to create art; the contribution revealed through this project is the consideration of how such autonomous systems might help shape subjective and aesthetic responses in an artwork.

In summary, the contribution to knowledge occurs through interpretative acts that map interstitial definitions to audiovisual form realised in a body of artwork that presents new understandings and articulations of the 'interstitial' through new forms of expression. Whilst the study explores methods from the fields of visual music and generative art, it adds to them through the subjective interest in the poetics of the visual and in the conceptual dimension of the research.

The contribution of the research includes:

1. A body of photographic light-paintings, visually representing the conceptual framework underpinning the study.
2. An interpretive essay explaining the conceptual framework in relation to the photographic light-paintings (1).
3. A contextual overview of visual music and generative artworks identifying relationships and overlapping features between these works and the works produced by the research.
4. A body of audiovisual artworks exploring and employing interstitial aesthetics and methods.
5. Analysis and discussion of each artwork, examining and evaluating issues from one work that leads to the next.
6. Future directions for researchers interested in mapping subjective responses based on conceptual understandings in visual music and digital art.

1.4 Statement on Motivations/ Background to the PhD

Technological motivations informing the research

My interest in working with the computer has been to explore how the digital medium and 'characteristics' made manipulable by it (through programming) – i.e. randomness and unpredictability, interactivity, non-linearity, repetition, etc. - might be employed to create new understandings of what art is and what it might be. Malcolm Le Grice in his 1974 essay *Computer Film as Film Art*, questions what special capacities the computer can offer the artist. For him, computer art is of no significance unless "it makes a positive use of the computer to expand conception, sensitivity and experience." The two "justifiable" reasons for an artist to use a computer in their work, he suggests, are firstly, "to explore aspects of art which would not be possible without computers" and secondly, "to produce work more easily, which could nevertheless be made without the use of the computer." (Le Grice: 2001: 221) In the discussion that follows, he recognises it is the former proposition which is the most challenging in that it involves the artist "at the level of program ..." and that the "program becomes an integral aspect of the meaning of the product, work." In addition he argues, "...aspects of the output must remain 'unpredictable.'" If not, the artist would "simply be making use of the 'mechanical' production capacity of the computer, which would not be playing its role of expanding the range in which the artist can make conceptions." (Le Grice: 2001: 221)

Similarly, Casey Reas, Chandler McWilliams and LUST (2010), separate the use of software into two categories: *production* and *conception*, declaring their greater interest in the latter. Production, they argue involves the use of the computer "to produce preconceived form"; whereas conception uses the computer "to participate in the development of form." (2010: 25) The amount of time needed to produce complex, repetitive compositions, has been greatly reduced due to computer efficiency, particularly in the field of animation. This efficiency, according to Reas et al. (2010) facilitated "the creative process by enabling more time for exploration as less time is needed for the final production." Citing computer graphics pioneer A. Michael Noll⁴ they explain that the computer came to be understood as more than a production tool. Rather, it was "an intellectual and active creative partner that, when fully exploited, could be used to produce wholly new art forms and possibly new aesthetic experiences." (Noll cited in Reas et al.: 2010: 25).

This research project explores these differences, examining the shift between the computer's role as a *collaborator* (involved in the conception of form) and as a *producer* (involved in creating preconceived form) in the pursuit of an 'interstitial aesthetic,' and for new forms of expressing the 'interstitial'.

Conceptual motivations informing the research

My work is concerned with defining notions of the interstitial – or in-between - through digital art. I am interested in processes of translation and interpretation between different forms of media, considering the new creative possibilities that result from what is lost or gained through such interpretation. Over the past 15 years I have created artworks that explore the computer as a medium for artistic practice. These works have spanned various areas of digital art such as net-art, electronic literature and audiovisual art. This

⁴ From the 1971 essay by Jasia Reichardt, *Cybernetics, Art, and Ideas*, (New York: New York Graphic Society: 1971: 143)

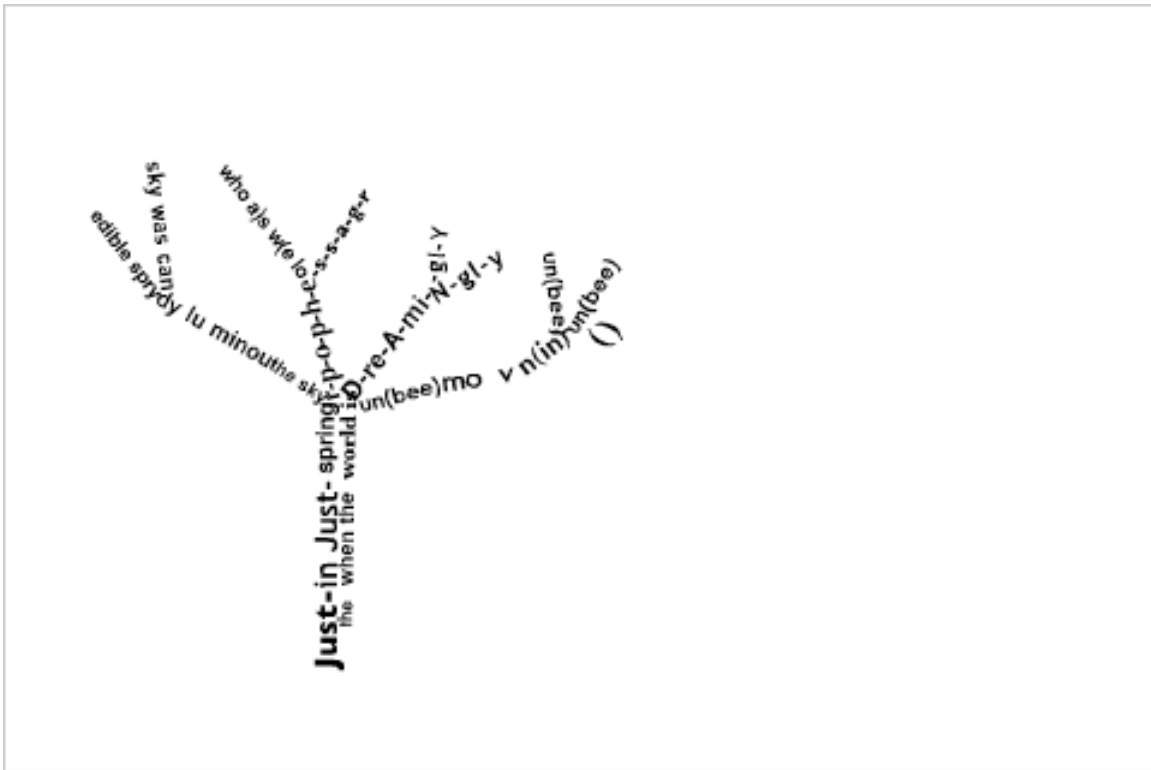
section aims to establish my relationship with the sphere of art practice known as 'digital art,' outlining the areas of interest that have led me to undertake this research project.

In this digital era we inhabit, the term 'digital art' is not a particularly helpful one, as discussed by Christiane Paul (2003) who notes the "fluidity of terminology for technological art forms". She explains that what we now term 'digital art' was previously referred to as 'computer art' (since the 1970s), then 'multimedia art' and now, digital art "takes its place under the umbrella term 'new media art'." What is new about new media art, she claims, is "that digital technology has now reached such a stage of development that it offers entirely new possibilities for the creation and experience of art" (Paul: 2003: 7) However she is quick to distinguish between art which employs digital technologies as a tool for the creation of traditional art objects – photographs, print, sculpture, etc. – with art that is *born-digital* and, "that employs these technologies as its very own *medium*, being produced, stored, and presented exclusively in the digital format and making use of its interactive or participatory features." (Paul: 2003: 8)

Prior to this research project, I have created born-digital artworks that firstly question how the computer (and digital technology) as a creative medium might expand or renegotiate our understanding of existing art forms, and secondly, that explore the new possibilities that technology brings to the "creation and experience of art." (Paul: 2003: 7) These works⁵ on the whole, fit under the broad category of electronic literature, and have explored concepts of authorship, collaboration, intertextuality and remediation through hypermedia⁶ structures; all these concepts bear a close relationship to the interstitial.

⁵ A short synopsis of each work is documented in *Bits, Bytes and the Rhetoric of Practice: New Media Artist Statements* (Clifford: 2007).

⁶ *Hypermedia* is an extension of *hypertext* (I define hypertext in the following paragraphs) with the addition of audio and visual material. For Landow, "hypermedia takes us even closer to the complex interrelatedness of everyday consciousness; it extends hypertext by re-integrating our visual and auditory faculties into textual experience, linking graphic images, sound and video to verbal signs." (Landow and Delany: 1991: 231).



[fig.01] Clifford, Alison (2006) *The Sweet Old Etcetera*, [image from online artwork]

Previous artworks exploring notions of the ‘interstitial’ through remediation

Professor of literary theory Laura Borràs, in her essay *The Internet as Interzone* (2011) refers to writer William Burroughs’s thinking on the interzone anticipating the Internet as a “transitional phase in between... an interzone between real life and virtual life”. Borràs considers the physical metaphor of the Internet as a place, “a hybrid, interstitial one, an inter-zone” proposing that thinking of it in this way “would help to understand the condition and the symbolic aspects of human relations.”⁷ For her, the Internet is a complex medium, that is in the “process of modifying creativity” reshaping and redefining other media as in the case of literature reshaped as digital literature or electronic literature (‘e-lit’). Referring to my work *The Sweet Old Etcetera*⁸ (2006) [fig.01] – a piece that reinterprets the visual poetry of E. E. Cummings for this new “(no)space” of the Internet - she writes:

There have been examples of rewriting the literary tradition into this new space that – when using all the capacities and the added value of the new medium – constitute an exercise of rewriting and re-reading, a deep reflection, on the production of literature in the digital era.

(Borràs: 2011)

Indeed in an earlier analysis of *The Sweet Old Etcetera* (Borràs: 2010), she refers to Boulter and Grusin’s (2000) concept of remediation, which allows her to discuss works located in “the creative space between the page and the screen – the locus of

⁷ Boulter and Grusin (2000: 14) similarly consider “how new digital media are participating in our culture’s redefinition of self.”

⁸ Available at: <http://www.sweetoldetc.org/>

intertextuality” - a manifestation of interstitial space. Remediation, according to Boulter and Grusin is “the representation of one medium in another,” this they argue, is a “defining characteristic of the new digital media.” (Boulter and Grusin: 2000: 45) Defining the term ‘medium’ they state:

... a medium is that which remediates. It is that which appropriates the techniques, forms, and social significance of other media and attempts to rival or refashion them in the name of the real. A medium in our culture can never operate in isolation, because it must enter into relationships of respect and rivalry with other media.

(Boulter and Grusin: 2000: 65)

From my perspective, *The Sweet Old Etcetera* was about creating a dialogue between old and new media, considering how the digital medium⁹ might be employed to alter our experience of the poetry.¹⁰ According to Manovich, numerical representation “turns media into computer data thus making it programmable.” (Manovich: 2001: 52) The work was based around my interpretations of selected poems, exploring the possibilities created through programming (i.e. motion, interactivity) when applied to specific ‘objects’ – text, sound, image - to convey these personal readings and responses. My aim was not to unlock any singular meaning of the text, rather it was to present the reader (or user) with my personal interpretations of the poems, re-read from the perspective of this new digital medium. With reference to Boulter and Grusin’s remarks concerning the “relationships of respect and rivalry with other media”, I approached the work of Cummings with respect, having studied his poetry as an undergraduate of literature. My presence in the work is as a reader¹¹ or interpreter of Cummings whilst also being the author of it. In this sense then, I agree with Borràs’s (2010) observation of the piece as “an exercise in intertextuality and intermediation in the making.” It is about rewriting the text via my relationship to it as a reader, or in other words, it is a text about reading and reinterpreting another text, realising to some degree Barthes’ notion of the *writerly text*.¹² In the act of interpretation and of translating such interpretation to a new work in a new setting (hypertext/ hypermedia environment), *The Sweet Old Etcetera* acknowledges a debt to Barthes who insists, “the goal of literary work (of literature as work) is to make the reader no longer a consumer, but a producer of the text” (Barthes: 1990: 4).

Hypertext, first defined by Ted Nelson¹³ as “non-sequential writing – text that branches and allows choices to the reader, best read at an interactive screen” (Nelson: 1974),

⁹ Manovich explains that all new media objects are composed of digital code, “they are numerical representations” (Manovich: 2001:27) Given that such objects are composed of a numerical digital code it is possible to affect characteristics of the ‘object’ through programming.

¹⁰ Or as Boulter and Grusin state: “What is new about new media comes from the particular ways in which they refashion older media and the ways in which older media refashion themselves to answer the challenges of new media.” (Boulter and Grusin: 2000: 15)

¹¹ For Borràs (2010), reading is not just a static process but rather, the act of reading opens up a wealth of critical possibilities.

¹² Barthes’s defines the writerly text:

The writerly text is a perpetual present, upon which no consequent language (which would inevitably make it past) can be superimposed; the writerly text is ourselves writing, before the infinite play of the world (the world as function) is traversed, intersected, stopped, plasticized by some singular system (Ideology, Genus, Criticism) which reduces the plurality of entrances, the opening of networks, the infinity of languages. (Barthes: 1990: 5)

¹³ Nelson first coined the phrase *hypertext* in his essay *A File Structure for the Complex, the Changing, and the Indeterminate* first published in 1965:

blurs the boundaries between traditional models of authorship, by allowing the reader to actively participate in the text. Similarly, Landow (1991) describes hypertext as transforming text into a “complex network of ‘textual units’ or ‘lexias’”, which the reader is free to explore (via hyperlinks), therefore disrupting the linearity of the text resulting in a “dramatic shift from centralised and ‘author-dominated’ literary forms.”¹⁴ (Packer and Jordan: 2001: 226) For Landow: “... it [hypertext] changes our sense of authorship, authorial property, and creativity (or originality) by moving away from the constrictions of page-bound technology.” (Landow: 1991: 235)

In a work like *The Sweet Old Etcetera* there are two authors, Cummings and myself, but there is also the reader or ‘user’ of the work, who is actively involved in choosing pathways through the piece, structuring their experience of it. Janet Murray, a leading scholar in interactive design, refers to this active experience of the reader as a “sense of agency.” Agency, she explains is “the satisfying power to take meaningful action and see the results of our decisions and choices.” (Murray: 1997: 126) However she is quick to clarify the confusion made by contemporary critics “attributing authorship to interactors because they do not understand the procedural basis of electronic composition.” Power over the elements within the work is not the same thing as authoring the work itself as she is clear in distinguishing:

[the] interactor is the author of a particular performance within an electronic story system, or the architect of a particular part of the virtual world, but we must distinguish this derivative authorship from the originating authorship of the system itself.

(Murray: 1997: 153)

The Sweet Old Etcetera plays with this idea of the reader’s apparent freedom to author their own non-linear experience within the work, by undermining it through the linear development of the background landscape that is gradually revealed as the user progresses through the work. This is similarly expressed in my remediation of Addie Tsai’s poem *Silhouette: A Dance*¹⁵ (2006) [fig.02] created for Born Magazine.¹⁶ The ambiguous structure of *Tsai’s poem*¹⁷ is explored by presenting a different version of it each time the user accesses the work (achieved via programming each poetic unit to

Let me introduce the word “hypertext” to mean a body of written or pictorial material interconnected in such a complex way that it could not conveniently be presented or represented on paper. It may contain summaries, or maps of contents and their interrelations; it may contain annotations, additions and footnotes from scholars who have examined it. Let me suggest that such an object and system, properly designed and administered, could have great potential for education, increasing the student’s range of choice, his sense of freedom, his motivation, and his intellectual grasp. Such a system could grow indefinitely, gradually including more and more of the world’s written knowledge. However, its internal file structure would have to be built to accept growth, change and complex informational arrangements. The ELF [Evolutionary File Structure] is such a file structure. (Nelson cited in Wardrip-Fruin and Montfort: 2003:144)

¹⁴ Similarly for Barthes the concept of a single author is restrictive: “... a text is not a line of words releasing a single ‘theological’ meaning ... but a multi-dimensional space in which a variety of writings, none of them original, blend and clash.

... To give a text an Author is to impose a limit on that text, to furnish it with a final signified, to close the writing.” (Barthes: 1977: 146-147)

¹⁵ Available at: <http://www.bornmagazine.org/projects/silhouette/>

¹⁶ Born Magazine is an online magazine that brings artists and writers together to collaborate by creating new forms of art and literature using emerging technologies.

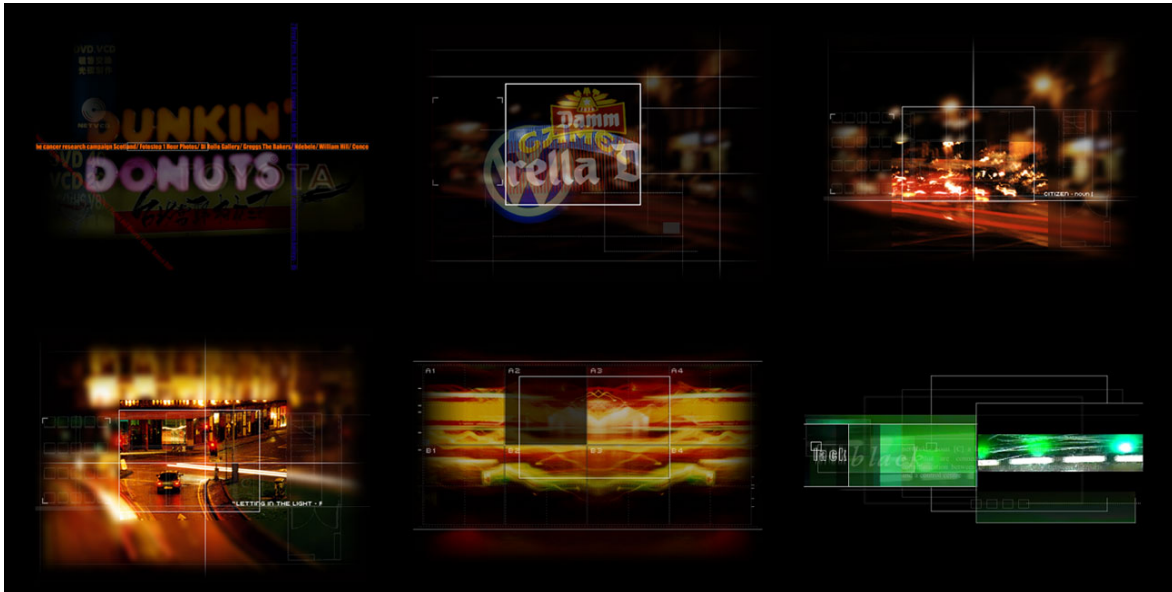
¹⁷ Available at: <http://www.bornmagazine.org/projects/silhouette/poem.html>

appear in a random order), contrasting with the linear development of the background graphic which is sequentially revealed as in *The Sweet Old Etcetera*.



[fig.02] Clifford, Alison (2006) *Silhouette: A Dance* [image from Internet artwork]

These two representations of time structures – linear and non-linear – and the space between them is a continuing area of interest to my practice and to this research, and is explored through the various artworks presented. Similarly, systems that incorporate multiple responses to the subject under exploration – for example through programming randomness within the structure and creation of content of a work – was key to the development of practice-based work. Enabling aspects of the computer to become part of the decision-making process involved in the creation of an artwork – a form of collaboration – resonates with Landow's comments on hypertext, facilitating a move away from 'author-dominated' responses. Collaboration whether it be with a musician, poet or with the computer itself, is another area of importance to the research and will be reflected upon in greater detail throughout the dissertation.



[fig.03] Clifford, Alison (2001) *[citizen]* (stills from audiovisual interactive artist's CD-ROM)

An earlier work that is arguably most relevant to the study in its photographic content is *[citizen]*¹⁸ (2001) [fig.03], an audiovisual interactive work created in collaboration with Japanese composer Teruyoshi Kamiya. The piece considers how the city environment at night, only really becomes visible when it is 'written' onto or articulated with light. At night and dictated to by light, the individual characteristics of the city disappear and the visual landscape of any one city becomes generic and much the same as any other.

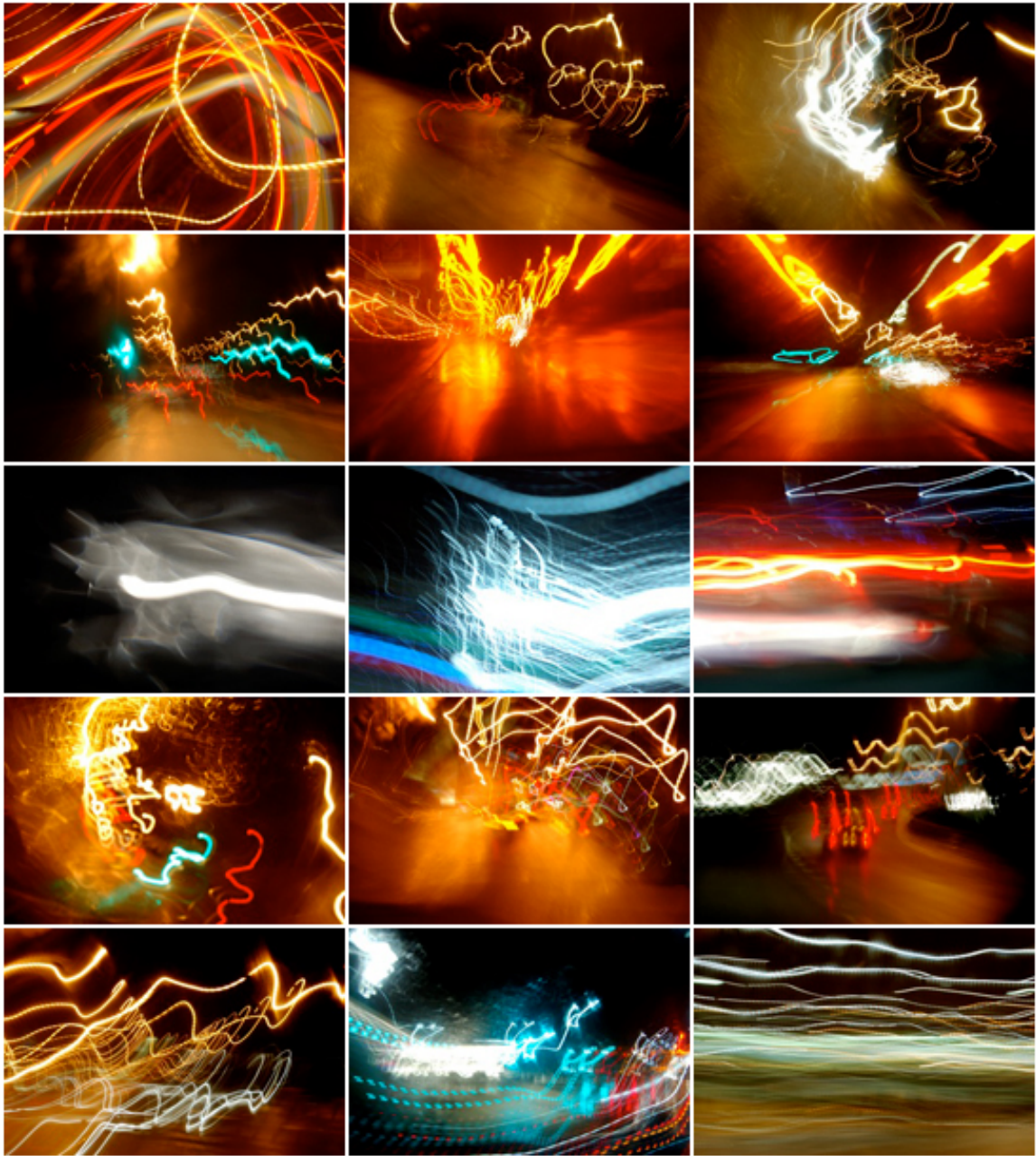
Exploring this idea, universal elements common to most cities were identified and photographed to create a visual vocabulary of the city at night. This vocabulary included the continual blinking and flashing of neon lights and ads; brightly lit, empty, silent shop windows; and the ghostly light-trails of passing traffic, frozen within a single frame. These elements were digitally manipulated and combined to create a collection of photomontages, exploring the city but re-imagined and re-articulated as the global city. The notion of the global city extended beyond the physical to the virtual – or “(no)space” that Borràs refers to – of the world wide web, demonstrated through visual connections between the flashing neon adverts of the city's nightscape with the bright, garish, commercials found in pop-up browser windows that appeared on early websites of that time (in the late 1990s).

A further aim of the work was the attempt to articulate that which is almost invisible, unheard or inexpressible. *[citizen]* incorporates and articulates the silences, gaps and interstitial spaces that form part of the city's fabric within the structure of the work. Articulating the interstitial or in-between, was about locating the moment at which presence and absence overlap and identifying the point at which memory and imagination intervene. Howard Nemerov (cited in McClatchy: 1988) states “Both the poet and painter want to reach the silence behind the language, the silence within the language.” Attempting to articulate the interstitial is the attempt to reach the silence behind existing language that Nemerov describes. The artwork in this PhD study aims to

¹⁸ Available at:
<http://www.duck-egg.co.uk/citizen/citizen01.html>

articulate this silence and to define these interstitial states as embodied through audiovisual art.

What is of relevance to this research then, are the following two areas. Firstly, the process involved in rearticulating and reinterpreting (and in this case, remediating) a source object to create a new way of understanding or thinking about it. Secondly, a continued fascination with exploring some of the abstract light-forms captured by the camera when it is left to record the passing traces of illuminated objects; considering how their interpretation might be approached imaginatively, and in terms of the concept of the interstitial.



[fig.04] Clifford, Alison (2008) images from the series: *Traces* [Photographic Light Painting Series]

2.0 THE INTERSTITIAL: DEFINITIONS AND MAPPINGS

Photographs, which cannot themselves explain anything, are inexhaustible invitations to deduction, speculation, and fantasy.

(Sontag: 1997: 23)

in·ter·sti·tial adj \, in-tər- 'sti-shəl

1. relating to or situated in the interstices
2. a : situated within but not restricted to or characteristic of a particular organ or tissue —used especially of fibrous tissue
b : affecting the interstitial tissues of an organ or part
3. being or relating to a crystalline compound in which usually small atoms or ions of a nonmetal occupy holes between the larger metal atoms or ions in the crystal lattice

(Merriam Webster: 2008)¹⁹

Overview

This chapter locates the conceptual framework within which the art practice sits. As previously outlined, the originating visuals for the project's inquiry into the interstitial came from the photographic series *Traces* (2008) [fig.04]. Like some of the photographic content of *[citizen]*, these images were created using extended exposures to capture the light trails of passing traffic at night. I argue through subjective interpretation and metaphorical mappings from textual definitions to visual form, that these images could be seen as photographic representations or definitions of *interstitial moments, forms* and *spaces*. Understanding metaphor as a mode of thought that helps us to make sense of the world around us (Ox and van der Elst: 2011)²⁰ as opposed to more commonplace understandings of the term (i.e. as a figure of speech), subjective interpretation and metaphorical readings on the source photographs explain how these images (and forms within them) visually represent the notion of the interstitial. In mapping textual definitions to the photographic light-paintings [fig.04], the process of translation and remediation from one medium (written language) to another (visual medium) begins.

¹⁹ Merriam Webster: 2008, Available at:
<http://www.merriam-webster.com/dictionary/interstitial>

Accessed: 20/02/08

²⁰ In their paper *How Metaphor functions as a vehicle of thought: Creativity as a necessity for knowledge building and communication* (2011) Ox and van der Elst use Conceptual Metaphor Theory as a framework for discussing Ox's art practice: specifically, Ox uses the thought structure of metaphor to determine the transfer of knowledge from one medium to another in her art practice. Referring to categories of metaphoric mapping, i.e. Source Domain/ Target Domain, Ox explains that conceptual metaphor "allows each individual to use source domain inferences about a target domain." This has enabled her to gain greater understandings of the transfer of knowledge and from one medium to another in her art practice, whilst also allowing her to evaluate her creative process.

2.1 The interstitial moment

in·ter·stice noun \in- 'tər-stēs\

plural *in·ter·stic·es* \-stē-, sēz, -stē-sez\

1. *a* : a space that **intervenes** between things; especially : one between closely spaced things <interstices of a wall>
b : a gap or break in something generally continuous <the interstices of society>
2. : a short space of time between events

(Merriam Webster: 2008)²¹

The interstitial moment and shutter time

The images in [fig.04] document how the camera has captured or 'sees' the motion of the headlights of passing traffic, together with recording any motion made by the photographer into single, still images. The passage of time over which the moving objects are recorded – defined by the moment in-between the shutter opening and closing - and the final resulting photographic representation of it in a still is, and in metaphorical terms, a representation of an *interstitial moment*. That is, a moment that only exists in the photograph, located between actual events and their photographic representation. The textual definition of interstices as expressed above in definition 2: a *short space of time between events* (Merriam Webster: 2008) - can therefore be mapped via metaphor to represent the short space of time between the action of the camera shutter opening and closing as an *interstitial moment*.

The still image and drawing with light

These photographic events are recordings – as represented by the medium of photography - of durations of moving objects, each with their own distinct timescale (different speeds of passing cars plus the speed at which the photographer moves), combined and compressed by the camera into a single, and contradictory, fixed moment in time – found in the still image. The still image presents us with moving subjects as actual static phenomena existing as unique occurrences within the timeframe of the photograph. Extended exposures allow the camera to record such motion into a single image (frame) that is otherwise invisible to the human eye. The resulting light-forms captured were, in terms of human perception, never actually there and have been 'drawn' by the motion of passing traffic and the gestures of the photographer combined.

The moment in-between the shutter opening and closing is the moment that light passes to the lens, and any motions made by the photographer (or other light-emitting objects) are recorded in streaks or lines of light directly onto the final photograph. Ultimately the camera becomes an instrument (or machine) that allows the photographer to draw forms with light into the scene that aren't and were never actually there. What is recorded is the photographic representation of the trace of various moving objects occurring during the moment in which the camera shutter opens and closes. This short space of time (exposure time) can also be mapped to definition 1 (as above): *interstices: a space that intervenes between things* (Merriam Webster: 2008). The camera then, becomes a machine that documents momentary interventions between what is there and what is not. Any chance gestures made by the photographer together with the movements of randomly passing traffic result in the ethereal light-forms found in the final image. The

²¹ Merriam Webster: 2008, Available at:
<http://www.merriam-webster.com/dictionary/interstices?show=0&t=1392988189>
Accessed: 20/02/08

visualisation of these motions combined in a single frame by the camera presents us with the trace that I propose embodies the interstitial.

Semiotics and the interstitial

It is the duplicitous nature of photography that allows us to access this interstitial moment. In semiotical terms, the glyph-like light-forms written into the scene, become the signifier for the concept of the interstitial (the signified). Applying Pierce's trichotomies of sign, these forms are both symbolic and indexical signs of the interstitial.²² They are indexical signs in that they indicate the trace of time passing as depicted by the motions of light-emitting sources that were directly connected to the scene (i.e. through presence); there is therefore a relationship between the sign and the object that does not depend on the 'interpreting mind.' However the forms are also symbolic signs in that their relationship to the interstitial has been defined by me (the interpreting mind), and to some extent is arbitrary for another viewer of the image. Barthes's description of the two levels of meaning in an image – the *denotative* and *connotative* meaning is also pertinent to this argument. The denotative meaning – or literal meaning - deals with the apparent 'truth' of the image in this case, light-emitting objects passing in front of the camera; as opposed to the connotative meaning – or symbolic meaning – that relies on "the cultural and historical context of the image and its viewers' lived, felt knowledge of those circumstances" (Sturken and Cartwright: 2001: 19). Barthes's essay, *The Rhetoric of the Image*, dissects the myth of photographic truth refuting the idea that any literal, objective message can result from the mechanical capture or non-human 'recording' of the scene. Rather, he reminds us:

Man's interventions in the photograph (framing, distance, lighting, focus, speed) all effectively belong to the plane of connotation; it is as though in the beginning (even if utopian) there were a brute photograph (frontal and clear) on which man would then lay out, with the aid of various techniques, the signs drawn from a cultural code.

(Barthes: 1977: 44)

In the source photographs, the concept of the interstitial belongs to the "plane of connotation" or symbolic meaning and to metaphor, and any literal, objective meaning captured in the image is undermined by "viewers' lived, felt knowledge" (Sturken and Cartwright: 2001: 19) of widely understood photographic techniques (i.e. extended exposures) that have allowed for the capture of these ethereal forms. The viewer is therefore aware of the impossibility of the existence of these forms as depicted in the scene.

Returning to the definitions of the interstitial then, the camera allows us to intervene in time, stopping it to draw into the scene with light. It therefore, allows us to directly access the gaps and breaks in between things and events. Or, in other words it allows us to access the interstitial, and in the case of this research, to imagine and (through practice) to create new articulations of it. Subsequent responses to the source images through digital art practice are formed around these metaphorical mappings between written definitions of the interstitial and interpretive readings from the photographs.

²² Sturken and Cartwright discuss Pierce's three kinds of sign (Sturken and Cartwright: 2001: 140).

2.2 Interstitial Forms

in·ter·sti·tial adj

1. *forming, situated in, or relating to one or more small openings, gaps, or cracks*
2. *located in or creating a space between other minerals*
3. *relating to a compound, for example, a carbide, in which ions or atoms of a non-metal occupy positions in a metal lattice.*
4. *lying between parts of an organ or between groups of cells or tissues.*

(Encarta: 2008²³)

WHEN
THE TOBACCO SMOKE
ALSO SMELLS
OF THE MOUTH
WHICH EXHALES IT
THE TWO ODORS
ARE MARRIED BY
INFRA-SLIM

Marcel Duchamp (Sanouillet and Peterson: 1973:194)

Interstitial form as hybrid form

Images of light-trails in night scenes have become part of our everyday visual language and are understood to be immaterial forms and a trick of photography. However for a viewer with no prior knowledge of the photographic techniques involved in producing images such as those found in the *Traces* series, the resulting forms represented might appear to contain properties similar to other physical objects, such as mass and volume depicted as light and shade in the photograph. Approaching the images without this learned prior photographic knowledge, considering the light-forms as found objects – operating on the level of denotation/ indexical signs - the physicality implied by them could suggest that they are actual objects *present* in ‘real’ (actual) space. This could also be described in terms of the interstitial: within the photographic frame, the forms appear to have some of the qualities associated with our understanding of presence, and could be considered similar to other physical objects (e.g. wires, fluorescent tubes, etc.) yet they do not exist. The forms then, could be explained as a hybrid of the real and the virtual, and the photographic space depicted within the image can no longer be seen solely as a representation of reality, rather, it is an altered reality in which the photographer directly intervenes (what Barthes (1977) refers to as “man’s intervention” discussed previously).

The notion of hybrid form can be mapped to textual definition 3: *interstitial adj.* – *relating to a compound, for example, a carbide, in which ions or atoms of a non-metal occupy*

²³ Encarta Dictionary: 2008, Previously available at:
<http://encarta.msn.com/dictionary/1861622011/definition.html>
Accessed: 20/02/08

positions in a metal lattice. (Encarta: 2008) This definition explains the interstitial in terms of biology and chemistry as a compound: a mixture of two or more different elements (i.e. carbon and another element). Similarly, I determine 'interstitial form' as a mixture of two different elements (in a non-chemical sense) or a 'hybrid form'.

Related concepts – the 'infra-slim'

Marcel Duchamp's writing on the *infra-slim*, *infrathin* and the *inframince* has much in common with the concept of the interstitial and provides a useful parallel construct that can be applied to the photographs. Duchamp was preoccupied by the interstitial, or what he refers to as the 'infra-slim' and the 'inframince', for much of his career. In 1968, Denis de Rougemont quotes the artist who:

... chose on purpose the word slim which is a word with human affective connotations, and is not an exact laboratory measure. The sound or the music which corduroy trousers, like these, make when one moves, is pertinent to infra-slim. The hollow in the paper between the front and the back of a thin sheet of paper ... To be studied! ... it is a category which has preoccupied me a great deal over the last ten years. I believe that by means of infra-slim one can pass from the second to the third dimension.

(Sanouillet and Peterson: 1973: 194)

What the quote suggests is that the infra-slim is a hybrid of two (or more) separate entities momentarily joining together to create something 'other'. It is this 'other' that describes the infrathin/ inframince/ infra-slim. Duchamp maintained that the infrathin "was an adjective, not a noun" and that "one can only give examples of it." Such examples include ...

The warmth of a seat (which has just been left) is infra-thin (#4)
In time the same object is not the / same after a 1 second interval — what / relations with the identity principle? (#7)
Subway gates — The people / who go through at the very last moment / Infra thin — (#9 recto)
Velvet trousers- / their whistling sound (in walking) by/ brushing of the 2 legs is an / infra thin separation signaled /by sound. (it is not? An infra thin sound) (#9)
When the tobacco smoke smells also of the /mouth which exhales it, the 2 odors / marry by infra thin (olfactory / in thin). (#11)
Infra thin separation between / the detonation noise of a gun / (very close) and the apparition of the bullet/ hole in the target.... (#12)
Difference between the contact / of water and that of/ molten lead for ex,/or of cream./ with the walls of its / own container this difference between two contacts is infra thin. (#14)
2 Forms cast in / the same mold (?) differ / from each other/ by an infra thin separative /difference. 'Two men are not / an example of identity / and to the contrary / move away / from a determinable / infra thin difference — but (#35)

just touching. While trying to place 1 plane surface on another plane surface/ you pass through some infra thin moments — (#46)²⁴

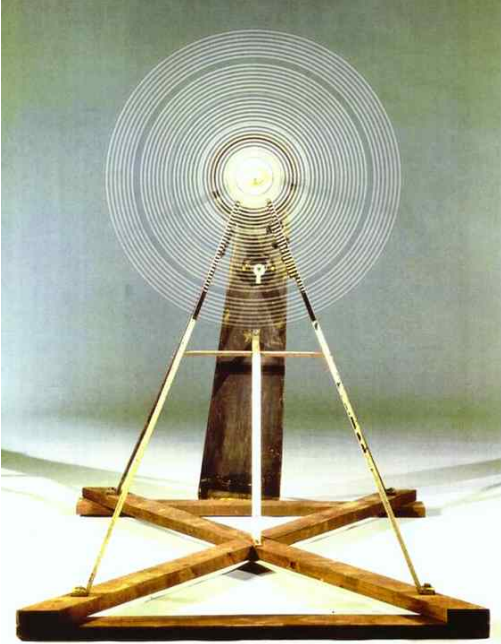
In example #4 above, an inanimate object – an empty seat - still maintains characteristics associated with the human presence of its former occupant despite their absence (albeit recent). Similarly in example #11, tobacco smoke - an inanimate entity that exists as a ‘thing’ in its own right, contains traces of the human presence (the exhaling mouth) that created it despite being a distinct ‘thing’ or entity in itself. When two things meet in the fleeting moment of the ‘infra thin’, they create a hybrid. The concept of the interstitial as evidenced in the light-photographs, holds similar connotations to the infra-slim or infra thin. Namely, that something other is created by differing or opposing states/ acts/ objects brought together (often in a fleeting moment (time) or through motion) in the infra-slim. Likewise with the photographic light-paintings, the light-forms are absent from the actual scene yet paradoxically the photograph gives them qualities associated with presence thereby making them appear as if they were there. An intervention made via the camera therefore, has created these strange, ethereal hybrid forms.

Duchamp’s artworks demonstrate his thinking on the infra-slim – an example from 1920 is the *Rotary Glass Plates (Precision Optics)* [fig.08] as described by Shanken:

Powered by an electric motor the work incorporated a series of five painted glass plates mounted on a motorized shaft. Spinning at high speeds, it created the appearance of concentric circles on a single plane when viewed at a distance of one metre. The work thus required motion and time to produce this perceptual effect in the viewer.

(Shanken: 2009: 18)

²⁴ The following definitions of the infrathin were previously available at:
<http://www.enthusiastprint.com/infraslim.html>
Accessed 4/11/10 (No longer online).



[fig.05]. Marcel Duchamp. (1920) *Rotary Glass Plates (Precision Optics)*

The moment at which the viewer's perception tricks them into believing that all circles are on the same plane, is the moment of the infra-slim – the point at which the actual (outer world) and the perceived (inner world) combine. The infra-slim therefore provides the portal or the point of access between two opposing states to create a hybrid of both. Returning to Duchamp's assertion that the infra-slim provides the means by which the viewer might "... pass from the second to the third dimension." (Duchamp cited in Sanouillet and Peterson: 1973: 194) brings us to the final consideration of the interstitial, that of interstitial spaces.

2.3 Interstitial Spaces

in·ter·stice noun \in- 'tər-stēs\

plural *in·ter·stic·es* \-stē-, sēz, -stē-sēz\

a : a space that **intervenes** between things; especially :
one between closely spaced things <interstices of a wall>

(Merriam Webster: 2008)

Interstitial space – interventions between knowledge and imagination

Interpreting the light-forms imaginatively involves removing them from the recognizable context they inhabit (the street scene at night), to allow for their exploration in new spatial environments. Susan Sontag writes:

The ultimate wisdom of the photographic image is to say: “There is the surface. Now think – or rather feel, intuit – what is beyond it, what the reality must be like if it looks this way.” Photographs, which cannot themselves explain anything, are inexhaustible invitations to deduction, speculation, and fantasy.

(Sontag: 1977: 23)

This invitation to “deduction, speculation and fantasy” presents the starting point for practice-based experiments to begin. If the forms were to be isolated and removed from the context of the street scenes they depict, how could they be rearticulated in another context? They possess qualities normally associated with physical presence, suggesting that they lend themselves to sculptural reinterpretations in 3-dimensional space (3d modelling), but how might such acts of translation and interpretation impact on the meaning of the original images? What new aesthetic possibilities emerge from the shift between representations of space in one visual medium to another, i.e. from 2-dimensional still photography to the 3-dimensional time-based computer image? Or as Sontag asks: what lies beyond the surface depicted in the photograph and what must the reality of the image be like, if it looks this way?

Practice-based investigation considers how the act of interpretation might change how we think about the ‘reality’ captured within the photograph and whether or not such interpretation creates the possibility of accessing other worlds or interstitial spaces. Claudia Gianetti (2004) discusses Vilem Flusser’s thesis stating that:

...the function of art is to create other worlds and to enable access to other realities. Anyone who produces a work of art not only expresses with it a part of himself and his environment, but also brings about a dialogue with other observers and a projection of other realities. Because art commits itself to this process, changing the world—expanding human realities (knowledge, experiences, sensations or perceptions)—becomes its cause.

(Giannetti: 2004)

In considering the detail of these forms - how they came about, where they are, what they are, etc. – possibilities for interpretive and imaginative responses emerge. Bachelard, in his phenomenological investigation into the meaning of space *The Poetics of Space* (1958), refers directly to “the details of a thing” which can be “the sign of a new

world.” (Bachelard: 1994: 155). For him, “One must go beyond logic in order to experience what is large in what is small” (Bachelard: 1994: 150). Casting aside any logical understanding or pre-existing knowledge of the light-forms, exploring them purely as found objects, I investigate what new and unseen worlds might result from their recreation and reinvention in another medium. With all of the translations however, there is a constant mediation between what the image presents us with - what we see (illusion of solid form) and what we *know* to be true regarding its creation (photographic trickery has created the illusion). I question whether working from this in-between space – between knowledge and imagination – allows us to access further interstitial spaces.

Referring to textual definitions of the interstitial then, these ideas can be mapped to definition 1 of the *interstices: a space that intervenes between things* (Merriam Webster: 2008). The interstitial in this sense refers to interventions in the space between knowledge and imagination as explained, and to interventions in the space between visual media (i.e. the photographic, the moving image and the computer image) in the discussion that follows.

Interstitial space as remediated space

Any act of translation between media is an act of remediation (Boulter and Grusin: 2000: 45), as Manovich states: “The computerization of culture not only leads to the emergence of new cultural forms... it redefines existing ones such as photography and cinema.” (Manovich: 2001: 9) For this research project, it is necessary to consider how different visual media used in practice-based work represents space: this incorporates photography, film and time-based media through to the computer image. Margot Lovejoy (2004) in her book *Digital Currents: Art in the Electronic Age* opens by stating that the technology of the age ultimately determines the way in which the world is seen and the way in which culture is formed:

The mind of any age is the eye of that age. Consciousness of the way the world is understood changes at different moments in history relative to the available knowledge of that period. A major shift in consciousness can change the premises about how we should seek to understand the world; what is important to look at and how we should represent it. Technological advances inform powerfully our knowledge base and affect all the premises of life, altering the way we see and think. They affect the content, philosophy, and style of art works. Technological development and artistic endeavour have always been closely related in one way or another, whether in a linear sense or a paradoxical one. Invention of technological tools for representation affects the way the world is seen, how events are interpreted, and the way culture is formed.

(Lovejoy: 2004: 13)

She suggests the crisis that resulted from the invention of photography on painting from 1839 onwards, as parallel to that of “our own era now that electronic technologies have changed the conditions of life and the consciousness of our own generation.” (Lovejoy: 2004: 22) Quick to highlight the influence of tools on the nature of artistic production, she quotes Delacroix writing about the impact of the new medium of photography at the time. He reminds us that “one should not lose sight of the fact that the daguerreotype should be seen as a translator commissioned to initiate us further into the secrets of nature;

because in spite of its astonishing reality in certain aspects, it is still only a reflection of the real, only a copy, in some ways false just because it is so exact.” (Lovejoy: 2004: 31)

Systems of visual representation – cinema and structuring time

Similarly, the arrival of the movie camera and cinematography brought about a new form of visual representation that “shattered all existing traditions.” (Lovejoy: 2004: 32) Movement, editing and large-scale projection of images with sound, provided the means in which new visual representations could emerge, confronting the viewer with new realities through the technique of montage:

Through slow motion, rapid panning, gliding close-ups, and zooming to distant views, space, time, illusion and reality were fused in a new way. The camera moves, rises, falls, distances objects, moves in close to them, coordinating all angles of view in a complex juxtaposition of images moving in time. ... In film, montage became part of the essential element of the grammar of the moving image. Through editing, juxtaposition could easily create new meanings through interruptions, isolations, extensions, enlargements, and reductions.

(Lovejoy: 2004: 32)

Cinema and the moving image present a more comprehensive understanding of the subject in that they “permit[s] an analysis from different points of view,” (Lovejoy: 2004: 32) unavailable to the naked eye. Indeed, Manovich (2001) argues in *The Language of New Media*, that many of the characteristics attributed to new media are not unique to new media but are found in older media technologies also. In his prologue, he refers to Russian director Dziga Vertov’s 1929 avant-garde film *Man with a Movie Camera*²⁵ as “a guide to the language of new media.” (Manovich: 2001: xiv) “A hundred year’s after cinema’s birth” he states “cinematic ways of seeing the world, of structuring time, of narrating a story, of linking one experience to the next, have become the basic means by which computer users access and interact with all cultural data.” (Manovich: 2001: xv)

Systems of visual representation – the computer image

The arrival of the computer, Lovejoy explains, presented challenges to conventional notions of representation. Quoting Menard she refers to the “transition from simulacra to simulation, from copying to modelling” that results from the digitization of images (Menard cited in Lovejoy: 2004: 152). The main distinction between the photographic and the computer image is that “digital images simulate the real by mathematically modelling it rather than imitating it through a copying process.” (Lovejoy: 2004:152) The photograph is an image created “through the lens of photocopying processes of media tools such as photography, cinematic film, or video, where what is seen is recorded”²⁶

²⁵ I am an eye. A mechanical eye. I, the machine, show you a world the way only I can see it. I free myself for today and forever from human immobility. I am in constant movement. I approach and pull away from objects. I creep under them, I move alongside a running horse’s mouth. I fall and rise with the falling and rising bodies. This is I, the machine, manoeuvring in the chaotic movements, recording one movement after another in the most complex combinations. Freed from the boundaries of time and space, I coordinate any and all points of the universe, wherever I want them to be. My way leads towards the creation of a fresh perception of the world. Thus I explain in a new way the world unknown to you. (Dziga Vertov: cited in Popper: 2004: p.44)

²⁶ This excludes any interventions by the photographer as discussed earlier in section 2.1 or in post-production. Lovejoy continues on to discuss the computer’s effect on the photograph and its “capability to invade images and create invisible alterations to photographs, thereby undermining its accepted ‘truth,’ authority, and authenticity through a seamless process of retouching and editing”. (Lovejoy: 2044: 155)

through various chemical or electronic processes as an immediate copy of reality.”²⁷ (Lovejoy: 2004: 152) The computer image in contrast, models visual experience in accordance with the physical laws that govern it:

A digital image does not represent an optical trace such as a photograph but provides a logical model of experience. In other words, it describes not the phenomenon of perception, but rather the physical laws that govern it, manifesting a sequence of numbers stored in computer memory. Its structure is one of language: logical procedures or algorithms through which data is orchestrated into visual form.

(Legrady cited in Lovejoy: 2004: 153)

Because the computer understands “scanned aspects of reality as information about light structures, storing this numerical information in its database” then it is numerical information that defines geometric space rather than shape or volume. This in turn, according to Lovejoy, means that “within the logical world of computers ... nature and the body as we know them do not exist.” (Lovejoy: 2004: 153)

Despite this however, photographic representation continues to impact on the computer image. Manovich identifies the main goal of research in the field of computer graphics as “the achievement of photorealism.” (Manovich: 2001: 199) Photorealism, he defines as, “... the ability to fake not our perceptual and bodily experience of reality but only its photographic image.” Druckey describes this as a crisis that emerges when technology and representation converge:

The computer ... begins to assimilate representation itself ... video, film, and principally photography are being challenged to hold their authority against visual modelling systems that are emerging which eclipse their forms ... As representation and technology converge, a crisis emerges.

(Druckey cited in Lovejoy: 2004: 152)

Computer systems of representation - new ways of seeing

However Lovejoy and Manovich are of the view that the computer and its mathematical way of seeing, opens up new potential for artistic possibilities. Manovich clarifies: “synthetic computer-generated imagery is not an inferior representation of our reality, but a realistic representation of a different reality.” (Manovich: 2001: 202). He continues noting the virtues of the synthetic image:

The synthetic image is free of the limitations of both human and camera vision. It can have unlimited resolution and an unlimited level of detail. It is free of the depth-of-field effect, this inevitable consequence of the lens, so everything is in focus. It is also free of grain – the layer of noise created by film stock and by human perception. Its colours are more saturated, and its sharp lines follow the economy of geometry. From the point of view of human vision, it is hyperreal.²⁸ And yet, it is completely realistic.

²⁷ The digital photograph involves the transformation of electronically scanned (digital) information to numerical data, which is then visualised as imagery through discrete pixels. Each pixel contains precise numerical values determining its location and colour information, etc.

²⁸ The concept of the ‘hyperreal’ has been explored by various philosophers and media theorists (Baudrillard, Deleuze and Eco amongst others), although it is Baudrillard’s essay ‘Simulacra and Simulations’ (1988) that is perhaps most widely known. According to Obery (2003) “simulation is

The synthetic image is the result of a different, more perfect than human, vision.

(Manovich: 2001: 202)

Similarly Lovejoy notes, "... the computer's capacity to 'see mathematically' is helping us to see more completely than we can with the human eye alone." (Lovejoy: 2004: 156) Distinguishing between *simulacra* – "a copy of a copy of the real" – and *simulation* – "a mathematical model of the real, a new kind of representation" she explains that "technical developments now take us into a territory where a parallel reality exists – one that resides within reality – where the perfection of mathematical modelling creates a reality which has been called 'virtual reality.'" (Lovejoy: 2004: 160)

As Lovejoy states, the computer allows us to "see more completely than we can with the human eye." Multiple views of a subject in 3-dimensional space become possible through computer modelling and this aspect of computer-based art practice is explored through practice in the articulations of the light-forms. The aim is not to present a perfect model of them, rather it is to present an artistic simulation located somewhere between the photographic image and the computer (synthetic) image. Reas et al (2010) draw a distinction between software simulation and artistic simulation, explaining "Artistic simulation differs from other forms of simulation such as software simulation where the goal is often based on modelling the natural world with precision. With artistic simulation, simulation can be a precise tool, but also a foundation for something beyond." (Reas et al: 2010: 147) My interest in this project is to consider simulation in the artistic sense as a "foundation for something beyond."

In addition to the interstitial space between knowledge and imagination (as previously discussed in the first section of the chapter); interventions made by translating visual forms between different and seemingly conflicting systems of visual representation, result in a further definition of interstitial space - that of a remediated interstitial space. Mediations between interstitial qualities of the photographic (the "layer of noise created by film stock" Manovich refers to) - with its trace in the 'real', contrast with the *synthetic* qualities (or more saturated colours, sharp lines of geometry (Manovich: 2001)) of the computer image. The audiovisual artworks included in the folio question what other 'realities' might exist in working between these two different visual systems. Differing aesthetics of these visual systems of representation and how they might be negotiated in response to the source images is discussed in Chapter 4. Similarly, the space between disciplines is explored through further mappings between audio and visual forms also documented in Chapter 4.

characterized by a blending of 'reality' and representation, where there is no clear indication of where the former stops and the latter begins." Whereas "the simulacrum is often defined as a copy with no original, or as Gilles Deleuze (1990) describes it, "the simulacrum is an image without resemblance" (p. 257)." In this project, practice-based work sits outwith these definitions in that the art practice refers to the source photographs, not as any accepted 'reality' but rather as a source for artistic exploration. The aim is not to simulate 'reality' or to provide a copy of the copy (simulacrum) but to explore dialogues between differing systems of representation.

3.0 LOCATING THE PRACTICE: CONTEXT + METHODS

Overview

The context of most relevance to the art practice is the field of visual music. Visual music is primarily concerned with relationships between sound and image and with the aesthetics of abstraction in moving image works. Like this project, many artists working in visual music have used light as a subject material. In addition to this, ideas and methods from the field of generative art are also considered, focussing on how autonomous systems are used to generate visual responses. This chapter gives an overview of visual music and its methods, with reference to a number of artworks that are influential to the research. It also locates areas and ideas within generative art of relevance to the art practice.

3.1 Visual Music

Visual music is the term used to describe the medium which encompasses many forms found within the realm of artistic exploration of abstraction in the moving image: lumia, visual music, absolute film, video synthesis, rhythmic light, abstract animation. (The Iota Center: n.d) Indeed, William Moritz (1986) reminds us that: “any discussion of visual music, however, must remain ‘inter-disciplinary’” given many artists use of “color-organs - those non-filmic instruments invented to project pure light configurations.” It is McDonnell’s (2007) definition of visual music however that is the most useful to the study:

A visual music piece uses a visual art medium in a way that is more analogous to that of music composition or performance. Visual elements (via craft, artistic intention, mechanical means or software) are composed and presented with aesthetic strategies and procedures similar to those employed in the composing or performance of music.

Like the challenges faced with this project when translating still images into moving image works, McDonnell notes that what is most striking about visual music works is that concepts from music are applied to visual material in order to “put some shape” onto it. For her, the common ground between the visual and sound mediums [sic] is in the craft of composition.

Aesthetic strategies of visual music

In her article *Visual Music*, McDonnell provides a comprehensive overview of the “key aesthetic strategies” employed by artists, filmmakers and instrument builders identified as visual music practitioners. She begins with a discussion of abstract painters – Kandinsky, Klee and De Maistre - who explore the visual with musical thinking, thereby creating “new visual forms, patterns and new relationships between visual elements.” She then turns to the work of filmmakers Eggeling, Richter and Ruttmann discussing the impact that “non-representational strategies for composing music” had on their work:

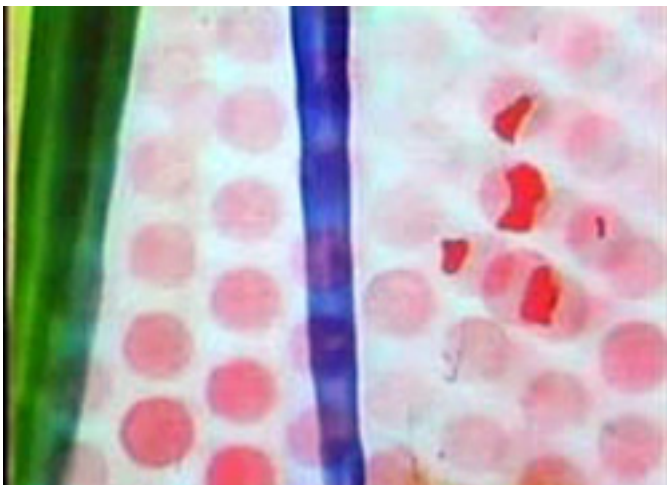
In abstract animation, the now hard-to-define artist could compose his or her animations like musical compositions, orchestrating the visual elements, creating motifs and repetitive elements, transforming a visual element’s shape over time, and creating a sense of harmony and symmetry in the use of screen space and screen time.

(McDonnell: 2007)

Composing motion

These filmmakers, she argues, realized “that motion was needed to fully realize their visual aesthetics.” Animation then is of key importance to visual music as Moritz (1986) points out: “many of the “Old Masters” of Visual Music were animators - Oskar Fischinger, James Whitney, Harry Smith, Jordan Belson, Norman McLaren, Alexeieff, and Len Lye.” Len Lye and Norman McLaren both worked with direct filmmaking techniques (drawing and scratching directly on to the filmstrip) to create their films, as demonstrated in works such as *A Colour Box*²⁹ (Lye: 1935) and *A Phantasy in Colors*³⁰ (McLaren: 1949).³¹

In *A Colour Box*, Lye recognised the potential of motion in a visual composition whilst also exploring the potential of music to help formulate such motion. In setting the visual elements – dynamic abstract shapes - to jazz-calypso music, they appeared to be dancing to the music. Lye therefore “used the soundtrack as a creative base by associating particular shapes with certain sounds, so that there is a loose relationship between sound and image.” (Sexton cited in McDonnell: 2007) As McDonnell summarises: “Composing visuals set to music was a task in composing motion, a task similar to that of the music composer who composes music.”



[fig.06] Lye, Len (1935) *A Colour Box* [still image]

Music to add feeling

Prior to Len Lye (1901 - 1980), German filmmaker and early visual music pioneer Oskar Fischinger (1900 - 1967),³² selected music from classical and jazz traditions for his films. Through focus on rhythm and dynamics in the music – “the application of acoustical laws to optical expression”³³ – the visual experience of the abstract elements was enhanced making both sound and image appear “to fuse.” Music was used “to make the absolute nature of the visuals more understandable” adding another dimension to the viewer

²⁹ Lye, Len (1935) *A Colour Box*, Available at: <https://vimeo.com/6276547>

³⁰ McLaren, Norman (1949) *A Phantasy in Colors*, Available at: <http://www.youtube.com/watch?v=86Wp96uG-N8>

³¹ As detailed in *McLaren's Negatives* (2006) an animated documentary on McLaren by filmmaker Marie-Josée Saint-Pierre. Available at: <http://www.youtube.com/watch?v=vCXT-iHmZYc>

³² Fischinger, Oskar (1933-34) *Kreise (excerpt)*, Available at: <https://vimeo.com/55181698>

³³ Fischinger, Oskar *My Statements Are My Work Art* in Cinema catalog, San Francisco, 1947, <http://www.oskarfischinger.org/MyStatements.htm> cited in McDonnell (2007)

experience through feeling: “the tightly synchronized non-representational graphics and music appeal directly to the feelings of the viewer.” (McDonnell: 2007) This idea was also evident in the work of experimental filmmaker and early animation pioneer Mary Ellen Bute. In the introductory titles to her film *Synchronomy no. 2*³⁴ (1936), she expresses her aim of creating “...moods through the eye as music creates moods through the ear.”³⁵

Synchronisation of image and sound

Fischinger was also an inventor as well as a filmmaker, inventing devices to realise his creative ideas. Such devices included the Lumigraph - a device to perform colour,³⁶ a wax-slicing machine and also a modified camera capable of photographing his ornament drawings and other geometric shapes directly onto the film’s soundtrack. [fig.07] In his article *Sounding Ornaments* (1932) Fischinger explains his filmed *Ornament Sound* (1931) experiments that made use of his modified camera:

If you look at a strip of film from my experiments with synthetic sound, you will see along one edge a thin stripe of jagged ornamental patterns. These ornaments are drawn music -- they are sound: when run through a projector, these graphic sounds broadcast tones or a hitherto unheard of purity, and thus, quite obviously, fantastic possibilities open up for the composition of music in the future.

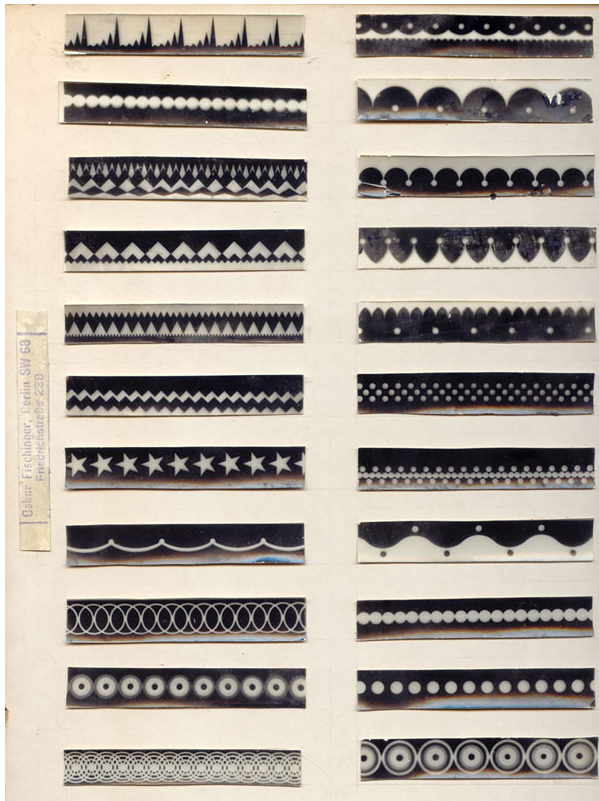
(Fischinger cited in Fischinger Trust: 2013)

Ornament Sound involves a direct translation of image to sound when the film is projected, a method that Keefer and Ox note as being a “pure” type of visual music since “Literally, what you see is also what you hear.” (Keefer and Ox: 2006 - 2008)

³⁴Available at: http://www.dailymotion.com/video/x58zv6_mary-ellen-bute-synchronomy-no2-1936_shortfilms#.URquGLYs_fY

³⁵ Mary Ellen Bute – from the introduction to *Synchronomy no.2* (1936): “The following film is designed / by a modern artist to create / MOODS THROUGH THE EYE/ as music creates/ MOODS THROUGH THE EAR. ... A pictorial accompaniment/ In abstract forms to the music of /“The Evening Star” by Richard Wagner

³⁶ The Lumigraph “consisted of a taut cloth sheet that could be pressed into from behind with hands or objects to intersect thin sheets of light controlled by foot pedals.” (Levin and Snibbe: 2000)



[fig.07] Elfriede Fischinger Trust, (1931 – 2005)
Detail from display card by Fischinger showing some of his “ornaments”

From the 1960s onwards, synchronization of image and sound was directly explored by brothers John (1917 - 1995) and James Whitney (1921 – 1982), who also built their own devices to realize the synthesis of music and image. These devices were initially optical, then analogue and later digital (the computer). Their focus was on methods “to create a more simultaneous composition of sound and image and a more immediate rendition of the temporal dimension of sound and image.” (McDonnell: 2007: 11) Influenced by Schoenberg’s twelve-tone system of composition “reducing music to the serial row” the Whitneys – in works such as *Catalog*³⁷ (1961) and *Arabesque*³⁸ (1975) - reduced the image “down to its most fundamental state – essentially a point of light, which could then be ordered like a tone row.” (Brougher cited in McDonnell). In films such as *Permutations*³⁹ (1966) and *Arabesque* (1975) (programmed by Larry Cuba) John Whitney demonstrated the principle of “harmonic progression.”⁴⁰ (Moritz: 1997) Discussing *Permutations* [fig. 23] he explains:

In PERMUTATIONS, each point moves at a different speed and moves in a direction independent according to natural laws' quite as valid as those of Pythagoras, while moving in their circular field. Their action produces a phenomenon more or less equivalent to the musical harmonies. When the

³⁷ Available at: <http://www.youtube.com/watch?v=TbV7loKp69s>

³⁸ Available at: <http://www.youtube.com/watch?v=w7h0ppnUQhE>

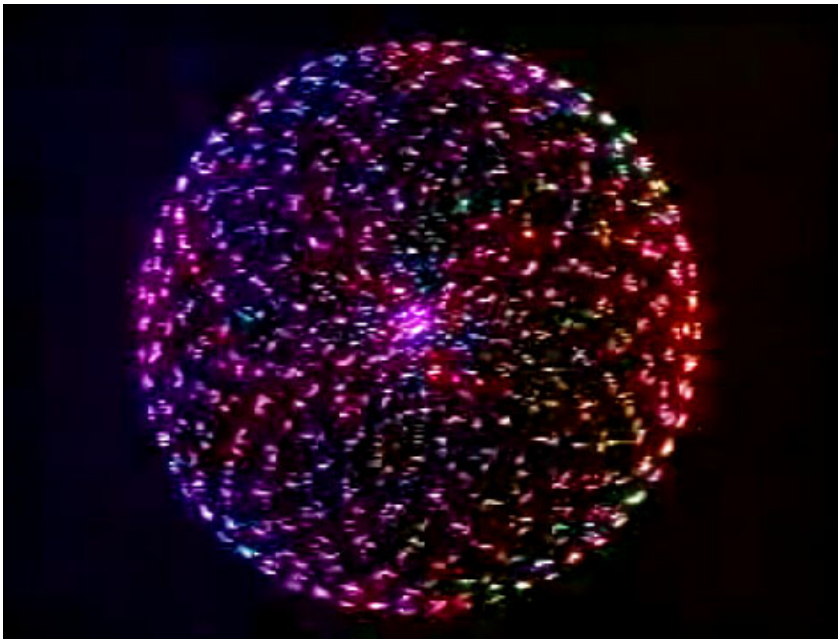
³⁹ Available at: <http://www.youtube.com/watch?v=BzB31mD4NmA>

⁴⁰ Harmonic progression: the movement from one chord to another, usually in terms of their function

points reach certain relationships (harmonic) numerical to other parameters of the equation, they form elementary figures.

(John Whitney: 1966)

As explained above in the work of earlier abstract filmmakers, Whitney recognized the impact his aesthetic and his focus on actions had on the emotions of the viewer: “Fluid, orderly action generates or resolves tensions much in the manner that orderly sequences of resonant tonal harmony have an impact on emotion and feeling...” (Whitney cited in McDonnell: 2007). These films – examples of early computer animation - predate and share common aims with much of the algorithmic experimentation that continues today.⁴¹



[fig.08] Whitney, John (1966) *Permutations* [still from film]

Visual music then, does not focus solely on the craft of composition; it also focuses on the performance aspect found in the creation of non-fixed media works that realize “mobile visual elements via mechanical or generative means.” Visual music can therefore contain elements of generative art and can focus more on the performance aspect:

Visual music can take two strands in its approach to the craft and presentation of itself as an art medium. It can focus on the craft of composition—working with mobile visual elements over time to be realized in time as a fixed-media video or film projection. Alternatively, visual music can focus more on the performance aspect, an improvisational approach or both, and hence focus more on the

⁴¹ Examples include: Daniel Francke, *One Minute Soundsculpture* (2010) and *Unnamed Soundsculpture* (2012), and Quayola, *Strata # 3*, (2009) (Full URLs for these works are included in the Reference List at the end of the dissertation.)

realization of mobile visuals elements via mechanical or generative means into a non-fixed media that exists mainly in its performance; the craft in this case often involves considerable technical skill in building a system or item that can realize a visual music in a real-time setting.

(McDonnell: 2007)

Systems for creating visual music

Works of visual music focussing on the performance aspect were previously realised with physical instruments or colour-organs that were 'played' rather like a musician playing an instrument. As discussed above, the Whitney brothers developed their own technological solutions (firstly analogue devices then digital) to address the problem of the direct synchronisation of sound and image. Currently such works are typically realised with computer instruments, created and controlled using hardware and software that favours a "more systems approach."⁴² (McDonnell: 2007) Contemporary artists such as Golan Levin and Scott Snibbe are amongst many others⁴³ who have developed systems to generate audiovisual performances in real time and will be discussed shortly. However an early example is found in the work of Thomas Wilfred (1889 – 1968), a pioneer of what he termed *lumia* – or the art of light.

⁴² McDonnell refers to Fred Collopy's comprehensive bibliography of artists working with such instruments: *Lumia & Instruments for Creating Them* (1998 - 2007) <http://rhythmiclight.com/archives/bibliography.html>

⁴³ *Seeing Sound* is one of many conferences bringing together contemporary artists and researchers working in the field of visual music. *Palimpsest* (2011), one of the audiovisual works produced in this study was screened at *Seeing Sound 2* (2011).



[fig.09] Wilfred, Thomas (1965-66) *Opus 161*
[Lumia composition]

Lumia

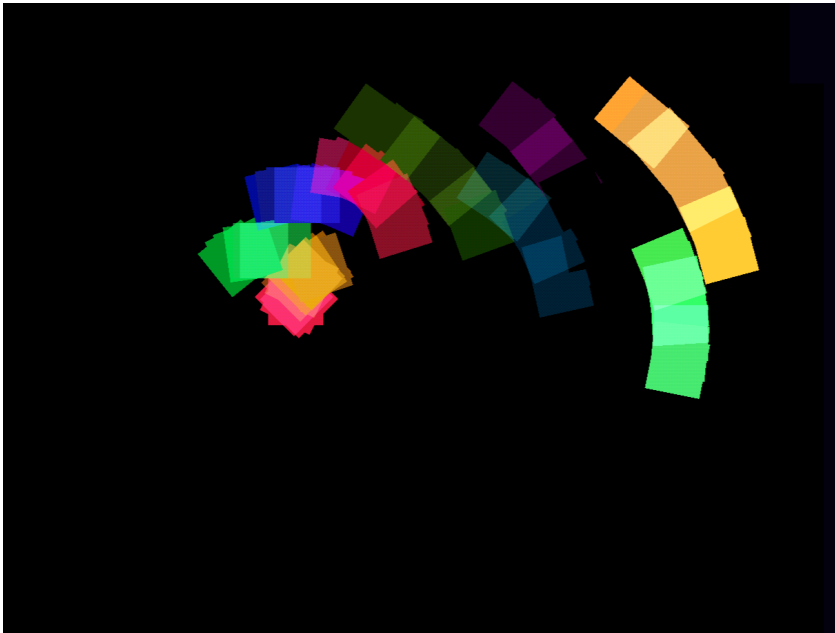
Wilfred believed the art of light to be a new art form developing the *clavilux* – or light keyboard - in 1921 to realise his ideas. Unlike Fischinger's approach, Wilfred's works were silent, instead focussing purely on light itself.⁴⁴ Lumia was the term he used to describe "the fluid kaleidoscopes of light projected by the Clavilux." (Shanken: 2009: 56) The clavilux "consisted of a moving lamp, a double-cone reflecting system and changeable colour discs, together with a keyboard that controlled tempo, a shutter, and floodlights that create the images." (Shanken: 2009: 56). Through sculpting light directly with the clavilux, Wilfred created compositions of gradually evolving "morphing light patterns" which "unfolded for weeks without repeating." (Shanken: 2009: 56) What is striking about his lumia compositions is their similarity to some of the photographic-light paintings that form the basis of this study. As with the light-paintings, the ghostly, ethereal nature of Wilfred's lumia compositions, suggest other worlds and spaces that could also be characterised as interstitial (see Chapter 2).

⁴⁴ Levin notes that Wilfred came to the conclusion that "there was no absolute correspondence between color and sound" (Levin: 2000: 23), instead choosing to focus on the art of light itself.

The otherworldly aspect of Wilfred's works, stem from his interest in using light to represent spirituality in his performances.⁴⁵ Like Kandinsky and many other prominent artists of his generation, Wilfred was a theosophist believing "that certain combinations of color [sic] and light could bring on spiritually transcendent experiences." (Snibbe and Levin: 2000) Wilfred's exploration into otherworldly spaces created and generated by light has much in common with this project's investigation into the interstitial. What is key in both cases is how these investigations are articulated through artworks.

Performative aspect in recent visual music works

Although there are many contemporary artists working with different manifestations of audiovisual systems,⁴⁶ projects involving a *performative* aspect through human action to control or generate audiovisual experiences are of particular interest to the study. This is primarily due to the manner in which the light-photographs [fig.04] were created in the first place. The gestures of the photographer (or photographer-performer) combined with the motions of passing traffic are 'painted' as light-forms in the final photographs. Similarly, it is the gestural aspect of such contemporary audiovisual systems - what Levin terms as 'painterly': "the act of *mark-making*, in which a gesture is made with respect to some material ... and because part of the *product* is, beyond the performance of the mark-making itself, a *two-dimensional image*." (Levin: 2000: 57) - that corresponds with this research project. Namely, the research raises the issue of how spontaneous human gesture might be mapped and translated to create new audiovisual articulations and expressive works that expand on the initial gesture. Artists Scott Snibbe and Golan Levin are two software artists⁴⁷ exploring such systems.



[fig.10] Snibbe, Scott (1995) *MotionPhone*

⁴⁵ Wilfred belonged to a group of theosophists called the Prometheans who searched for elements that emit light to represent the principles of spirituality. (Rezende: 2012)

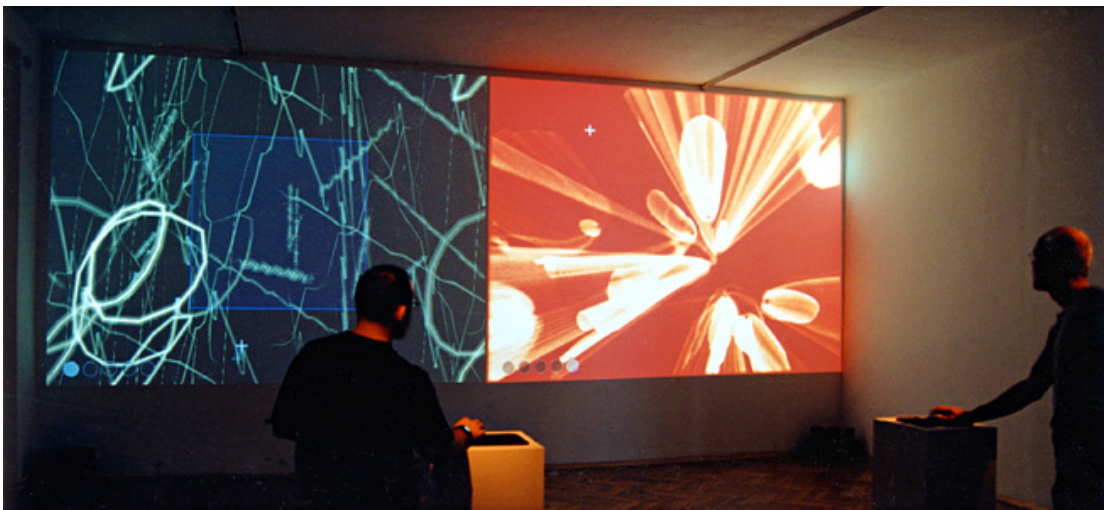
⁴⁶ See Snibbe and Levin (2000) and Levin (2000) for a comprehensive overview

⁴⁷ Christian Paul defines the term 'software art' as used "predominantly for pieces that have been "hand-coded" by the artist." (Paul: 2008) In the following section, software art will be discussed in relation to generative art.

Scott Snibbe's *Motion Phone* (1989 – 1996)⁴⁸ “is a software artwork that allows its user to interactively create and perform ‘visual music’ resembling the geometric abstract films of Oskar Fischinger or Norman McLaren.” (Levin: 2009) Snibbe explains that the work “evolved out of an exploration of how to make cinema with one’s body” (Snibbe: 1998 - 2010) and was influenced by Fischinger’s use of pure abstraction to create emotionally powerful films from simple black and white forms, and Lye’s direct use of his body. The work is based around attaching the movements of the user’s hands via the mouse (or graphics tablet) to the movements of abstract forms on screen thereby creating dynamic animations. Specifically, the user’s gestures are recorded as data (i.e. the speed and location of his/ her ‘marks’ on screen) that is then entered into a digital animation loop. As the user continues to draw, the shape, size and colour of their marks can be simultaneously changed by pressing options on the graphics tablet or keyboard. Movement is therefore translated into interactive, abstract dynamic forms. Snibbe describes the work as:

...an experiment in pure visual communication... It is an attempt to open up the language of abstract animation to a general audience by allowing spontaneous human gestures to be captured in all their subtlety...The quality of work created with this tool is strikingly human – in stark comparison to the work created with most computer art and animation programs today.

(Snibbe cited in Levin: 2000: 49)



[fig.11] Levin, Golan (1998 - 2000) *Audiovisual Environment Suite (AVES)*

What makes the work successful is the manner in which the subtlety of spontaneous human gesture is captured, combining hard-edged imagery with more amorphous forms that reflect a “more general expression of color and light.” Snibbe remarks on the difficulties involved in creating a colour-organ capable of producing such imagery:

⁴⁸ MotionPhone was made available in 2012 as an app on the AppStore allowing users to download the work to their iPad or iPhone.

The physical color organs face two difficulties in producing imagery: creating detail or hard-edged imagery requires specificity – e.g. templates or slides; while creating a more general expression of color and light necessitates amorphousness – soft, ethereal forms. Free from the limitations of physics, mechanics and optics, digital computer graphics promise an unprecedented palette of color, light, form and animation. However, the majority of computer graphics tools accurately mirror the mathematical processes required for animated production, rather than the aesthetic.

(Snibbe and Levin: 2000)

Similar challenges are faced by this study in relation to defining the aesthetics of the audiovisual artworks: i.e. I investigate how spontaneous human gesture might be captured in all its subtlety and re-expressed in a grammar of light - spanning both hard-edged imagery and more amorphous forms – to become the basis of a series of expressive audiovisual artworks. Aesthetic issues arising from these investigations are considered in greater detail in the following chapter.

Golan Levin, a regular collaborator of Snibbe's, also explores human gesture in his audiovisual performance instruments. Referring to his *Audiovisual Environment Suite (AVES)* (1998 - 2000)⁴⁹ [fig.11] he writes:

The *Audiovisual Environment Suite (AVES)* is a set of seven interactive software systems which allow people to gesturally create and perform abstract animation and synthetic sound in real time. ... The *AVES* systems are based on the metaphor of an "audiovisual substance" which can be gesturally created, manipulated, and deleted in a painterly, non-diagrammatic image space. Each instrument situates this substance in a context whose free-form structure inherits from the visual language of abstract painting and animation. The use of low-level synthesis techniques permits the sound and image to be tightly linked, commensurately malleable, and deeply plastic.

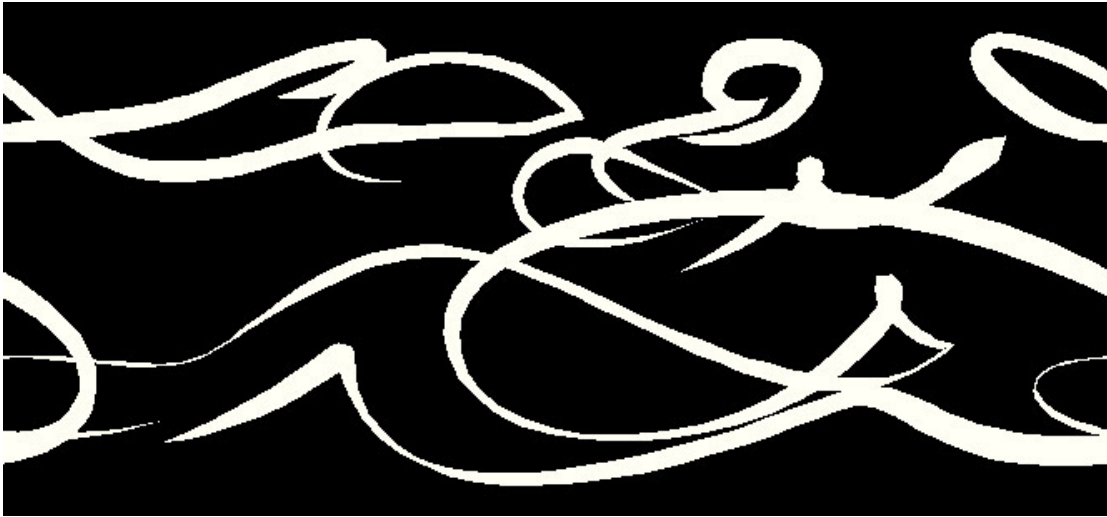
(Levin: 2000B)

His Masters thesis documents the development from his early silent experiments (*Streamer*, *Escargogolator*, *Polygona Nervosa*⁵⁰ and *Directrix*) to the design of: *Aurora*, *Yellowtail*, *Loom*, *Warbo* and *Floo*, systems for the simultaneous performance of dynamic graphics and sound included in the *AVES*. Levin's early silent experiments – directly influenced by Snibbe's *Motion Phone* - were prototypes of early "visual instruments" that focus on allowing the performer to produce *dynamic imagery over time*. (Levin: 2000: 59) Levin wanted to expand on Snibbe's exact reproduction of human gesture to explore "a hybrid realm of computational movement, halfway between *Motion Phone*'s literal playback of stored gestures, and the strictly procedural animation methods prevalent in the multimedia and graphics of the time." (Levin: 2000: 62) The *AVES* saw a development of these early silent experiments into a suite of audiovisual performance instruments.

⁴⁹ Available at:

<http://flong.com/projects/aves/>

⁵⁰ The first three works were created in collaboration with Scott Snibbe. (Levin: 2000: 59)



[fig.12] Levin, Golan (1998) *Yellowtail*

*Yellowtail*⁵¹ (1999) [fig.12] is an example of one of these systems. In *Yellowtail*, the user's gestures made via the mouse are recorded as marks and are animated based on the initial movement: slow marks move slowly, while fast marks move quickly. These marks can then be added to thereby creating animated compositions. Building on this, Levin asked what these compositions would sound like, employing an inverse spectrogram⁵² to convert image into audio to realise the sound-image relationships. As he explains in his video documentation of the work⁵³: marks generating low frequencies are on the left of the screen, marks generating high frequencies are on the right, and marks which go across the screen are sonified as short bursts of sound. Chords are possible, as are more complex compositions. Additionally, the user can also introduce a grid to make a rhythm machine and a visual filter can be added which blurs the image as well as the sound.

Whilst Levin's mappings between sound and image are the result of visualisations and sonifications created from digital signal analysis algorithms, filtering algorithms and computer simulations; mappings between sound and image in this research project are founded on subjective human responses made by myself, the 'interpreting mind.' These relationships are forged through direct mapping of visual form to sonic form centred on qualities inherent within a specific set of photographic images [fig.04]. As in the work of early experimental filmmaker Len Lye, music acts "as a creative base by associating particular shapes and certain sounds" (McDonnell: 2007), this is demonstrated by the

⁵¹ Available at:

<http://flong.com/projects/yellowtail/>

⁵² Levin explains: "spectrograms were originally developed to analyze sounds, such as speech, but took on provocative new possibilities when used in reverse, as a means of synthesizing sound." (Levin: 2000: 75)

⁵³ Available at:

<http://acg.media.mit.edu/people/golan/aves/movies/yellowtail.mov>

artworks included in the folio and will be discussed in Chapter 4. In these works it is analysis of the music that gives structure to the visual response.

Sound-image relationships

In simple terms, I asked how the light-forms might ‘sound’ and made my selection of the audio based on this.⁵⁴ This relates directly to Michel Chion’s concept of *added value*. Chion defines added value as: “The expressive and/ or informative value with which a sound enriches a given image, so as to create the definite impression (either immediate or remembered) that this meaning emanates ‘naturally’ from the image itself.” (Chion: 1994: 221) Selections for the audio in each artwork relates directly to Chion’s ideas of how sound adds meaning to an image: responding to and indeed directly linking ‘interstitial’ qualities and textures identified in the source photograph (see Chapter 4 for further discussion).

As previously stated, sound was also used to provide the structure for the visual response for each interpretation of the selected source photograph. Chion states: “One of the most important effects of added value relates to the *perception of time in the image*, upon which sound can exert a considerable influence.” (Chion: 1994: 13) His following discussion of the conditions necessary for sound to temporalize images, examines the nature of sounds and images put together and the effect this then has on the perception of the image. In his own terms “... through the phenomenon of added value, it [sound] interprets the meaning of the image, and makes us see in the image what we would not otherwise see, or would see differently.” (Chion: 1994: 34) The role of sound in the artworks then, adds value to visual definitions (i.e. non-verbal understandings) of the concept of the interstitial.

In summary, the main areas of interest within visual music of relevance to the research are as follows:

- How might music be used to shape visual material, or more specifically:
 - How might relationships between audio and visual elements be mapped to form the basis of creative works?
- How might abstract works appeal directly to the senses?
- Could translations of ethereal light-forms create works suggestive of other ‘interstitial’ spaces and places (cf. Thomas Wilfred)?
- How might systems be devised to link and/ or synchronise audio and visual material?
- How might spontaneous human gestures be translated into audiovisual forms?

⁵⁴ This refers directly to the use of metaphor as a mode of thought for transferring ideas from one domain to another as discussed in Chapter 2.

3.2 Generative Art

An additional area of interest to the research is the field of generative art. Philip Galanter defines generative art as:

... any art practice where the artist uses a system, such as a set of natural language rules, a computer program, a machine, or other procedural invention, which is set into motion with some degree of autonomy contributing to or resulting in a completed work of art.

(Galanter: 2003)

Whilst visual music can incorporate aspects of generative art, the definition of generative art is somewhat stricter, and relies on the incorporation of systems that focus on “some degree of autonomy contributing to or resulting in a completed work of art.” Indeed McCormack et al (2012: 2) explain:

In essence, all generative art focuses on the *process* by which an artwork is made and this is required to have a degree of *autonomy* and *independence* from the artist who defines it... Indeed, arising from our discussions is a distinction between what might be termed “strong” and “weak” generative art. Strong generative art gives creative autonomy and independence primarily to the computer, minimising the creative signature of the human who designed the system. In contrast, weak generative art uses the computer more passively as a tool or assistant, the human artist having primary creative responsibility and autonomy.

(McCormack et al: 2012: 2)

Given that the goals of this research are driven by human expression where the artist has primary responsibility, albeit through a technological approach, then it becomes clear that the artworks included in the folio could be classified by McCormack et al.’s definition of “weak” generative art rather than “strong” generative art minimising the “creative signature of the human who designed the system.” As is discussed in the following chapter, both the interpretive aspect of the research and the critical evaluations that focus on human responses to aesthetic issues, inform and shape subsequent works, thereby removing creative autonomy and independence from the computer. The role of the computer is therefore an assistant involved in the creation of form, but form that has the “creative signature of the human who designed the system.” Taking this into consideration, it then becomes impossible to classify the artworks in the study as outputs from systems of “strong” generative art.

Levin and Snibbe’s works referred to above are categorised as software art rather than as purely generative works. Software art, according to McLean, is distinguishable from generative art since “software art ... admits views of software as an extension of the human, where the computer provides language which allows human expression to reach further.” In contrast McLean’s view that generative art “must be considered separable from the programmer, who is in the business of creating activity external to their own influence” (McLean: 2011: 16) supports the definition of strong generative art proposed by McCormack et al.

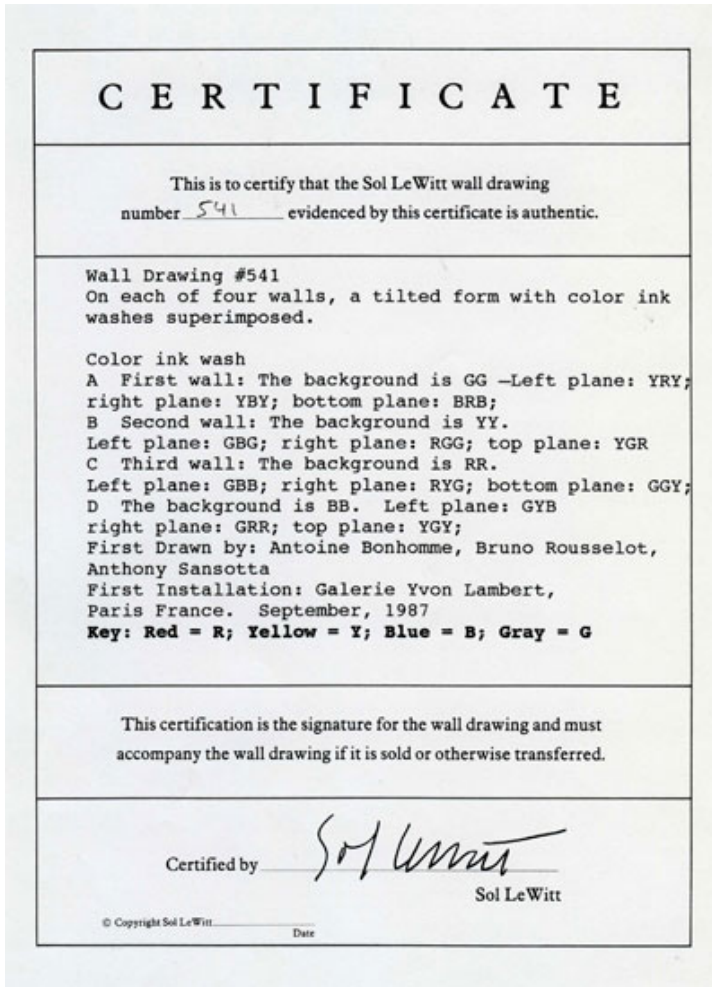
Whilst McCormack et al. discuss generative art in relation to computer-based art practice; Galanter (2003) argues that generative art existed long before computers, recognizing that “randomization in the arts came into its own primarily in the 20th

century.” Cage, Burroughs and Duchamp, he explains, used randomization as a generative principle, whilst Minimalists Andre, Bochner and Morgenson used mathematical principles to generate compositions. Conceptual artist Sol LeWitt, was more interested in the concept or idea underlying the work rather than the final art-object representing it. His wall drawings from the 1960s onwards consisted of a list of instructions or a simple diagram [fig.13] describing a visual structure to be implemented on a wall. This could be completed by anyone, anywhere and at any time. In his 1967 essay *Paragraphs on Conceptual Art* he writes:

...the idea or concept is the most important aspect of the work. When an artist uses a conceptual form of art, it means that all of the planning and decisions are made beforehand and the execution is a perfunctory affair. The idea becomes a machine that makes the art.

(LeWitt: 1967)

For LeWitt: “There are several ways of constructing a work of art. One is by making decisions at each step, another by inventing a system to make decisions.” (Lewitt cited in Dreher: 1986) The system LeWitt invented for the wall drawings incorporates decisions made by whoever interprets the instructions when executing one of the drawings. The inclusion of the interpretation of the person executing the drawing, introduces an autonomous element to what is essentially a controlled list of instructions. Any beauty or aesthetic value that results “is often incidental” as Gallant (Smith College Museum of Art: 2008) comments.



[fig.13] Virginia Museum of Fine Art, n.d., Certificate of authenticity for Sol LeWitt's *Wall Drawing #541*

In terms of this research, the process in which the light-paintings were captured shares similarities with Sol LeWitt's wall drawings and could indeed be described as generative art and in terms of a system incorporating autonomy via a human agent. What is important to note is that, like LeWitt, I did not take the photographs; rather an 'assistant' following a set of instructions took them. The instructions delivered to the assistant (or photographer-performer) could be described as follows:

Procedure for capturing light-paintings during a drive around the city at night:

- A. Set camera to slow shutter setting
- B. When car is in motion: point camera at passing light-forms
- C. Take photo – when taking photo, incorporate whatever movement you see fit.

The autonomy in this system comes from the human agent that implements the instructions. Their motions and choices combined with other elements present in the

environment (i.e. passing cars) is what created the visual result in the final photograph. Pearson (2011) explains agents as observing and interacting with their environment:

They may have more sophisticated behaviours, such as goals, beliefs and prejudices. They can also harbour imprecisions, self-interests, and irrationalities too, which is what makes them so interesting to work with. That is what we mean when we speak of *autonomy*: the capability for something, whether human, monkey, software construct, robot, or supermodel, to make its own decisions.

(Pearson: 2011: 127)

Pearson's criteria for classifying a work as generative art insists that "the systems need to be autonomous: independent of outside control, free of any guiding hand." (Pearson: 2011: 151) In this case and with this system, the human agent [the photographer] makes decisions acting on his/ her own agenda and in response to the environment. Reas and Fry elaborate further on autonomous agents:

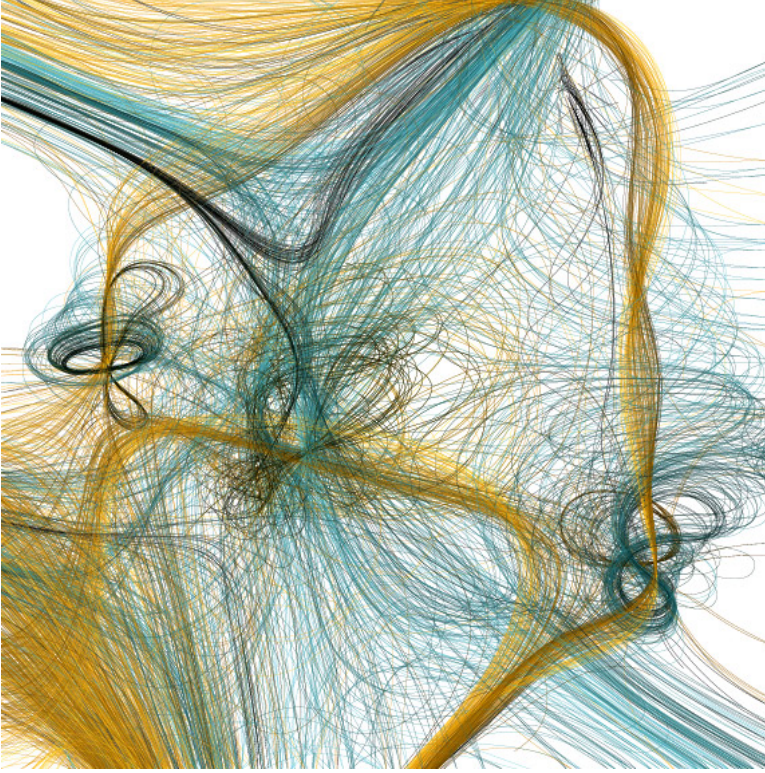
An autonomous agent is a system that senses and acts on its environment according to its own agenda. People, spiders, and plants are all autonomous agents. Each agent uses input from its environment as a basis for its actions. Each pursues its own goals, either consciously or through reflex.

(Reas and Fry: 2007: 469)

Indeed Casey Reas series *Path Prints* (2001) [fig.14] exemplifies autonomous systems in action by documenting the trace left by objects in motion. According to Reas, *Path Prints* is:

A series of six prints documenting the movement of synthetic neural systems. Each line in the image reveals the history of one system's movement as it navigates its environment.

(Reas: 2002-12)



[fig.14] Reas, Casey (2001) *Path 00* [print]

Like Gallants's observations on LeWitt's wall drawings, the beauty and aesthetic value is incidental to the process in which the photographs were created. However unlike pure or strong generative art as defined above by McCormack et al, it is the incidental beauty and aesthetic value resulting from this system that motivates the second phase of the research and is what places it outside the interests of pure or strong generative art. In other words, the aesthetic results from chance events (spontaneous human gesture plus the motions from the headlights of randomly passing traffic) – or the aesthetics of autonomy – and how this might be rearticulated or translated is what inspires the second phase of the study.

Processes involved in translating the trace of autonomy - i.e. subtle human gesture as recorded in the light-forms - into computer-generated form that conveys the organic quality of such gesture, is detailed in the following chapter. In the case where form is generated directly from code, the system is based around defining the light-forms firstly in language then as algorithms that create visual forms. These systems are not built around autonomy as was the case for the system in which the source photographs were captured; rather they define a set of rules that generate constantly varying visual forms and that explore the capacity of the computer to create form that I (the artist) might not have anticipated. Rather than belonging purely to generative art then, this has more in common with the group of artists called the Algorithmists.

The Algorists

The Algorists are “artists who create art using algorithmic procedures that include their own algorithms” (Verostko: 2012). The term was first used at the SIGGRAPH⁵⁵ conference panel entitled *Algorithms and the Artist* in 1995 where “the creative potential of the algorithm as a generator of artistic form was theorized and debated by Stephen Bell, Peter Beyls, Brian Evans, Ken Musgrave, Hérbert, and Verostko.” (Taylor: 2013: 15) As Taylor explains:

What makes the Algorists’ practice original is that each artist builds an individual art-making system that can generate an infinite amount of form, extending the production power of the artist by doing the work of thousands of people and creating limitless variations on a single idea. In addition, the computer, vested with the artist’s generative algorithms, imagines forms that were beyond the artist’s mental and productive capacity.

(Taylor: 2013: 26)



[fig.15] Hébert, Jean-Pierre (1995) *Un cercle trop étroit*

⁵⁵ SIGGRAPH (<http://www.siggraph.org>) is short for the Special Interest Group on Graphics and Interactive Techniques and refers to the annual international conference on computer graphics run by the Association for Computing Machinery.

The 1995 SIGGRAPH conference also included an exhibition of algorithmic works in which a human programmed the computer to generate compositions that were made into drawings via a pen plotter. “Pen plotters generated an image by moving a pen across the surface of paper, essentially drawing a line through those numerical coordinates defined along points on the x and y axes.” (Taylor: 2013: 17) Hebert’s single-line plotter drawing, *Un cercle trop étroit*, [fig.15] - one of the works on display - is relevant to this research given its overall organic feel. The final image bears a striking resemblance to the motions of waves in water and conveys a mysterious atmospheric quality similar to one of Wilfred’s Lumia compositions. Remarkably the entire form that makes up the image was created from one single line exploring fractal structures. Fractals are “shapes or patterns that repeat at many levels” and are found in nature in snowflakes, tree branches, rivers, coastlines, and blood vessels. (Pearson: 2011: 157) Hebert’s exploration of fractal structures captures what appears to be an organic fleeting ‘interstitial’ form – i.e. the image suggests movements in water that could only be captured in a passing moment as in a photograph.⁵⁶ Indeed in terms of the work’s natural quality and of other such works by the Algorists, Taylor compares the American landscape painters of the nineteenth-century Hudson River School and their explorations of the sublime power of nature with the Algorists’ exploration of the algorithm as “a powerful generator of a vast, previously unimaginable world of geometric and linear form.” (Taylor: 2013: 21) In this sense, the algorithm can produce unforeseen visual outcomes that lead to new and unforeseen worlds – interstitial spaces between what is known and what is not. In this study, practice-based research explores the gaps and breaks found in processes of translation, contemplating what is seen with what can be expressed as ideas in language and in algorithmic terms. Rather than considering these gaps as deviations from faithful representations of the source image, I consider them as opportunities for accessing unknown or unforeseen visual outcomes creating a different and ‘other’ world to that depicted in the photograph.

In summary and with reference to generative art then, it is the aesthetic results *produced* by autonomous systems and how this informs future creative works that is important to the next phase of the research. Practice-based inquiry borrows ideas and techniques from the fields of algorithmic art and visual music in order to devise processes to ‘translate’ and mediate between the photographic stills and motion-based works. This interstitial practice operates in the gaps between disciplines, sharing much in common with Keefer’s and Ox’s definitions of intermedia art.

Intermedia art is a fertile source for visual music. Dick Higgins, the noted Fluxus artist and theorist, first named and defined the phenomenon in 1966 in the *Something Else Newsletter* No. 1. Intermedia occurs when there are structural elements from two or more different media combined into one medium. It is a term that must be differentiated from multimedia. Intermedia can actually be multimedia, but it does not need to be, and it is frequently visual music. Conversely, many examples of visual music are intermedia.

(Keefer and Ox: 2006-2008)

⁵⁶ Like the algorists’ interest in nature realised through computational processes, Moritz also notes John Whitney’s preoccupation with nature. Whitney’s later films, he notes, “made extensive observations of various fire, water, air currents, wood and stone phenomena to learn the secrets of design and flux in nature as they relate to pattern and movement in art.” (Moritz: 1986)

The following chapter discusses the negotiation between the areas of generative art and visual music with reference to individual works, in addition to providing an account of the process of critical reflection and evaluation of them.

4.0 THE INTERSTITIAL: ARTICULATIONS

Overview

Each of the three artworks – ‘*articulations*’ of the interstitial – submitted in the portfolio of practice-based work was created in response to a photographic-light painting selected from the *Trace* (2008) series [fig.04]. The aim was to explore the interstitial qualities of the photograph based on the following framework: selection, analysis and interpretation of the source image; mappings between concept and image; visual language defined in terms of the organic or synthetic; sound-image relationships and how these relate to conceptual mappings; temporal structure, and finally reflections and evaluations on the work identifying further areas to be investigated by subsequent research.

4.1 Analysis and discussion of articulation 1

Title: *Substratum* (2010)

Duration: 03'40

URL: <http://vimeo.com/16856572>



[fig.16] Clifford, Alison (2008) *Untitled Photographic Light Painting* (from the *Traces* series)

1. Selection of image for interpretation

The first artwork produced by the research *Substratum* (2010) was based on and responds to the forms in the photograph above [fig.16]. I selected this photograph over others largely due to the simplicity of the light-forms in comparison with other photographs featuring individual forms of a more complex nature. In the image, repetitions of light-streaks occupy the screen horizontally and suggest a flatter 2-dimensional space where forms in the other photographs suggest 3-dimensions. Due to this, I determined that any artistic response would be time-based exploring 2-dimensional space as opposed to working with 3-dimensional form.

2. Analysing the image and determining the approach

When observing the forms in the image it was apparent that despite the overall similarities in terms of the direction the light-streaks follow, each group is 'born' at different locations across the image space indicating different speeds of travel of any passing light-emitting objects when the photograph was captured. Also analysis of each of the groups revealed that, although similar overall (i.e. wavy lines), they are marked by

subtle differences and individual characteristics that I desired to ‘translate’ to the final work. Due to these factors, the most appropriate approach for the first artwork (or ‘articulation’) was to program the visual response. Programming the visual response allowed me to explore the computer as a participant in the development of form (Reas et al.: 2010: 25), thereby enabling aspects of the output to be unpredictable (Le Grice: 2001: 221). In other words working with the computer as a collaborator produced subtle variations in each manifestation of the light-streak groups that I might not have foreseen without adopting such an approach. Following on from this and much like the early visual music pioneers, music was used to shape the visual material into a time-based response found in the final work.

The main challenges identified for this ‘articulation’ then were firstly: considering how the subtle differences between each of the light-streaks might be translated in a way that suggested their individual characteristics, and secondly, how these forms could then be placed in time and in response to sound to create an audiovisual artwork.

3. Interpreting the photograph – concept to image mappings

My interpretations of the photograph focussed on representing the *organic*⁵⁷ qualities of the image witnessed through the dense, irregular and undulating textures created by the groups of lines (the light-streaks) in the image. Referring to my earlier conceptual framework for the interstitial (*interstitial moment*, *interstitial forms* and *interstitial spaces*), this interpretation focuses on representing the interstitial through both forms and spaces on a connotative level⁵⁸ and with ‘human affective connotations.’⁵⁹ In terms of metaphor, interstitial forms in the photograph were interpreted as living and breathing organic matter that I wanted to translate to the final articulation. Human-like qualities were found in the rhythmic nature of individual lines that appear to rise and fall in and out of synch with one another, reminiscent of the act of drawing and exhaling breath. Furthermore, the irregular - ‘wavy’ nature of the lines, when considered as a complete entity, were suggestive of a kind of subterranean fabric or bedrock interstitial space which practice-based exploration aimed to convey. This interstitial bedrock space was reflected through the title of the resulting artwork – *Substratum: n. the non-living material or base on which an organism lives or grows*. The interstitial forms in themselves are therefore mapped to the definition of the interstitial (Chapter 2) as being “located in or creating a space between minerals.” Much like the Algorists, Verostko and Hebert, the title of the work comes from the suggestive qualities evoked by the image. (Taylor: 2013: 31)

4. Visual language: remediating the aesthetics of autonomy – the organic line

As mentioned above, the gestures of the photographer are evidenced in the photograph as multiple groups of varying organic lines (the light-streaks). Since the groups were similar in ‘feel’ in terms of their overall structure (i.e. groups of ‘wavy’ lines), I opted to program algorithms that generated short animated fragments of moving lines that would convey the ‘breathing’ idea outlined above. Whilst these algorithms were devised using

⁵⁷ The organic is defined as follows:

or-gan-ic adj - 1. relating to, derived from, or characteristic of living things 2. occurring or developing gradually and naturally, without being forced or contrived 3. forming a basic and inherent part of something and largely responsible for its identity or makeup 4. consisting of elements that exist together in a seemingly natural relationship that makes for organized efficiency (Encarta: 2008) (Reference no longer available online)

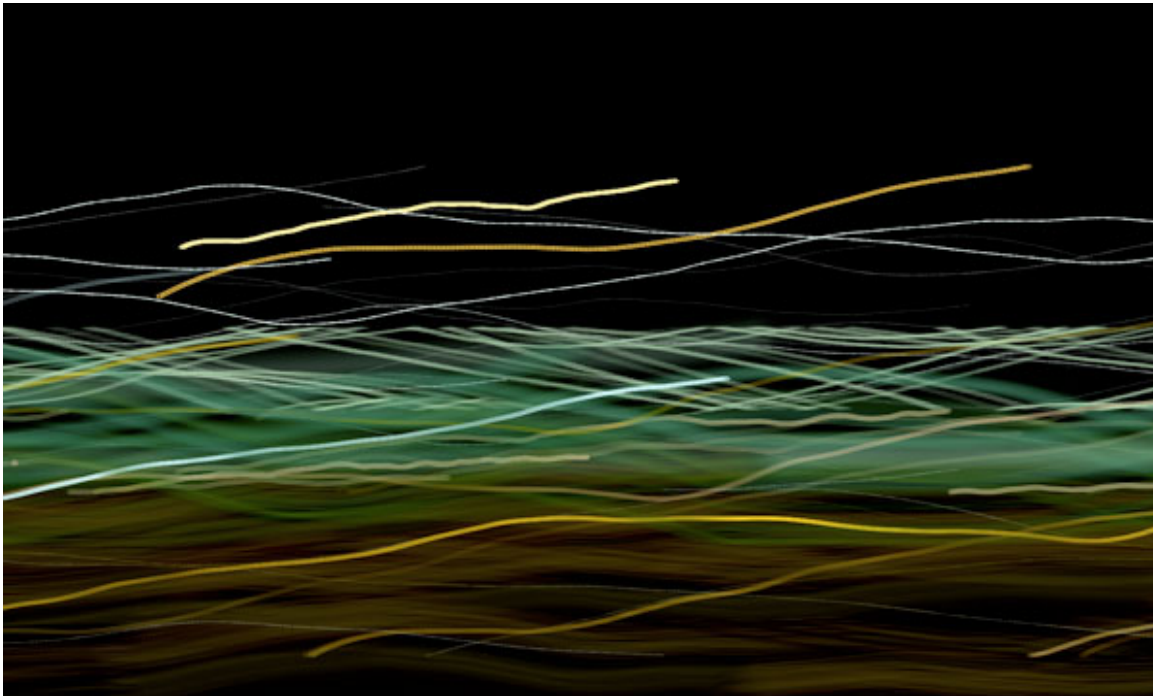
⁵⁸ With reference to Barthes’s layers of meaning in an image previously discussed in Chapter 2.

⁵⁹ I refer to earlier discussions on Duchamp’s explanation of the *infralim* (Sanouillet and Peterson: 1973: 194) in Chapter 2.

rule-based systems, they aimed to translate the visual aesthetics of an autonomous agent (the photographer) when following a set of instructions (see discussion on generative art in Chapter 3). The following paragraphs document the process and methods used to create these visual fragments with reference to two earlier motion studies that informed the development of *Substratum*.

Method

Sequences of still images forming the animated line-group fragments were generated using algorithms that were designed and programmed in Processing⁶⁰ based on specific line groups in the photograph (texture, colour, etc). The lines were created by plotting two points and drawing a line between them, a new point was subsequently plotted then a line drawn between it and the previous point, creating a new segment of the line. This process was then repeated across the width of the display window (or to a pre-defined limit in other cases). The build-up of all the line segments, when joined together with the previous one, created a continuous line on screen. Earlier motion studies for *Substratum* - *Trace*⁶¹ (2009) and *Equilibrium*⁶² (2010) - explored different variations of this.



[fig.17] Clifford, Alison (2009) *Trace* [still from generative animation]

Preliminary studies for *Substratum*: 1) *Trace* (2009)

In *Trace* [fig.17], due to Processing's 'display window' intentionally being left un-cleared between frames, lines grow gradually, incrementing segment by segment, leaving the

⁶⁰ Processing is an open-source programming language and environment aimed at people with an interest in creating visual content. It was created by Casey Reas and Ben Fry. <http://processing.org>

⁶¹ Available at: http://duck-egg.co.uk/interstitial/trace_09_01.html

⁶² Available at: http://duck-egg.co.uk/interstitial/inter_10_01.html

trace of their journey visualised across the screen. In order to capture the organic quality of each line documenting the gestures of the photographer, I added Perlin noise⁶³ to the trigonometric functions (sine and cosine) that determined the new x and y coordinates for each new point. Adding noise meant that each time the program (or sketch⁶⁴) executes, there would be subtle variations in the lines drawn to the screen. Although the overall shape is predetermined (a wavy line), the intricacies of each line always look different and cannot be predicted precisely. Working at the level of the program allowed aspects of the output to remain unpredictable (Le Grice: 2001: 221). This then allowed the computer to be explored as a collaborative partner actively participating in the development of form (Reas et al.: 2010: 25).

Trace was one of the first experiments attempting to translate the lines in the photograph into code. The lines generated from the code however, although organic in quality, did not 'breathe' (I refer to Section 3 'Interpreting the photograph') – in other words, once drawn on screen they no longer moved and to a certain extent appeared to be lifeless forms. As a result of this reflection, the second sketch *Equilibrium* experimented with the notion of a 'breathing,' living, line.

Preliminary studies for *Substratum: 2 Equilibrium* (2010)

To capture the sensation of breathing and the motions of inhaling and exhaling, trigonometric functions (sine and cosine) were again used to determine the x and y coordinate for each frame. Using trigonometric functions made the line oscillate up and down giving the rhythm and appearance of the act of breathing. However instead of drawing each line segment sequentially, frame after frame, as was the case for *Trace*, the system for drawing lines in *Equilibrium* relies on the use of arrays. All the x and y values of coordinate points that make up the line are stored in an array that is then used to draw the form to the screen in an entire unit. With each new frame, noise was added to the values in the array and the new line was redrawn to the screen using the updated values in the array. This was expressed in code as:

```
myLineExample.updateArray();  
myLineExample.drawLine();
```

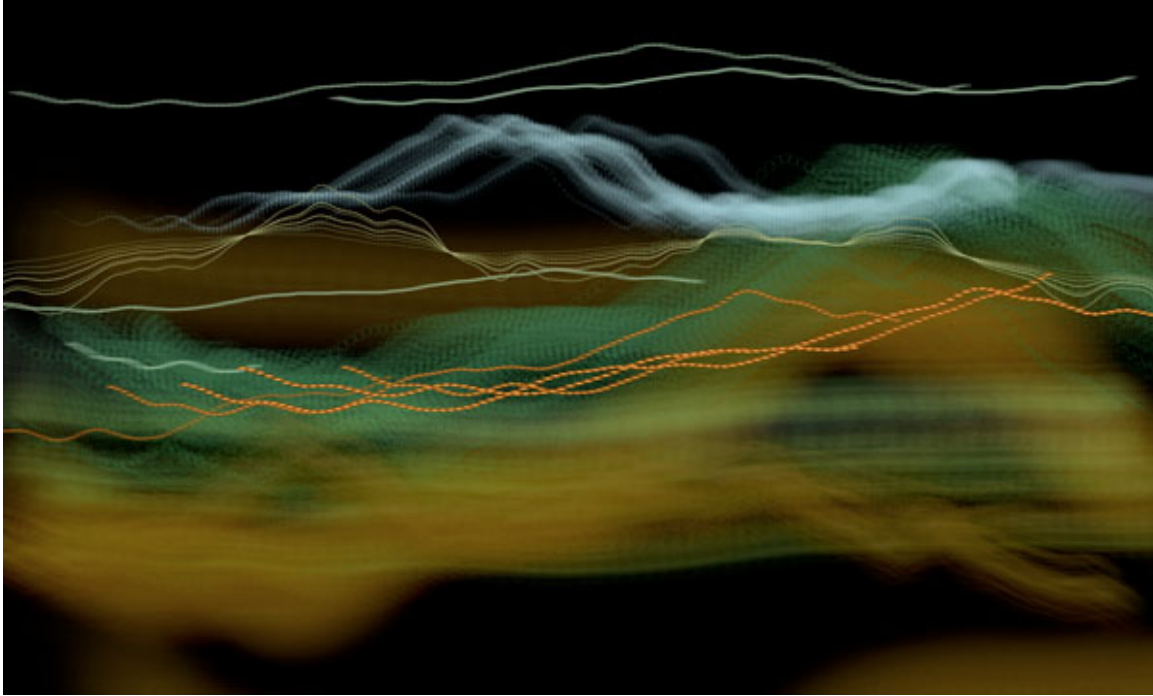
In contrast to the method used in *Trace* that relied on the build-up of lines by leaving the display window un-cleared, *Equilibrium* clears the screen on every frame before the array values are updated and the new line is drawn. The image therefore is redrawn to the screen each time the code runs. A simple example of this idea is found in the pages of an old-fashioned flip-book that reveals a moving image when the viewer flips through them. Similarly, *Equilibrium* rapidly updates and prints the line-forms in a whole unit to the screen on every new frame; when the sketch is 'played' (or executed) at a fast frame rate the impression of a moving line is conveyed, in this case a living, 'breathing' line.

Without the addition of Perlin noise when plotting each new coordinate point, an obvious sine curve would result which would lack the naturalistic, gesture present in the lines in the photo. In the search for a more organic quality to the lines, rather than solely creating vector-based lines with Processing's line function (– i.e. line(x1, y1, x2, y2),) various

⁶³ "Perlin noise is a random sequence generator producing a more natural, harmonic succession of numbers than that of the standard random() function. It was invented by Ken Perlin in the 1980s and has been used in graphical applications to generate procedural textures, shapes, terrains, and other seemingly organic forms." (Processing: 2012)

⁶⁴ Processing terminology: programs are referred to as 'sketches.'

pixels were sampled from the original source image and the resulting bitmap image was reprinted across the screen at these points, leading to subtler visual effects as seen in the source photograph [fig.16].



[fig.18] Clifford, Alison (2010) *Equilibrium* [still from generative animation]

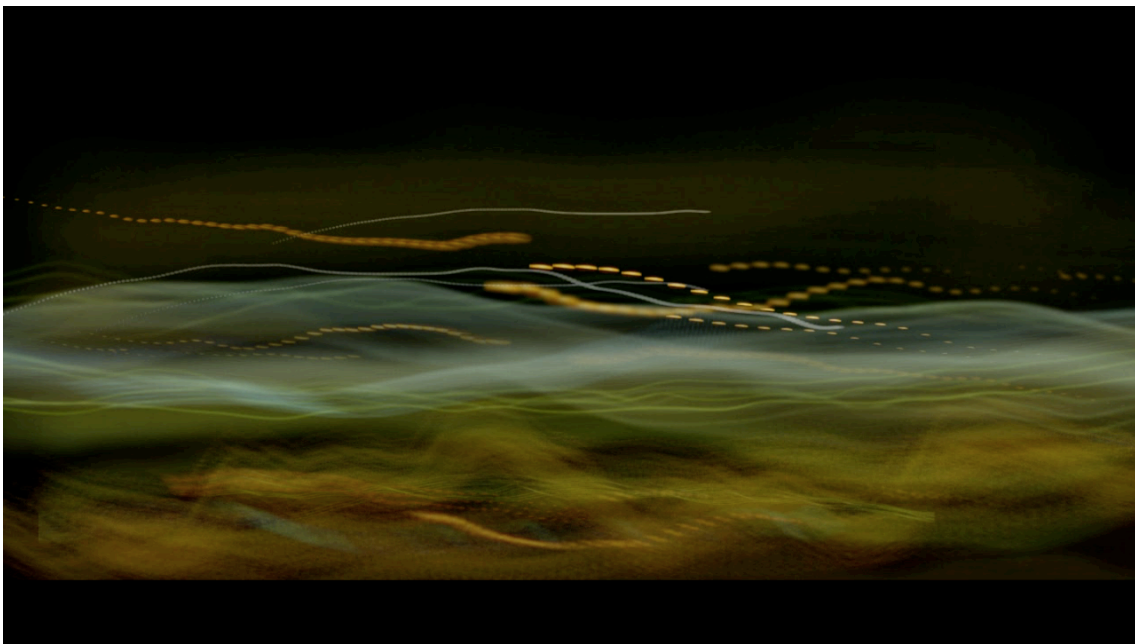
Aesthetic issues affecting *Substratum*

The final work *Substratum* was created by writing algorithms that generated distinct visual animated sequences that were then montaged together using video editing software in response to the dense textures of Truslove's audio (discussion of this follows.) The decision to combine programmed approaches with montage methods common to film-making and earlier forms of visual music practice was taken after these initial algorithmic experiments in Processing revealed significant restrictions and limitations when sampling and reprinting pixels to the screen in real-time. These studies – *Trace* (2009) and *Equilibrium* (2010) – function with no further intervention (i.e. editing) from myself once the system executes. However due to the limitations of the processor intensive algorithms (i.e. when sampling pixels from the source photograph and repeatedly reprinting the sample across the screen), the viability of presenting the works as real-time outputs running directly from the code and therefore displaying each variation on every execution in real-time, was no longer possible without experiencing heavy delays and dropped frames. As a result the final output format of both *Trace* and *Equilibrium* is essentially a recording of the system made into a Quicktime movie. When the code executes a still image is saved and exported on every frame, these stills are then reassembled using video editing software (Final Cut Pro) as an animated sequence and output as a Quicktime movie, the final format.

Despite early intentions to create a system that would “enable the art to occur” without my intervention, I very quickly became aware that relinquishing all decision-making to the computer⁶⁵, would mean compromising on the aesthetic criteria⁶⁶ for the system to run more efficiently. Once the lines were programmed in both *Trace* and *Equilibrium*, complexities in terms of how the line-groups might appear and disappear in terms of the overall sequence was problematic both in programming terms⁶⁷ and given the fact that they were eventually to be structured around my own interpretations of the selected audio for the final work. This factor affected how subsequent practice was to continue and it was at this point that I felt it appropriate to incorporate methods common to visual music.

Audiovisual collaboration

The decision to work with Truslove was made given his interest in microtemporal electronic composition. What unites our work is the desire to create new worlds extending outward “from the level of the grain, albeit sonic or visual (light-grains).” (Clifford and Truslove: 2011) Like myself, Truslove relies on the capabilities of the computer to participate in the creation of the audio material (or visual in my case) that is used to construct the final piece. Focusing on “the details of a thing” (Bachelard: 1994: 155) - or the grain - as the basic unit for composition, the possibility of constructing and imagining new audiovisual “worlds” that extend beyond the original reference image or recording emerges. Through such acts of remediation and translation, new interstitial realities emerge.



[fig.19] Clifford, Alison (2010) *Substratum*, still from audiovisual artwork

⁶⁵ As suggested by Sol Lewitt, “several ways of making art ... one is by inventing a system to make decisions” (Lewitt cited in Dreher: 1986) – discussed in Chapter 3.

⁶⁶ I was not prepared to compromise on the use of pixels sampled directly from the image due to the qualities in the image it produced. In addition, visual compositions were structured in response to the audio, which relied directly on human interpretation rather than machine interpretation.

⁶⁷ The level of programming required for this was beyond the scope of the study.

5. Sound-image relationships: mapping visual textures to sound

The audio for *Substratum* was selected from Truslove's compositions based on my interpretations of the source photograph and the qualities it would bring to the visual response. In simple terms, I asked what this image would 'sound' like and made my selection based on this. This relates directly to earlier discussions on Michel Chion's concept of *added value* as explained in the previous chapter. The audio selected shared the same dense nature as the source image together with a similar dark, claustrophobic quality conveyed through the dense layering of sound textures that suggest the act of breathing - in and out - echoing the lines in the photo.

In addition to this, processes involved in the creation of Truslove's piece shared similar methods to my own. The sonic grains came from samples of acoustic instruments (double bass solos⁶⁸) that were decomposed into their lowest units; this consisted of numerous articulations of the same pitch. Through the process of separating these elements from the original recording in its entirety, Truslove "attempts to encapsulate and control the essence of the source recordings, by manipulating the elements that convey the chosen sonorities." (Truslove: 2009: 39). Likewise, the visual response to the photograph is based around variations on a single form – the organic line - as represented in the image. By sampling visual grains from the source photograph to use as the basis for constructing some of the line forms (others are generated purely from code), the boundaries between the photographic and the computer generated are blurred in the final artwork.

6. Temporal structure

The temporal structure of the work – was based around my interpretations of Truslove's audio, placing the work within the realm of visual music and within Chion's definitions of the perception of time in the image, through *added value* (Chion: 1994: 13). Listening carefully to the audio, I placed each of the animated sequences in the timeline responding to patterns and shapes I heard in the sound.⁶⁹ To add variation (as seen in the photograph) I manipulated colour, speed, duration and direction of play in individual fragments, in addition to experimenting with how each of these layers would blend together. Line-groups were made to fade in and out to reflect the rhythms of breathing in the audio but also in accordance with my observations from the source photograph. In contrast to programmed approaches where the system generates visual material without my intervention once set in progress, the montage-process was based around my own decision-making and intuitive responses trying out different combinations when assembling the visual material. Like early visual music pioneers who aimed to affect the emotions of the viewer (Fischinger et al.); *Substratum* aims to convey the dark, dense, claustrophobic texture of the subterranean world found in the image. This is achieved through sound adding to the meaning of the image or as Chion states: "... through the phenomenon of added value, it [sound] interprets the meaning of the image, and makes us see in the image what we would not otherwise see, or would see differently." (Chion: 1994: 34)

7. Reflections and Evaluation

Whilst *Substratum* does capture the density and heavy layering of textures in the photograph through both sound and image, the limitations of the processor intensive

⁶⁸ Performed by musician George Lyle.

⁶⁹ This is also common in other visual music works. Alves (2005) refers to the work of Oskar Fischinger, explaining that his films rely on "an intuitive sense of connection to musical form."

image generation algorithms (as previously described) meant that there was no opportunity for real-time interaction between sound and image. Due to these restrictions, the most appropriate means to create the final work was employing montage techniques using an external video editor (Final Cut Pro). This approach did however enable a more intuitive way of working allowing for more immediate manipulation of each visual segment in terms of colour, speed and direction of play (forward or reverse), revealing directly (via real-time previews in Final Cut Pro) how these manipulations would affect neighbouring elements and consequently, the developing visual aesthetic of the piece.

Overall, I was satisfied with the visual aesthetic in terms of realising my intention to convey the appearance of a dense, somewhat claustrophobic, bedrock texture or interstitial space made from organic, gesture-based lines (or interstitial forms). However the final format of the work – fixed medium [video] - somehow removed the possibility of indeterminacy, a trait that both myself and Truslove wished to explore further.

8. Subsequent work

Substratum interprets one of the source photographs, which is largely textural, however there are a number of other photos in the series that are gestural in nature (that demonstrate the movements of the photographer combined with the headlights of passing traffic.) The work that followed, *Palimpsest*, aimed to explore such gesture.

4.2 Analysis and discussion of articulation 2

Title: *Palimpsest* (2011)⁷⁰

Duration: 03'44

URL: <http://vimeo.com/26733648>



[fig.20] Clifford, Alison (2008) *Untitled Photographic Light Painting* (from the *Traces* series)

1. Selection of image for interpretation

The interpretation of interstitial space in *Substratum* was very much concerned with the claustrophobic nature of the multi-layered 'world' found in the photograph and the interstitial organic forms that grow within this space. In *Substratum* the work locks the viewer in the same frontal location, revealing a singular perspective view of the gradually undulating forms, conveying the feeling of being locked inside this closed 'sub-space'. However for the next piece, as stated previously, the intention was to create a work that was more gestural in nature, informing the choice of the next photograph selected for interpretation [fig.20]. Investigation of the forms in 3D space would also be key since this was yet to be explored thoroughly by the research.⁷¹

⁷⁰ The work was commissioned by Brian Stefans and San Francisco Museum Of Modern Art's 'Open Space' initiative, accompanying Stefans' series, (2011) *Third Hand Plays*, on electronic literature.

⁷¹ Early investigation produced *Flex* (2008) [fig.19] however this early study did not capture the physical nature of the forms and greater exploration was needed.



[fig.21] Clifford, Alison (2008) *Flex*, [still from 3D animation]

2. Analysing the image and determining the approach

Where the light-forms in the first photograph are organic in nature, those in the second [fig.20] are much more *synthetic*⁷² having an almost sculptural quality to them. This synthetic aspect was to inform the visual approach for the final artwork. Returning to Manovich and Lovejoy's discussions on the synthetic image⁷³ and the new mathematical ways of seeing offered by the computer, they define the synthetic image as possessing the following characteristics:

- a. "... everything is in focus" free from the depth-of-field effect. (Manovich: 2001: 202)
- b. It is "free of grain." (ibid: p 202)
- c. "Its colors are more saturated" (ibid: p 202)
- d. Its "sharp lines follow the economy of geometry" (ibid: p 202)
- e. It allows us to "see more completely than with the human eye alone" (Lovejoy: 2004: 160)

⁷² **Synthetic** – adjective. 1. Made from artificial materials or substances, not natural ones 2. False, or not real (Macmillan Dictionary: 2014) Available at: <http://www.macmillandictionary.com/dictionary/british/synthetic>
Accessed: 10/06/14

⁷³ As discussed in Chapter 2.

These characteristics influenced the aesthetic approach and the decision to model forms directly using 3D software (Blender). The forms were then grouped and composed in 3D space to create a virtual light sculpture. Whilst this approach satisfied the aims of the visual aesthetics, the aim of exploring gesture in the work would occur in interactions between sound and image. What was needed was some sort of intermediary approach connecting the two that would enable some means of expressing the performative gesture of the photographer. This would be achieved through Truslove's software interface detailed in section 5.

3. Interpreting the photograph – concept to image mappings

The forms in the source photograph [fig.20] capture the momentary improvised gesture of the photographer recorded in the final image as seemingly physical, synthetic objects – tubes, wires and beads of light – that suggest different contours, energies and spaces. Referring to my conceptual framework for the interstitial, this interpretation focuses on both interstitial space and the interstitial moment again as understood on the level of connotation. Beginning with interstitial space then, the work considers Manovich's observations on the synthetic image: "synthetic computer-generated imagery is not an inferior representation of our reality, but a realistic representation of a different reality" (Manovich: 2001: 202). The "different reality" in this case was to consider the forms as an entire unit in a new spatial context – or other reality - as a virtual light sculpture that would be experienced via multiple views of it recorded in the 'final'⁷⁴ artwork. The intention was to exploit the computer's capacity to "see more completely than with the human eye alone" (Lovejoy: 2004: 160) by means of creating a series of journeys around the sculpture in 3D space.⁷⁵ Remediating the light-forms from the 2D photographic image into this new 3D world involved interventions in the interstitial space between knowledge and imagination⁷⁶ – between what we see (illusion of solid form), what we *imagine*, and what we *know* (the forms are the result of photographic trickery); it also involved interventions in the interstitial space between different visual media (i.e. the photographic, the moving image and the computer image).

The interstitial moment was investigated by considering how gesture in the audio might structure the viewer's visual experience of the light sculpture. As will be explained further in following discussions on sound-image relationships, the design of the software interface controlling the visual experience was determined in terms of gestures in the audio that interrupt and refresh the viewer's journey around the light-sculpture at that moment, thereby making it appear to 'perform' to the audio. The version presented in this PhD submission is a recording of two successive playbacks of the audio file, with two⁷⁷ different visual interpretations. It alludes to the process of rewriting, referred to in the title of the work, *Palimpsest*, defined by American poet H.D: "*Palimpsest, i.e. a parchment from which one writing has been erased to make room for another.*" Like *Substratum*, the title of the work results from its suggestive qualities, in this case through the temporal structure.

⁷⁴ The 'final' work was a recording two successive playbacks from the Max patch where the audio appears to intervene and cause changes in the visual response.

⁷⁵ These journeys would then be interrupted by gestures in the audio creating a non-linear work.

⁷⁶ As Bachelard states: "One must go beyond logic in order to experience what is large in what is small" (Bachelard: 1994: 150).

⁷⁷ I recorded two versions of the playback, the patch allows for multiple interpretations as indicated in the sound-image section that follows.

In summary, mappings between the concept of interstitial space and the 'final' work occur via the remediation of forms present in the photograph to a 3D context, and through mappings between the interstitial moment and the temporal structure of the work.

4. Visual language: the synthetic form

Individual forms were modelled and placed together as a group to create a virtual light sculpture in 3D space. The modelling process involved tracing the shape of individual forms in the photograph as curves in Adobe Illustrator, then importing these curves into Blender to be used as the basis for modelling each light-form in 3D space. With reference to Reas et al. (2010) the computer, when used in this way, adopts the role of a producer rather than collaborator. However it could be argued that the computer is, to some small degree, also a collaborator in that it has enabled me (the artist) to 'see' and comprehend the forms as 3D objects in a way that would otherwise be impossible without recreating them as physical objects.

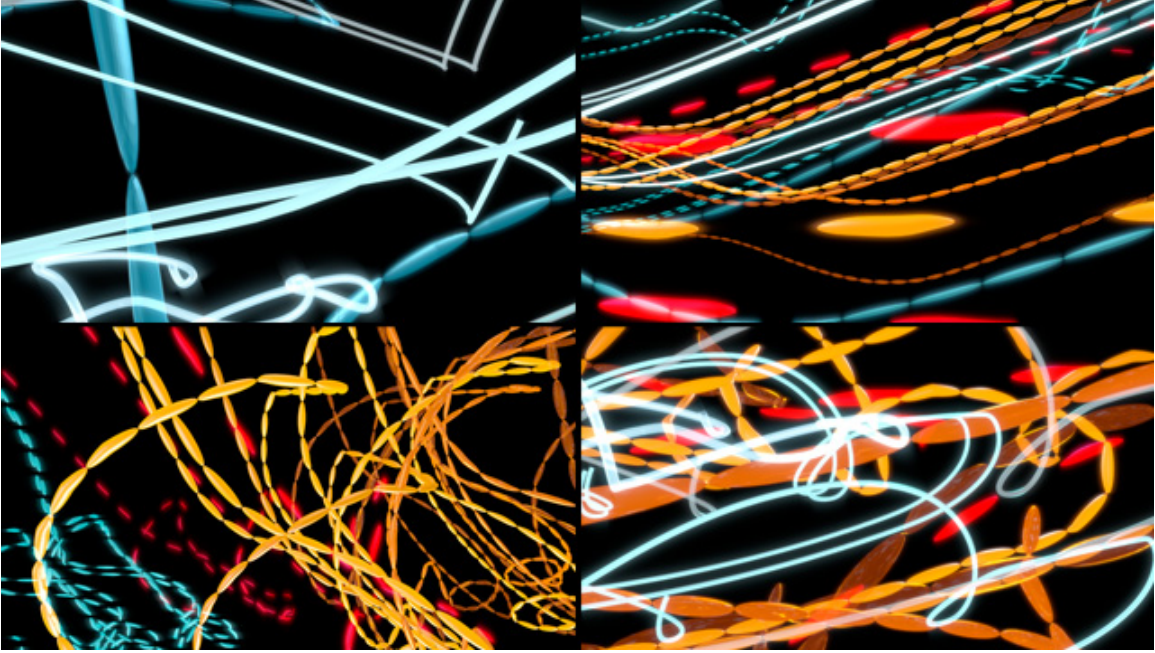
With this translation to a 3D environment, my aim was not to produce a 'realistic' simulation; rather the aim was to produce an artistic simulation influenced by my interpretation of the light-forms, as a "foundation for something beyond." (Reas et al.: 2010: 147) In this work, what was of interest visually speaking was a more comprehensive treatment of the light-forms. To this end, a series of short clips of journeys around the sculpture were created, documenting multiple perspectives of it as an object in space - i.e. travelling underneath it looking upwards, travelling through it, along it, around it, etc. (see [fig.22]). These perspectives were then edited together to create a 6-minute video loop⁷⁸ providing the visual material for the work. 3D software enabled a more comprehensive treatment of the forms from multiple perspectives and multiple views beyond the singular perspective of the photograph (as indicated through the name of the work). Janet Murray referring to narrative works that incorporate multiple characters' viewpoints on the same (traumatic in this case) event states:

The retracing of the situation from different perspectives leads to a continual deepening in the reader's understanding of what has happened, a deepening that can bring a sense of resolution but one that allows for the complexity of the situation and leaves the moment of shock unchanged and still central.

(Murray: 1997: 136)

Retracing or rewriting the forms from different perspectives, similarly leads to different and deeper understandings of the forms in new spatial settings.

⁷⁸ Available at: <https://vimeo.com/26473627> Vimeo password required to view the file = PhDfolio



[fig.22] Clifford, Alison (2011) [Different views of 3D light-sculpture]

5. Temporal Structure – sound-image relationships

In *Substratum*, the work resulted from interpretation and manipulation of the visual material in terms of the audio, it was a deliberate, conscious process that resulted in a fixed, non-changing work. With *Palimpsest* however, in order to explore gesture and the performative element in the source image, Truslove and I began to consider how sound might structure the visual experience of the journeys around the light sculpture.

The audio selected for *Palimpsest* was based on its gestural nature, which could be used to make the light-sculpture 'perform.' Truslove then designed a software interface linking the audio to the set of visual materials that I had created independently (as explained above). The challenge was to somehow unite the audio and visual elements into one coherent audiovisual experience, by forging causal relationships between sound and image.

The audio component of the work consisted of a fixed-medium montage of improvised performances (performed by Truslove) on a self-devised interactive software instrument, using a technique he calls *Live Micromontage*,⁷⁹ (Truslove: 2009) The software interface (created with Max/MSP⁸⁰) was designed to remix the visual materials (the series of journeys around the light sculpture), to synchronise them to significant events within the audio (what was 'significant' was defined by the composer). It functions by matching cues from the audio with different sections in the video, so that events in the audio appear to 'cause' visual changes of scene thereby forming *synchretic*⁸¹ relationships between audio and visual. The light sculpture appears to tumble and turn to the gestures of the audio in this strange weightless environment.

We worked closely together to define which parts of the visual materials 'matched' certain sections of Truslove's audio. In many cases, I had a number of visual responses to the audio, not one single interpretation. With this in mind, the interface was programmed to randomly *choose* which visual materials accompanied the audio track, from a predefined set of 'suitable' visual materials. *Palimpsest* is therefore an open-formed audiovisual piece, which is never identical from one playback to another. The version presented in the 'final' articulation is a recording of two successive playbacks of the audio file, demonstrating two different visual interpretations.

In terms of the interstitial moment, Truslove's Max patch⁸² allows the audio to intervene directly in the playback of visual material by incorporating programmed interstitial moments into the structure of the work that break and interrupt visual playback. Such intervention echoes the interstitial moment of the camera shutter opening and closing found in the source photograph, where motions and gestures made by the photographer affect the outcome of the final image. In this moment - the "short space of time between

⁷⁹ Micro-montage is the practice of combining extremely brief (ca 100ms) fragments of sound, to form larger sonic structures. **Live Micro-Montage** is the real-time implementation of this technique, facilitated by the invention of the *Live Micromontage Instrument (LIMMI)*, designed by composer Graeme Truslove in 2006 (Truslove 2009). The technique was used in a number of his musical works from 2006 onwards.

⁸⁰ Max/MSP is an interactive visual programming environment for controlling and manipulating audio and multimedia first created by Miller Puckette at IRCAM, Paris. It is now available from San Francisco based software company Cycling 74: <http://cycling74.com>

⁸¹ Chion defines *synchresis* as "The forging of an immediate and necessary relationship between something one sees and something one hears at the same time (from *synchronism* and *synthesis*). The psychological phenomenon of synchresis is what makes dubbing and much other postproduction sound mixing possible." (Chion: 1994: 224)

⁸² Max programs are referred to as 'patches'

events” (Merriam Webster: 2008) – the gestures and motions of the slowly moving, weightless light-sculpture are influenced and it is consequently made to perform. In *Palimpsest*, tension is created by the erratic, non-linear nature of the viewer journey through the light-sculpture explored through algorithms that negotiate interactions between audio and visual.

6. Evaluation

The aim of *Palimpsest* was to investigate the gestural nature of the source photograph; a further aim was to make the sculpture perform in some way that would capture this gestural quality of the photograph. Both of these aims have been achieved through the Max/MSP patch that enables the viewer to experience different non-linear 'remixes' of the visual material at different speeds depending on the gestural activity in the audio. The patch facilitates a shift in the role of the computer from a producer (as used to realise the virtual sculpture), to that of a collaborator involved in determining the viewer's path through the sculpture. However, whilst the many possibilities raised by the open form are yet to be explored, the work is not wholly satisfying on a visual level. The level of interest in the forms themselves is somewhat limited as opposed to the forms in *Substratum*; in *Substratum* different forms move independently creating moving micro-textures and micro-worlds, each form appearing to have a life of its own. With *Palimpsest* however the forms move as one solid, frozen mass; we [the viewer] move around the sculpture, the sculpture does not move in itself. It doesn't live or breathe.

7. Subsequent work

In addition to this, although I was satisfied with the synthetic quality that 3D modelling lends to the work, many of the interstitial textures found in the photographic representation remain unexpressed. Namely, the subtle cloud-like mist of shadows and echoes surrounding the light-forms that exists in between the bright light forms and the black of night (what Manovich refers to as the 'grain'.) Essentially what is lost in this translation to the synthetic computer image then, are some of the interstitial qualities on which the series is based. What is lost in the translation or remediation – these interstitial, granular textures - is what differentiates the synthetic computer image from the photographic image. The next articulation addresses this directly, attempting to bring together these two different visual approaches – the organic (*Substratum*) with the synthetic (*Palimpsest*).

4.3 Analysis and discussion of articulation 3

Title: *Lux* (2012)

Duration: 04'33

URL: <https://vimeo.com/50281321>



[fig.23] Clifford, Alison (2008) *Untitled Photographic Light Painting* (from the *Traces* series)

1. Selection of image for interpretation

Of all the photographs in the light painting series (2008), the next image selected [fig.23] depicts the clearest articulation of the two different aesthetics the study negotiates – i.e. the organic and the synthetic. In the photograph, the prominent, single, central white form – streak-like in appearance rather like a fluorescent tube - conveys the synthetic nature of the earlier 3D studies found in *Palimpsest*, whilst the cloud-like shadow forms that surround it have a much more organic appearance, these forms are less predictable and have more in common with the forms found in *Substratum*. The central form appears to be deliberate and constructed or made, in contrast with the shadow-like forms that appear to grow outwards from it into the surrounding space. In this space, (which could also be described as interstitial: in-between the form and the blackness of night), echoes of lines and shapes distorted from the central form gradually fade into black.

2. Analysing the image and determining the approach

The challenges for the final work of the study were firstly, to find a means to successfully express the subtle interstitial ‘granular’ qualities of the shadowy, echo-like forms in the photograph in a 3D environment (where perhaps *Palimpsest* is lacking) and secondly, to bring together these different visual approaches in a way that would successfully ‘translate’ them to a time-based audiovisual response. In addition, given my earlier criticism of the lifeless forms of *Palimpsest*, it was important for individual forms to move organically and to capture the sense of forms in continual flux.

The source photograph selected shares similarities with some of the still images produced by Thomas Wilfred’s lumia compositions [fig.09] generated by his clavilux (see Chapter 3 – section on visual music). When comparing the qualities of the light-projections (as still images) produced by Wilfred’s lumia compositions with the cloud-like forms of the source photograph, it became clear from earlier studies (e.g. *Flex* [fig.21]) that a direct 3D-modelling approach would not be able to produce such results. Instead, in order to produce continually changing, organic forms (also impossible with traditional keyframing techniques), a method that either directly manipulated natural phenomena (like Wilfred’s use of light) or that involved simulation of natural phenomena was required. For this reason I opted to work with Autodesk’s Maya software which provided the possibility of working with dynamic animation to generate the different layers of visual textures (detailed in section 5). Following this, montage techniques were used to synchronise these visual textures in response to distinct textures in the audio.

3. Interpreting the photograph – concept to image mappings

The interpretation of the photograph focused on marrying the organic qualities of the image with the synthetic appearance of the central form. The ethereal textures are suggestive of the patterns of smoke lingering in the air and of the motions of a light fabric (chiffon, muslin) in the breeze. These observations were to inform translations to a 3D environment, using simulations of natural phenomena to make the forms move. Motion then, provided the vehicle to make these visually distinct forms cohere in the final work.

With reference to my interstitial framework: the work intervenes via the interstitial moment witnessed in the gaps and breaks in the linear progression through the work (as was the case with *Palimpsest*); however the greater contribution to ideas of the interstitial is through the new aesthetic responses that emerge from explorations of interstitial space. Namely, the aesthetic that emerges from remediated interstitial space that exists between the photographic image and the computer image. Marrying together these different aesthetics – the photographic (with its inherent interstitial noise-like image) and the computer-image (with its clean and “sharp lines that follow the economy of geometry” Manovich: 2001: 202) – in a coherent way was achieved through motion and by applying filters to individual layers during the montage process to simulate the grain or noise of the photographic on to image sequences generated in Maya. The trace of the photographic is therefore brought together with the clean synthetic vision of the computer-generated image and an aesthetic between the two emerges – an interstitial aesthetic - represented in the final abstract landscape of light.

The title of the work refers directly to the source of its origin – light. However it is light that is remediated by the camera and by the computer, and through my interpretations of its qualities mapped to image and sound.

4. Visual language: remediating the aesthetics of autonomy – an interstitial aesthetic

Given my aim of translating the forms to a 3D environment, I selected Autodesk's 3D software package Maya⁸³ that not only provided a more stable environment for working in 3D but also offered an extensive range of possibilities for working with dynamics. "Dynamics is a branch of physics that describes how objects move. Dynamic animation uses rules of physics to simulate natural forces." (Autodesk Maya: 2012) Maya presented me with the possibility of creating naturalistic movement through the use of dynamic systems to animate my 'translations' of the forms in the photograph. Simulating natural forces to animate the forms (i.e. wind, gravity, etc.) also meant there would be a level of unpredictability in how the animation would unfold, this was rather like the use of Perlin noise in *Substratum*. Although the overall motion is understood, the intricacies in how the shape changes from frame to frame would be impossible to predict or create convincingly using more traditional 'hands-on' keyframing animation techniques. In this sense, Maya's dynamic systems provided the ideal tool to work with natural simulations to produce the organic motion that I desired for this interpretation.

5. Sound-image relationships: mapping visual textures to sound

As with the other articulations, I selected the audio from Truslove's microtemporal compositions based on how I imagined the forms in the photograph might 'sound.' Like the other works preceding *Lux*, techniques of *reduced listening* – a term given by Pierre Schaeffer⁸⁴ to describe "the listening mode that focuses on the traits of the sound itself, independent of its cause and of its meaning" (Schaeffer cited in Chion: 1994: 29) - were employed to identify 'interstitial' textures in the audio. Listening to the inherent quality of the sound in Truslove's composition allowed me to link textures in the audio to textures in the image. I could hear 3 main layers in the audio which were characteristic of elements in the image – firstly a steady 'drone-like' sound providing a foundation or background to the work (rather like the sound of a passing aircraft or the hum of a heating system); secondly, a static texture like electrical noise and thirdly, percussive-like, transitory impulses articulating a constantly changing top layer.

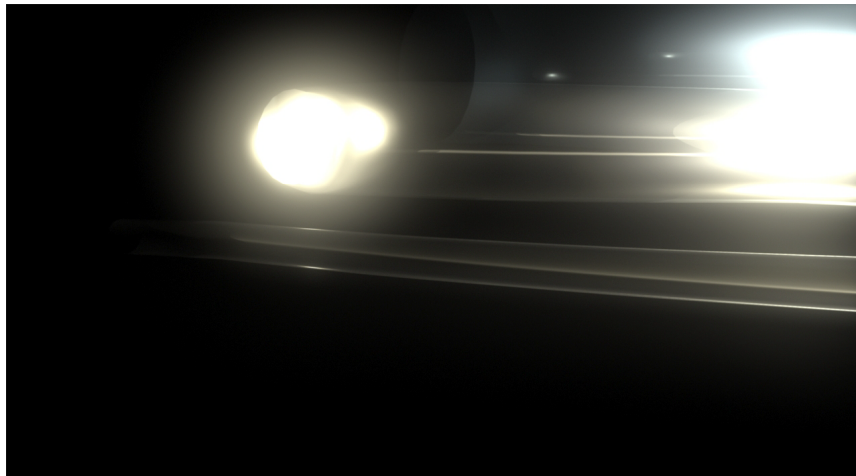
This informed the visual representation and the overall structure of the final work. In total there are 3 main visual components to the interpretation of the audio in *Lux*:

1. The transparent 'tube' layer - which represents the constant presence of the 'drone-like' sound in the audio. This sound remains fairly consistent throughout with only minimal variation in pitch [fig.24].
2. The 'ectoplasm-like' layer – which represents the static or electrical sound in the audio. Truslove refers to this as the "sound-skin", or "substrate layer like a transparent sonic dust that wraps around the other sonic activity" (Truslove: 2009: 30) [fig.25].
3. The 'particle' layer representing the grain-like layer of impulses and expressive gestural activity in the audio that according to Truslove "becomes speech-like in its rhythmic design." (Truslove: 2009: 29) It is in

⁸³ Despite my commitment to using open source software I found Blender to be problematic primarily due to the lack of available documentation and educational resources, but also that it could at times be slightly unstable. I therefore made the decision to use industry standard software, Autodesk's Maya: <http://usa.autodesk.com/maya/>

⁸⁴ French composer, writer, broadcaster, engineer, musicologist and acoustician, Schaeffer is widely regarded as the pioneer of *musique concrète* (a form of electroacoustic music derived from acousmatic sound.)

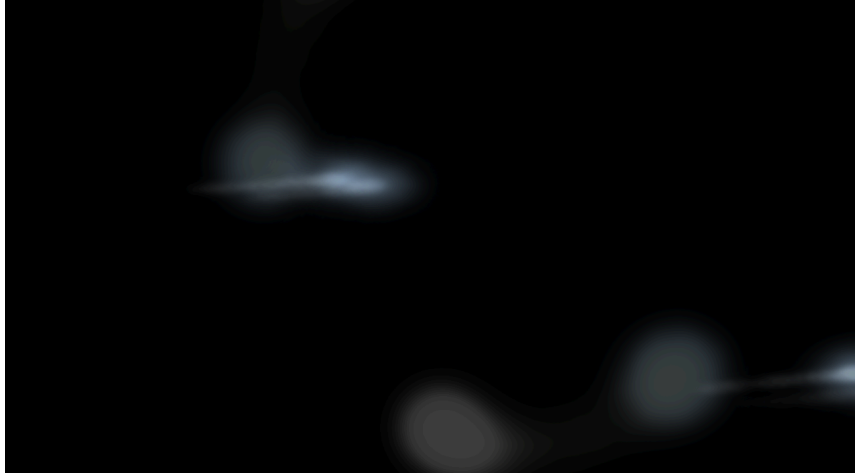
this layer that I chose to represent the most expressive (or percussive) response visually given its speech-like nature as opposed to the more textural nature of the other layers. [fig.26] The sketch [fig.29] documents the process involved in identifying and mapping individual sounds to particle types in terms of their nature (percussive or otherwise). Numbers in the sketch refer to the frame number in the editing software.



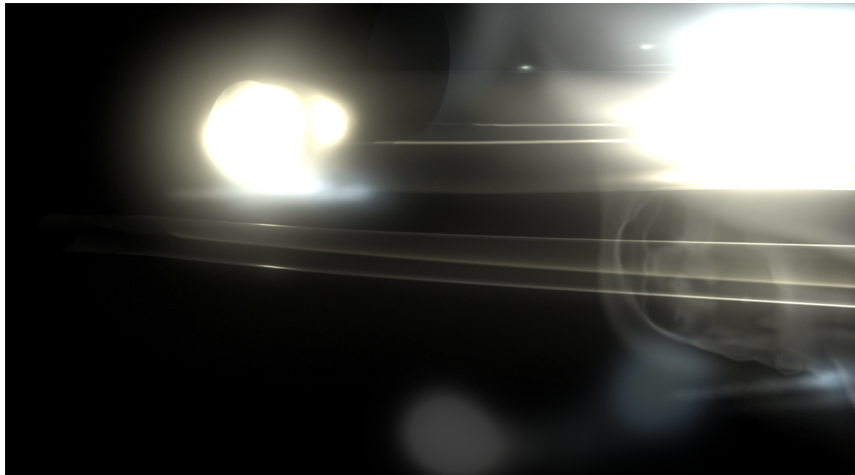
[fig.24] Clifford, Alison (2012) *Tube Layer* [still image from 3d animation]



[fig.25] Clifford, Alison (2012) *Ectoplasm Layer* [still image from 3d animation]



[fig.26] Clifford, Alison (2012) *Particle Layer* [still image from 3d animation]



[fig.27] Clifford, Alison (2012) *Composite Image (Layers 1-3)* [still image from 3d animation]

Layer 1

The transparent tube layer [fig.24] was created using Maya's Dynamic Hair System using it to simulate the behaviour and movement of a strand of hair blowing in the wind. Instead of creating hair with the system, the system was used to create and control a dynamically driven curve that would inform the movement of the tube-form that was created by extruding a simple cylinder along the dynamic curve. The hair system in Maya allows for direct control of the various parameters that control the curve – i.e. gravity, motion, drag, stiffness, weight, attraction, etc. The final motion was a matter of trial and error adjusting these various parameters to obtain a result I was satisfied with. A relevant contextual example illustrating this idea is found in Hans Haacke's *Blue Sail*, [fig.28] which essentially realises the same idea with simpler technological means – i.e. unpredictable, naturalistic motion affecting the movement of chiffon material by means of a fan blowing air directed towards the chiffon.

Layer 2

The 'ectoplasm-like' layer [fig.25] was created using Maya's Fluid Effects, a technology for "realistically simulating and rendering fluid motion." (Autodesk Maya 2012) To create

the mist-like, clouds surrounding the central white form in the photograph, I used Maya's 3D fluid container to create the fluid effects that would react with each other. The fluid container is the space (a 3-dimensional grid made up of voxels) in which a fluid is emitted, fluids have properties such as density, temperature, fuel and colour that react with each other according to settings made by the user when the simulation is played back. For example, combining fuel settings with density creates a fluid where a reaction can take place. Similarly, temperature settings can ignite fuel to create an explosion within the container.

As with the dynamic curve system used in layer 1, much of the ectoplasm layer was a matter of trial and error experimenting with different parameters in the fluid effects system until the final cloud-like texture was achieved.

Layer 3

The top 'speech-like' layer [fig.26] was created using Maya's particle effects system. Particles are "points that display as dots, streaks, spheres, blobby surfaces, or other items." (Autodesk Maya 2012). For layer 3, particles were emitted from the vertices of a 3D object travelling along a path drawn in the 3D environment; each change in movement (per frame) was recorded and saved as an individual still image creating the material for the moving sequences. To create different compositions for the moving image sequences, I experimented with different shapes of 3D objects emitting particles from different vertices (or fewer in some cases). Again, like the other layers, this was a process of trial and error until the desired effect was achieved.



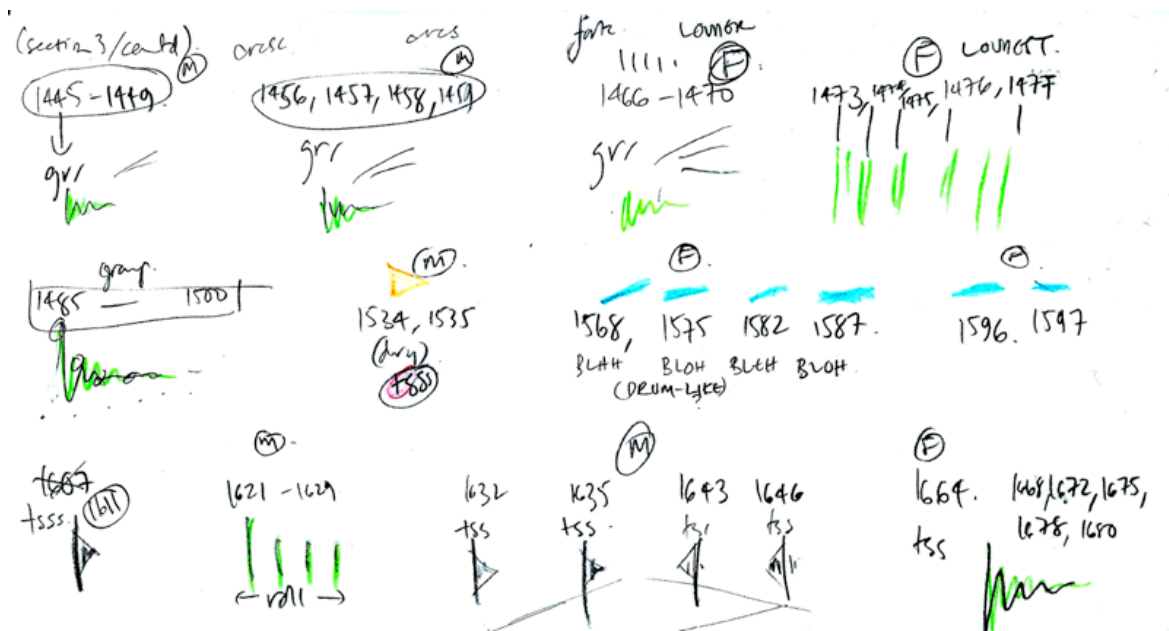
[fig.28] Haacke, Hans (1964 – 65) *Blue Sail*, [installation]

6. Temporal structure

Material generated from each of the three layers was recorded as high-quality [HD] still images that would be reassembled as moving sequences using video editing software

(Apple's Motion software). Still image sequences were recorded using various cameras placed in Maya, giving different views of the forms from different angles and heights, etc. These different views of the objects in the 3 layers were used to create scene changes when interpreting the audio in the final work. This was a deliberate reference to the structure of *Palimpsest*, which is also centred on different views of the light forms as objects in space. The investigation of how the light-forms might be perceived as objects in space from multiple views and perspectives was one of the overall aims of the study. *Lux*, similarly presents views of the light-forms that are interrupted by sweeping gestures in the audio, disrupting any linearity in the 'narrative'⁸⁵ (also the case with *Palimpsest*). This consequently breaks the continuity of the viewer experience, drawing attention to the fragmented and constructed nature of the work. As their experience of the forms shifts between different temporal and spatial perspectives, they are made aware of the act of perception itself: in other words, they see how I see but through remediated space made accessible by the computer.

In addition to the changes in scene or view of the light-forms in the work, the "speech-like" particle layer (layer 3) determines the light-particle formations that are visible to the viewer. These were structured by composing different groups of particles directly in response to sounds in the audio. Like the work of early visual music artist Len Lye particular shapes and formations of particle groups, were associated with certain sounds as witnessed in the sketch outlining the construction of this [fig.29]. ("grr" and "blah, bloh, bleh, bloh" which represents a musical phrase, etc.)



[fig.29] Clifford, Alison (2012) *Visual Notation/ Score for Particle Layer*⁸⁶

⁸⁵ "If one considers 'narrative' beyond a linear literary sense – more like the 'vertical' layered narrative of a poem, then film structure starts to include ideas of rhythm, pace, themes and metaphors." (Harris: 2005)

⁸⁶ For further reference on the topic of visual notation, Theresa Sauer's book, *Notations 21* (2009), is an anthology of visual scores that documents the different visual notation systems used by a wide range of composers.

7. Reflection and evaluation

Of the three audiovisual works presented in the folio, *Lux* was the most challenging to create from a compositional perspective. In layers 1 and 2, dynamic animation was used to produce organic motion, using the rules of physics (as programmed by Maya) to simulate natural forces. Given the textural nature of the audio these layers aimed to represent, this method proved to be effective since they were working with an overall texture rather than discreet audio events. However this was not the case for the top 'speech-like' layer. With this layer, individual particles were added to the time-line to synchronise with patterns and impulses in the audio. [fig.29] Given the frenetic activity (at times) in the audio, this proved to be highly time-consuming, difficult to synchronise with events in the audio and therefore a frustrating method to use. I found it difficult to adhere to decision-making strategies I had previously identified for translating individual sonic grains to specific particles or particle sequences, [fig.29] and found myself using much of the same material repeatedly. This was largely due to trying to match visual sequences from a specific camera angle with corresponding visual material from the same view in the other layers. Overall, this is not a method I consider to be sustainable for future practice.

Despite these issues however, *Lux* is perhaps the most successful of the three works in terms of its visual interstitial aesthetic. The work has a photographic quality to it that expresses many of the interstitial characteristics of the photograph that were lacking in *Palimpsest*. The synthetic – found in the tube-like form (layer 1) and the organic – found in the ectoplasm layer (layer 2) - are successfully combined, resolving what I previously considered to be conflicting aesthetics and methods. The tube involves elements of both modelling and using dynamic systems to create movement, whereas the ectoplasmic layer has been created purely using dynamics. With layer 3 - the particle layer, although the material was created using Maya's particle system combined with path-driven animation, I used more traditional filmmaking techniques to arrange the particles when interpreting the audio.

With regard to the relationship between the audio and visual, the sonic element has greatly enhanced the interstitial aspect of the work. Referring to Chion, "through the phenomenon of added value, it [sound] interprets the meaning of the image, and makes us see in the image what we would not otherwise see, or would see differently." (Chion: 1994: 34) The qualities of the 'ectoplasm' layer (layer 2) that arguably are the most interstitial element of the work, are better understood through the imposed syncretic relationships between audio and visual which connote a static, dust-like substance.

Referring back to the earlier discussions on the role of the computer (Reas et al.: 2010: 25), in this work, the computer has acted as both a producer and a collaborator. Through experimentation with Maya's dynamic systems, the computer's role was more like a collaborator generating visual possibilities that I could not always foresee, or predict accurately. However, through the use of more traditional filmmaking techniques (i.e. to synchronise visual material to my interpretation of the audio) where the process was clearly determined on my part the computer's role shifted to that of a producer.

Lux therefore brings together the differing aesthetics of the study, the photographic remediated by the synthetic computer image, ultimately revealing an interstitial aesthetic located between the two. These 3 works have provided responses through practice to the research questions posed in Chapter 1. In doing so, this stage of the practice has reached its conclusion. The next chapter concluding the study, returns to each of the

research questions in turn and summarises findings for each, I then discuss areas for future directions in postdoctoral research.

5.0 CONCLUSION

A new meaning is equivalent to a new word.

Wallace Stevens

Overview

The concept of the interstitial was the central focus of the study: firstly considering what this might mean and how a photographic series of abstract light-forms could be said to define it. Referring to textual definitions of the interstitial, I devised a conceptual framework for the research in terms of the *interstitial moment*, *interstitial forms* and *interstitial spaces*. This framework incorporated interpretive readings of the source photographs using ideas from semiotics, Duchamp's concept of the infra-slim, and Manovich and Lovejoy's discussions of various technological media. I argued via metaphorical mappings that these photographs, visually define the interstitial. This directly addressed Research Question 1: *How might the interstitial be conceptualised through visual representation, beyond existing verbal definitions of it?*

The second component of the research, through practice, sought to explore how the interstitial aspects of these images could be expanded into a series of artistic responses that I describe as 'articulations' of the interstitial. Processes and methods involved in the creative practice were documented in this textual dissertation, that constantly reflected on the aesthetic implications involved in the 'translation' between various media. This addressed the second and third questions posed by the research. Namely: Research Question 2: *How might these visual definitions be translated to new spatial environments through digital art practice and what are the aesthetic implications of this?* And also: Research Question 3: *What are the processes involved in the creation and documentation of practice-based responses?*

The documentation of methods and processes involved explicit reflection and evaluation of decision-making and thought processes influencing the various stages of creative practice. This foregrounded elements of art-making that normally exist in the hidden space between the origin of the work and its final realisation, thereby resulting in an interstitial research method. In this sense, the second part of Research Question 3 was addressed: *Could these [processes and their documentation] then be described as interstitial methods?* The final question – Research Question 4: *How might interdisciplinary or collaborative practice shape understandings of interstitial art practice?* - was tackled through a thorough discussion of the collaboration between Truslove and myself. I identified characteristics of the interstitial in Truslove's audio which *added value* (Chion: 1994) to my visual definitions and through forged relationships between audio and visual, further examples of the interstitial emerged. Programming in the collaboration then, was approached as a creative space (in terms of how sound and image could be related) that could bring new possibilities and expand on existing expressions of the interstitial.

5.1 Conclusions

In summary, the interstitial was addressed through the following areas: *at the level of language(s) and meaning* – through interpretation, translation, to articulation (and the aesthetic implications this involves); *as a process* – capturing the in-between state of both creative and thought processes; and *through interdisciplinarity* – exploring the space between the domains of sound and image.

The concept of the interstitial addressed *at the level of language and meaning* was defined firstly in visual terms, represented by a series of abstract light-forms in the photographic series *Traces* (2008). The thinking informing this was expanded through critical analysis and interpretation of the photographs in this textual dissertation. Analysis and interpretation occurred largely at the level of connotation and metaphor where the photographs were understood to symbolise the concept of the interstitial. Definitions that resulted encompassed the following three areas: the *interstitial moment*, *interstitial forms* and *interstitial spaces*.

The *interstitial moment* expressed the interstitial in terms of duration (or representations of duration) or the “short space of time between events” (interstitial definitions – Chapter 2.) This acknowledged the camera as an instrument that allows the photographer to access this moment (the space between events) through direct interventions in the passage of time.

The discussion of *interstitial forms* (forms “relating to or situated in the interstices”) referred to Duchamp’s ideas of the infra-slim, proposing that the forms in the photographs could be considered as manifestations of the infra-slim. The infra-slim (or infrathin and inframince) was understood to be a hybrid of two separate entities that momentarily join together to create something ‘other’. With reference to the source photographs, actual events (the passing headlights of traffic and any motion made by the photographer) were brought together with their virtual representation in the image, resulting in a collection of interstitial hybrid forms.

Finally the discussion of *interstitial space* (or “space that intervenes between things”) considered Sontag’s conjecture as to what the reality beyond the photograph might be, or in her words: “Now think – or rather feel, intuit – what is beyond it, what the reality must be like if it looks this way.” (Sontag: 1977: 23) Any intuitive responses as to representing the reality beyond the photograph were ultimately laden with the knowledge of the paradoxical nature of the forms (that they were not actually present in the scene). Interpretations would therefore not be of reality but an alternative reality based on conjecture and imagining, proposing how these forms might exist in different temporal and spatial contexts. Given my intention to ‘translate’ or reinterpret the photographic forms in these new spatial contexts, it was necessary to consider different representations of space in each medium used in practice-based work. Referring to Manovich and Lovejoy, this encompassed a discussion that explained the differences between the photographic image and the computer image, in terms of recording reality and simulation of it. The photographic image records events via a copying process, whereas the computer image mathematically simulates form through modelling. Any translation from one medium to another would in effect be an interpretation and remediation (rather than a direct translation) from one mode of visual representation to another. The challenge was to try to interpret the interstitial aspects of the photographic image to that of the 3-dimensional computer image and subsequently to time-based computer animation. This was addressed through practice-based research, the second component of the project.

This area of research addressed how the interstitial might be understood as a *process* through digital art practice, and involved a number of methods. Research questions considered how the visual representations of the interstitial (the abstract light forms) might be translated to new spatial environments, reflecting on the aesthetic implications of this. The investigation through practice spanned the following topics: *aesthetic*

implications: the organic v. the synthetic; relevant contexts for practice: generative art and visual music; and a reflection on the role of the computer in the creative process. Practice-based research resulted in the production of three audiovisual artworks: *Substratum*, *Palimpsest* and *Lux*. Each work was discussed independently in relation to these topics and also in relation to each other. Documentation and reflective analysis of normally hidden thought and creative processes explaining the articulation of ideas, the thinking informing each work and methods used in its creation were fore-grounded. Due to this, discussion in the textual dissertation was considered to be an interstitial method.

In terms of creating the artworks, methods employed were related to their relevant contexts, namely the fields of generative art and visual music. The role of the computer as producer or collaborator was also considered in these approaches. Early arguments regarding the role of the computer in art from Malcolm Le Grice suggested that the computer should be used to explore aspects of art that would not be possible without it, otherwise the artist would “simply be making use of the ‘mechanical’ production capacity” of it (Le Grice: 2001: 221). Similar arguments by Casey Reas, Chandler McWilliams and LUST (2010), separated the use of software into two categories: *production* and *conception*. Production involved the computer as producer “to produce preconceived form” – making use of the mechanical capabilities of the computer, whereas conception enabled aspects of the computer “to participate in the development of form.” (Reas et al.: 2010: 25)

Where the computer was an active participant in the creation of form (or collaborator) in practice-based work was in the use of systems that allowed for a degree of unpredictability in the forms generated. These systems generated visual fragments (sequences of still images) that were later ‘montaged’ together using more deterministic methods (film editing). Design of these systems resonated with the first area of research that was concerned with the interstitial at the level of language and meaning. Analysis and observations made on forms from a selected photograph were firstly defined in human language, prior to any consideration in machine implementation (Reas: 2006). I expressed ideas about the forms in the photographs initially in human language and then translated these thoughts into a series of procedures or algorithms in computer code (or used pre-programmed systems such as Maya’s dynamic systems) that would generate the visual responses. For selected photographs, I characterised the forms as either organic or synthetic helping to define the approach I would take in each artwork.

Where algorithms were designed to generate visual material (i.e. *Substratum*), I incorporated noise functions, resulting in multiple visual responses, each having subtle differences between them. This approach enabled the computer’s capacity “to produce multiple output with perpetual variety.” (LeGrice: 2001: 220) This meant that I could not completely predict the outcome of the visual forms generated, and as such the computer became a kind of collaborator in the creative process. Due to the use of Perlin noise applied to sequences of both bitmap images sampled from the original photograph and vector-based lines, the visual forms generated were indeterminate and organic in appearance. Sampling pixels from the original photograph provided a trace of photo-realism in the work but one that was consciously reworked to combine with the more synthetic aspects of other lines in the source image. Similarly much of the visual material created for *Lux*, used Maya’s dynamic systems to produce unpredictable, organic motion and form, based on simulations of natural phenomena. Without the assistance of the computer, I would have been unable to produce such material.

To realise forms that were more synthetic in nature, I used methods such as direct modelling in 3D and film-editing techniques (although in *Lux* dynamic systems were then used to simulate organic motion). In this case, the role of the computer was more that of a producer responding to my predefined ideas concerning the final composition. Modelling directly in 3D was the approach suitable for photographs where the light-forms had a synthetic appearance (rather like that of an illuminated tube) and was the approach I used to create the visual material for *Palimpsest*. Filmmaking techniques were also used in the construction of a final montage that negotiated my response to Truslove's audio; methods common to the field of visual music.

On a visual level, the interstitial aesthetic emerges when these approaches are combined: the synthetic aesthetic of the intentionally modelled computer image with the organic aesthetic that results from more indeterministic methods, realised through programmed systems involving elements of unpredictability to generate visual material. Where the final outcome was already anticipated, as was the case for the visual material in *Palimpsest*, the computer is not given the opportunity to realise its potential as a collaborator in the creative process. Or as Le Grice states computer art is of no significance unless "it makes a positive use of the computer to expand conception, sensitivity and experience." (Le Grice: 2001: 221) This potential however was subsequently realised in the work through the exploration of relationships between audio and visual (discussed in the paragraphs which follow). What has been of significance for me in this research has been the combination of the intentional, pre-defined approach of direct 3D modelling and montage techniques in film editing, with the spontaneous or indeterminate approach of programmed systems that incorporate opportunities for indeterminate or unpredictable responses. Returning to Sol LeWitt's comments on the process of making art: "There are several ways of constructing a work of art. One is by making decisions at each step, another by inventing a system to make decisions." (LeWitt cited in Dreher: 1986); my position differs in that I remain 'in conversation' with the system that makes the art, working with the material generated by the computer but structuring it and shaping it according to my own human responses. I therefore, am ultimately unwilling to relinquish total control over the art to the computer algorithm, preferring to work with the computer in both its roles as collaborator and producer.

Finally, the research considered these ideas through *interdisciplinarity* and the interstitial space between two disciplines - audio and visual. In all the artworks presented in the folio, sound structures our visual experience, providing an anchor and a kind of interstitial 'narrative' for this experience. Having a shared interest in working with granular approaches to constructing form, I collaborated with electroacoustic composer Graeme Truslove. Truslove's audio added value (Chion: 1994) to the visual material, encapsulating many of the interstitial qualities of the source photographs. In *Substratum* the 'breathing' texture of the photograph was conveyed through the inhaling and exhaling drones of double bass samples repeated throughout the audio; in *Palimpsest* the original gesture and energy of the photographer's movements were conveyed through gesture in the audio; and in *Lux*, a static electric dynamic was added to the visual response. Similarly, I altered the perception of time in the image (Chion: 1994) by manipulating the speed and duration of visual material to interpret the textures of the audio.

In terms of the 'narrative' (understood to be "more like the 'vertical' layered narrative of a poem" (Harris: 2005)) in both *Lux* and *Palimpsest*, sound mediates and edits our visual experience from one view to the next, disrupting any linear path or journey through the

forms. The interface programmed by Truslove used in *Palimpsest*, negotiated non-linear paths through the visual material (consisting of different views of the virtual light sculpture) by increasing or decreasing the speed, and by jumping to different sections in response to the audio. Design of the interface was based on making the light sculpture 'perform' to the gestures of the audio, creating syncretic relationships (Chion: 1994) between audio and visual. This was achieved by working with Truslove to define parts of the visual materials that 'matched' sections in the audio. In many cases, I identified multiple visual responses that linked audio and visual rather than any single, finite response. Truslove then programmed the interface to randomly choose between the visual responses that would accompany the audio track. Each time the interface executed, visual playback differed and was 'rewritten', referenced by the title of the work. In this work, a further interstitial aspect occurs between the two distinct disciplines through the medium of computer code and the algorithm. Code facilitates an element of unpredictability and the computer is involved on a collaborative level.

The non-linear structure of *Palimpsest* is also experienced in *Lux*. The gaps and breaks experienced by the viewer in the interstitial narrative structure echo the gaps and breaks in my own perception of the forms. What is presented is in-between what I see and what I imagine. In focussing on the construction of the work, the processes around the act of perception are laid bare. Youngblood (1970) argues that what is significant in human experience is "the awareness of consciousness, the recognition of the process of perception ... to perceive is to interpret. Through synaesthetic cinema man attempts to express a total phenomenon – his own consciousness." (Youngblood: 1970: 76) The artworks in this folio negotiate the awareness of consciousness and processes of perception through a combination of both human perception and interpretation with that of machine implementation and interpretation. Through the combination of both, new aesthetic interstitial responses are proposed.

The contribution to knowledge offered by the research, is in proposing new ways of visualising and understanding the interstitial beyond existing verbal definitions of it. This was achieved through metaphorical mappings between different media, forming the basis of a body of artworks that demonstrated this new interstitial aesthetic. In response to a set of 'interstitial' photographs, Sontag's invitation to intuit what lies beyond the [photographic] image was accepted, leading to audiovisual works that remediated and reimagined forms within the source photographs in new contexts. Working with the computer in its capacity to act as a collaborator, delivered "new art forms and new aesthetic experiences" (Noll cited in Reas et al.: 2010: 25) combining methods from the fields of both generative art and visual music. New and unforeseen responses were revealed by incorporating elements of chance through programming that extended beyond mere acts of translation of the source photographs. Technology then assisted with the aim of the research to "reach the silence behind the language" (Nemerov cited in McClatchy: 1988) in the attempt to articulate the interstitial.

5.2 Future Directions

The collaboration between Graeme Truslove and myself - *Interstitial Articulations* - brings together the individual artistic practice of two artists – a visual artist and a composer – to create, new audiovisual narratives exploring the space between sound and image. Whilst the research is focussed around subjective interpretations and understandings of the interstitial, processes and methods detailed in the research is

relevant to other visual music researchers interested in how conceptual mappings between different media informs the development of a creative work. Future directions for postdoctoral research specific to this project and collaboration are identified as follows.

The first articulation in the series *Substratum*, focused on sculpting and interpreting the deep, textures of the audio to structure the final work; the visual component of the work was therefore created in response to the audio. The second articulation *Palimpsest*, relied on programming an indeterminate visual playback system to synchronise with significant events in the audio: the visual experience was therefore determined by events in the audio. In the final work *Lux*, similar strategies were applied as those found in *Substratum*, where the visual material was sculpted around interpretations of the audio. Essentially then, the interdependence of audio and visual, and the conversation between them was what provided the creative force behind these works. Both 'speak' from the interstitial space between two distinct disciplines (visual art and music), questioning how one can shape our experience of the other.

However the potential of speaking with one united voice - an audiovisual voice - has yet to be explored in the context of this research and ideas of the interstitial.⁸⁷ This study presents the first stage of the exploration between sound and image; it attempts to find commonality between two distinct disciplines through process, philosophy and content and negotiate how the two might be brought together through creative practice. But what if they could speak together from the outset? This initial stage of the collaboration was based on my interpretations of the audio, but what if the audio was to generate the visual and vice-versa? How might this interdisciplinary approach extend the practice of each collaborator? Rather than conceiving works from separate positions with one form leading or privileging another, how could we define an audiovisual substance based on concepts of the interstitial that could be moulded simultaneously from the start?

In terms of the visual, future work would explore how the two aesthetics of the study – the organic and the synthetic – might be combined convincingly and in a way that is 'performable'. Of equal importance is considering how this shared language might be used to continue to articulate the interstitial or the inexpressible – “the silence behind the language, the silence within the language” (Nemerov: 1988) – in a new form. In other words, future practice would be anchored around the concept of the interstitial, again considering the point where knowledge and imagination meet. It would incorporate the intentional and the unpredictable, investigating the role of the computer as collaborator through shared systems (manipulating audio and visual) whilst allowing for critical interventions from myself the visual artist, or Truslove the sound artist.

In terms of the audio, future work would also focus on finding sonic equivalences in the different visual aesthetics – organic and synthetic – and then using these to create the audiovisual 'grains', which would form the basic unit of expression. A future challenge would be in finding immersive strategies for the visual to reflect the spatial diffusion of the audio. How could the audiovisual substance be experienced in multi-screen formats for instance? Building on the early examples of colour-organs or light instruments, how

⁸⁷ Although John Whitney in the 80s and Golan Levin (and many others) more recently have explored the creation of computerised instruments in which sound and image can be output simultaneously in real time (Moritz: 1997), our interest is in combining the discreet and distinctive artistic practice of a composer and a visual artist in the context of interpreting concepts of the interstitial.

might artistic gesture in both disciplines be incorporated into a system that integrates real-time interaction between sound and image without restricting the experience of either one?

Perhaps the most important question of all to be explored through future work is considering what impact the live situation has on the process of composition/ creation for both music and visual art? How does the live situation bring together the momentary consciousness of the performer (or improviser) with the more intentional 'composed' aspects of the work? It is from this 'sweet spot' that future practice will begin.

REFERENCE LIST

- Alves, Bill** (2005) *Digital Harmony of Sound and Light*, Computer Music Journal, 29:4, pp.45-54, Winter 2005, Massachusetts Institute of Technology, USA
- Autodesk Maya** (2012) *User Manual* [online]
Available at:
http://download.autodesk.com/global/docs/maya2012/en_us/index.html
Accessed: 04/10/12
- Bachelard, Gaston** (1958/ 1994 edition) *The Poetics of Space*, Beacon Press: Massachusetts
- Barthes, Roland** (1977) *Image, Music, Text*. (Ed. and trans. Stephen Heath) Fontana Press, London
- Barthes, Roland** (1990) *S/Z* (trans. Richard Miller), Blackwell Publishers, Oxford
- Baudrillard, Jean** (1988) *from 'Simulacra and Simulations,'*
in Brooker, Peter (ed.) (1992) *Modernism/ Postmodernism*, Longman Group, Harlow, England
- Boden, Margaret A. and Edmonds, Ernest A.** (2009) *What is generative art?*, Digital Creativity, 20: 1, 21— 46, Routledge, London
- Borràs, Laura** (2011) *The Internet as Interzone* in: *Charting the Interzone, Bergamo, 20 January 2011. The Contributions*, Cultural Studies in Literary Interzones - Publications, Erasmus Mundus Joint Doctorate, [online]
Available at:
http://www.mundusphd-interzones.eu/struttura.asp?cerca=virtual_shelves#676
Accessed: 25/10/12
- Borràs, Laura** (2010) *Leer literatura (en) digital: una historia de intermediaciones, desplazamientos y contaminaciones*, Arizona Journal of Hispanic Cultural Studies, Volume 14, 2010, pp. 177-195
- Boulter, Jay David and Grusin, Richard** (2000) *Remediation: Understanding New Media*, MIT Press, Cambridge Massachusetts
- Bute, Mary Ellen and Nemeth, Theodore** (1936) *Synchronomy no.2*, 6 mins [online]
Available at:
http://www.dailymotion.com/video/x58zv6_mary-ellen-bute-synchromy-no2-1936_shortfilms
Accessed 21/7/12
- Chion, Michel** (1994) *Audio-Vision: Sound on Screen*, Columbia University Press, New York
- Clifford, Alison** (2001) *[citizen]* [online]
Available at:
<http://duck-egg.co.uk/citizen/citizen01.html>
- Clifford, Alison** (2006) *The Sweet Old Etcetera* [online]
Available at:
<http://www.sweetoldetc.org/>
- Clifford, Alison** (2006) *Silhouette: A Dance* [online]
Available at:
<http://www.bornmagazine.org/projects/silhouette/>
- Clifford, Alison** (2007) *Bits, Bytes and the Rhetoric of Practice: New Media Artist Statements*, Media_N: Journal of the New Media Caucus, Fall 2007: Vol. 03. N.01 [online]
Available at:
http://www.newmediacaucus.org/html/journal/issues/2007_fall/fall_2007.html
Accessed: 25/10/12

Clifford, Alison (2008) *Flex* [online]
 Available at:
http://duck-egg.co.uk/interstitial/flex_08_01.html

Clifford, Alison (2009) *Trace* [online]
 Available at:
http://duck-egg.co.uk/interstitial/trace_09_01.html

Clifford, Alison (2010) *Equilibrium* [online]
 Available at:
http://duck-egg.co.uk/interstitial/inter_10_01.html

Clifford, Alison and Truslove, Graeme (2010) *Substratum* [online]
 Available at:
<http://duck-egg.co.uk/substratum/index.html>

Clifford, Alison and Truslove, Graeme (2011) *Palimpsest* [online]
 Available at:
<http://duck-egg.co.uk/palimpsest/index.html>

Clifford, Alison and Truslove, Graeme (2012) *Lux* [online]
 Available at:
<http://duck-egg.co.uk/lux/index.html>

Clifford, Alison and Truslove, Graeme (2011) *Interstitial Articulations: Reflections on Audiovisual Collaborative Practice*, GA2011: International Conference on Generative Art, Rome, Conference Proceedings, XIV edition, Domus Argenia, Sardinia

Collopy, Fred (1998 - 2007) *Lumia & Instruments for Creating Them* (1998 - 2007)
 Available at:
<http://rhythmiclight.com/archives/bibliography.html>
 Accessed: 20/03/14

Dreher, Thomas (1986) *Sol LeWitt: The two Series "Forms derived from a Cube" and "Pyramids"*, Arte Factum, No 15, p 2

Fischinger, Oskar (1933-34) *Kreise (excerpt)*, 40 secs [online]
 Available at:
<https://vimeo.com/55181698>
 Accessed: 29/01/13

Fischinger, Oskar (1932) *Sounding Ornaments in The Fischinger Trust* (2013) [online]
 Available at:
<http://www.oskarfischinger.org/Sounding.htm>
 Accessed: 29/01/13

Franke, Daniel (2012) *Unnamed Soundsculpture*, 5 mins [online]
 Available at:
<http://daniel-franke.com/?p=6>
 Accessed: 31/01/13

Franke, Daniel (2010) *One Minute Soundsculpture*, 1 min [online]
 Available at:
<http://daniel-franke.com/?p=114>
 Accessed: 31/01/13

Giannetti, Claudia (2004) *Aesthetics and Communicative Context* [online]
 Available at:
http://www.mediaartnet.org/themes/aesthetics_of_the_digital/aesthetics_and_communicative%20Context/print/
 Accessed at: 4/12/09

Galanter, Philip (2003) *What is Generative Art? Complexity Theory as a Context for Art Theory* [online]

Available at:

http://www.philipgalanter.com/downloads/ga2003_paper.pdf

Accessed 1/02/09

Harris, Lucy (2005) *How to Edit* [online]

Available at:

http://www.luxonline.org.uk/education/learning_tours/how_to_edit%283%29.html

Accessed: 21/ 07/12

Iota Center, [n.d.] *About Us* [online]

Available at:

The Iota Center: <http://www.iotacenter.org/about>

Accessed: 04/08/12

Keefer, Cindy and Ox, Jack (2006-2008) *On Curating Recent Digital Abstract Visual Music*, Center for Visual Music, [online]

Available at:

http://www.centerforvisualmusic.org/Ox_Keefer_VM.htm

Accessed: 03/02/13

Landow, George and Delaney, Paul (1991) *Hypertext, Hypermedia and Literary Studies: The State of Art* in: Packer, R and Jordan, K (eds.) *Multimedia: From Wagner to Virtual Reality*, W.W. Norton, New York

Le Grice, Malcolm (2001) *Experimental Cinema in the Digital Age*, British Film Institute, London

Levin, Golan (2000) *Painterly Interfaces for Audiovisual Performance*, MIT [online]

Available at:

<http://flong.com/texts/publications/thesis/>

Accessed: 20/03/14

Levin, Golan (2000B) *Audiovisual Environment Suite*, [online]

Available at:

<http://flong.com/projects/aves>

Accessed: 20/03/14

Levin, Golan (2009) *Audiovisual Software Art: A Partial History*, [online]

Available at:

http://www.flong.com/texts/essays/see_this_sound_old/

Accessed:

24/03/14

Lovejoy, Margot (2004) *Digital Currents: Art in the Electronic Age*, Routledge, London

Lye, Len (1935) *A Colour Box*, 4 mins [online]

Available at:

<https://vimeo.com/6276547>

Accessed: 29/01/13

Manovich, Lev (2001) *The Language of New Media*, MIT Press, Cambridge, Massachusetts

McCormack J, Brown O, Dorin A, McCabe J, Munro G, and Whitelaw M., (2012) *Ten Questions Concerning Generative Computer Art*, Leonardo, MIT Press, 2012 [online]

Available at:

<http://www.csse.monash.edu.au/~jonmc/research/Papers/TenQuestionsLJ-Preprint.pdf>

Accessed: 24/03/14

McDonnell, Maura (2007) *Visual Music*, [online]

Available at:

<http://www.soundingvisual.com/>

Accessed: 04/06/12

McLaren, Norman (1949) *A Phantasy in Colors*, 7 mins [online]

Available at:

<http://www.youtube.com/watch?v=86Wp96uG-N8>

Accessed: 29/01/13

McLean, Alex (2011) *Artist-Programmers and Programming Languages for the Arts*, PhD thesis, Goldsmiths, University of London [online]

Available at:

<http://yaxu.org/thesis/>

Accessed: 24/02/12

Moritz, William (1986) *Towards an Aesthetic of Visual Music*, The Center for Visual Music, Los Angeles [online]

Available at:

<http://www.centerforvisualmusic.org/TAVM.htm>

Accessed: 7/8/12

Moritz, William (1997) *Digital Harmony: The Life of John Whitney, Computer Animation Pioneer*, Animation World Magazine, Issue 2.5, August 1997 [online]

Available at:

<http://www.awn.com/mag/issue2.5/2.5pages/2.5moritzwhitney.html>

Accessed: 26/07/12

Murray, Janet H (1997) *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*, MIT Press, Cambridge, Massachusetts

Nelson, Ted (1974) *Computer Lib/ Dream Machines*, in: Packer, R and Jordan, K (eds.) *Multimedia: From Wagner to Virtual Reality*, W.W. Norton, New York

Nelson, Ted (1965) *A File Structure for the Complex, the Changing, and the Indeterminate* in: Wardrip-Fruin, N and Montfort, N (eds.) *The New Media Reader*

Nemerov, Howard (1988) *On Poetry and Painting, with a Thought on Music* in McClatchy, J.D (ed) (1988) *Poets on Painters: Essays on the Art of Painting by Twentieth-century Poets*, University of California Press: London

Oberly, Nicholas (2003) *reality, hyperreality*, The University of Chicago: Theories of Media [online]

Available at:

<http://csmt.uchicago.edu/glossary2004/realityhyperreality.htm>

Accessed: 31/01/13

Ox Jack and van der Elst, Judith (2011) *How metaphor functions as a vehicle of thought: Creativity as a necessity for knowledge building and communication*, Journal of Visual Art Practice, vol. 10 number 1, pp. 83-102

Packer, Randall and Jordan, Ken (2001) *Multimedia From Wagner to Virtual Reality*, W.W. Norton, New York

Paul, Christiane (2003) *Digital Art*, Thames and Hudson, London

Paul, Christiane (2008) *New Media in the White Cube and Beyond: Curatorial Models for Digital Art*, University of California Press

Pearson, Matt (2011) *Generative Art: A Practical Guide Using Processing*, Manning Publications: New York

Processing (2012) *noise()* \ Language (API) \ Processing [online]

Available at:

http://www.processing.org/reference/noise_.html

Accessed: 12/9/12

Quayola (2009) *Strata # 3*, Audiovisual Installation [online]

Available at:

<http://www.quayola.com/selectedartworks/strata3/>

Accessed: 31/01/13

Reas, Casey and Fry, Ben (2007) *Processing: A Programming Handbook for Artists and Designers*, MIT Press, Cambridge, Massachusetts

Reas, Casey (2006) *Reas.com / Process/ Drawing* [online]

Available at:

<http://www.reas.com/texts/processdrawing-ad.html>

Accessed: 03/03/09

Reas, Casey (2001) *Reas.com / Casey Reas / Works / Path Prints* [online]

Available at:

http://www.reas.com/path_p/

Accessed: 10/04/14

Reas Casey, McWilliams Chandler, LUST (2010) *Form and Code: In Design, Art, And Architecture*, Princeton Architectural Press: New York

Rezende, Mariana (2012) *Original Creators: Thomas Wilfred, the Father of Multimedia*, The Creator's Project, [online] Available at:

<http://thecreatorsproject.vice.com/blog/original-creators-thomas-wilfred-the-father-of-multimedia>

Accessed: 02/08/12)

Roads, Curtis (2001) *Microsound*, MIT Press, Cambridge: Massachusetts

Saint-Pierre, Marie-Josée (2006) *McLaren's Negatives* 10 mins [online]

<http://www.youtube.com/watch?v=vCXT-iHmZYc>

Accessed 18/1/13

Sanouillet Michel and Peterson, Elmer (eds) (1973) *The Writings of Marcel Duchamp*, Da Capo Press, New York

Sauer, Teresa (2009) *Notations 21*, Mark Batty Publisher, New York

Schon, Donald (1984) *The Reflective Practitioner: How Professionals Think in Action*, The Perseus Books Group: New York

Shanken, Edward (2009) *Art and Electronic Media*, Phaidon: New York

Smith College Museum of Art (2008) *Sol LeWitt Wall Drawing 139 – Smith College Museum of Art (February 1, 2008 – January 4, 2009)* [online]

Available at:

http://www.smith.edu/artmuseum2/archived_exhibitions/lewitt/index.htm

Accessed: 5/05/10

Snibbe, Scott Sona and Levin, Golan (2000) *Interactive Dynamic Abstraction*, Proceedings of Non-photorealistic Animation and Rendering (NPAR 2000), Annecy, France [online]

Available at:

http://www.snibbe.com/download/publications/academic/2000Dynamic_NPAR.pdf

Accessed: 24/03/14

Stefans, Brian (2011) *Third Hand Plays: "Palimpsest" by Alison Clifford*, SFMOMA Open Space [online]

Available at:

<http://blog.sfmoma.org/2011/08/third-hand-plays-%E2%80%9Cpalimpsest%E2%80%9D-by-alison-clifford/>

Accessed: 20/08/11

Sturken, Martia and Cartwright, Lisa (2001) *Practices of Looking: An Introduction to Visual Culture*, Oxford University Press, Oxford

Taylor, Grant D (2013) *Linearity and the Algorithmic Search*, in *The American Algorists: Linear Sublime August 30 – October 20, 2013*, [exhibition catalogue], Lebanon Valley College, Pennsylvania [online]

Available at:

<http://www.nydigitalsalon.org/american-algorithms/AmericanAlgoristHiRes.pdf>

Accessed: 10/12/13

Truslove, Graeme (2009) *Intuited Architectures: Mediations Between Micro-Temporal and Improvised Musical Praxes*, PhD thesis, University of Glasgow

Wardrip-Fruin, Noah and **Montfort, Nick** (2003) (eds) *The New Media Reader*, MIT Press, Cambridge, Massachusetts

Whitney, John (1961) *Catalog*, 7 mins [online]

Available at:

<http://www.youtube.com/watch?v=TbV7loKp69s>

Accessed: 28/01/13

Whitney, John (1966) *Permutations*, 7 mins [online]

Available at:

<http://www.youtube.com/watch?v=BzB31mD4NmA>

Accessed: 6/08/11

Whitney, John (1972) *Matrix III*, 10 mins [online]

Available at:

<http://www.youtube.com/watch?v=ZrKgyY5aDvA>

Accessed: 29/01/13

Whitney, John Sr. (1972) *Notes on Permutations*, Originally published in *Film Culture* No. 53-54-55 (Spring, 1972), p. 78

Article republished at the Center for Visual Music. Available at:

<http://www.centerforvisualmusic.org/WhitneyNotesPerm.htm>

Accessed: 13/08/12

Whitney, John (1975) *Arabesque*, 7 mins [online]

<http://www.youtube.com/watch?v=w7h0ppnUQhE>

Accessed: 28/01/13

Wilfred, Thomas (1965-66) *Opus 161*, 1 min [online]

Recording of Lumia composition Available at:

http://www.youtube.com/watch?v=sqb88gdCM4Q&feature=player_embedded

Wilfred, Thomas (1947) *Light and the Artist*, *The Journal of Aesthetics and Art Criticism*, vol.5, No.4, June 1947, [out of print]

Electronic copy available at: <http://rhythmiclight.com/archives/bibliography.html>

Accessed: 1/8/12

Wilson, Stephen (2010) *Art + Science Now*, Thames & Hudson, London

Youngblood, Gene (1970) *Expanded Cinema*, P. Dutton & Co., Inc., New York

Zentrum Fur Kunst und Medientechnologie Karlsruhe (2004) *Algorithmic Revolution: On the History of Interactive Art* – Exhibition statement by curators: Peter Weibel, Dominika Szope, Katrin Kaschadt, Margrit Rosen, Sabine Himmelsbach (31st Oct, 2004) [online]

Available at:

http://www.zkm.de/algorithmische-revolution/index.php?module=pagemaster&PAGE_user_op=view_page&PAGE_id=118

Accessed online: 30/07/12

LIST OF EXHIBITIONS/ SCREENINGS

2013

- *Lumen Prize Exhibition, 8 – 17 March, 2013*
Plum Blossoms Art Gallery, Hong Kong
[Exhibition of *Lux*]
- *Lumen Prize Exhibition, 23 February – 3 March, 2013*
FQ Projects, Shanghai
[Exhibition of *Lux*]
- *Lumen Prize Exhibition, 1 -10 February, 2013*
Robert's Books, Latvia
[Exhibition of *Lux*]
- *Lumen Prize Exhibition, 22 -26 January, 2013*
Gallery 27, London
[Exhibition of *Lux*]

2012

- *Sonica 2012 - Free Flicks, 10 November, 2012*
Exhibition of International Sonic Art, Centre for Contemporary Art, Glasgow
[Screening of *Lux*]
- *Orphans (Sound 2012), 21st October, 2012*
Belmont Picture House, Aberdeen
[Screening of *Substratum*, *Palimpsest* and *Lux*]
- *Hypersonica Event at FILE 2012 - Electronic Language International Festival, 17 – 20 July, 2012*
SESI Cultural Centre,
Sao Paulo, Brasil
[Screening of *Palimpsest*]
- *9th International Conference on Computer Graphics, Imaging and Visualisation, 24 – 27 July, 2012*
National Chiao Tung University,
Hsinchu, Taiwan
[Exhibition of *Substratum* and *Palimpsest*]
- *16th International Conference on Information Visualisation, 10 – 13 July, 2012*
University of Montpellier, France
[Exhibition of *Substratum* and *Palimpsest*]
- *Electrifying Literature: Affordances and Constraints, Electronic Literature Organization Media Art Show, 20 – 23 June, 2012*
The Art Museum of West Virginia University, USA
[Exhibition of *Palimpsest* and *Substratum*]
- *Lightworks 2012 - Annual International Arts Festival, 16th - March, 2012*
Grimsby Minster, Grimsby, UK
[Exhibition of *Substratum*]

2011

- *GA2011 XIV Generative Art International Conference, 5 – 7 December, 2011*
Rome, Italy
[Presentation and Screening of *Palimpsest*]
- *Seeing Sound 2, 29 – 30 October, 2011*
Centre for Musical Research, Bath Spa University, UK
[Screening of *Palimpsest*]

- *"Third Hand Plays" online series at Open Space SFMOMA, 18th August - ongoing*
San Francisco Museum of Modern Art, USA
[Exhibition of *Palimpsest*]
- *Hypersonica Event at FILE - Electronic Language International Festival, 19 – 22 July, 2011*
SESI Cultural Centre, Sao Paulo, Brasil
[Screening of *Substratum*]
- *Sound Thought 2011, Feb 3rd, 2011*
The Arches, Glasgow
[Exhibition of *Substratum*]

2010

- *GA2010 XIII Generative Art International Conference, 15 – 17 December, 2010*
Politecnico di Milano University, Milan, Italy
[Exhibition and presentation of *Substratum*]
- *"Half-knowledge/ Half..." 16 – 28 April, 2010*
Grace & Clark Fyfe Gallery, Glasgow School of Art,
[Exhibition of *Trace* and *Equilibrium*]