Pulse, chance, flux: the energetic image

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Abstract

**Pulse, chance, flux: the energetic image** is a practice-led research project which investigates the possibilities for extending analogue film and digital video projection beyond mere image reproduction, to become a transmission of embodied energy.

The project is broken down into three key areas of investigation: **pulse** (vibration; frequency), **chance** (indeterminacy; synchronicity) and **flux** (the flow and transduction of energy).

This project argues for the existence of a fundamental **pulse** to the world, or rather for millions of pulses, overlapping each other. From the addition of a multitude of pulses of information arises **interference**: the complexity of the world. Key works of vibration by Alvin Lucier, Tony Conrad and Bridget Riley are discussed.

Artistic strategies of **chance** are investigated as a means to imbue works with the complexity of interference and to question how deeply relation really goes. Key time-based works by John Cage and David Tudor are compared for their strategic attempts to model the indeterminacy of the world in their very form.

**Flux** is articulated as being the flow of energy. Douglas Kahn’s concept of the **Aelectrosonic** (the always-moving electromagnetic) is discussed and an argument is raised for its extension from sonic practices to include the luminous. In thinking about Kahn’s idea of transduction as the ‘locating moment’ of energy, a fundamental technical difficulty in working with light energy versus sound can be accounted for by abandoning literal transductions, instead turning to allusions.

Three projection installation works, **Modulations** (2012–2015), **Black Noise** (2012) and **Dark Matter** (2015), were created, each comprising arrangements of projection devices, objects and images in relation. Flicker was used as a tactic to transmit an apparent embodied energy via the projection to the visitor. Decentralisation and dislocation were used strategically to continually shift attention from object to image to space to experience. The marriage of these theories and tactics is intended to create an energetic ‘noise’ in the space, in the projection machines and in the neurophysical of the viewer.
Declaration

This is to certify that

i) the thesis comprises only my original work towards the masters,

ii) due acknowledgement has been made in the text to all other material used,

iii) the thesis is 10817 words in length, exclusive of bibliography and appendices.

Marcia Jane
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# Table of Contents

Abstract  
Acknowledgements  
List of Figures  
Introduction  
Pulse  
Chance  
Flux  
Modulations (2012–2015)  
Black Noise (2012)  
Dark Matter (2015)  
Conclusion  
Bibliography  
Appendices
## List of figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1      | Berenice Abbott, *Wave Interference Pattern* (1950s)  
Gelatin silver print  
Met Museum, New York |
| 2, 3   | Tony Conrad, *The Flicker* (1966)  
30 minutes B&W 16mm film |
| 4      | Bridget Riley, *Fall* (1963)  
Polyvinyl acetate paint on hardboard  
Tate, London |
| 5      | David Tudor, *Rainforest IV* (1973)  
Transducers, sound and found objects  
Workshop at Chocorua, New Hampshire |
Transducers, sound and found objects  
Lincoln Center, New York City |
| 7      | Joyce Hinterding, *ULAM from Aura series* (2009)  
Graphite on paper with electronics  
Breenspace, Sydney |
| 8      | Joyce Hinterding, *Large Ulam VLF Loop* (2014)  
Graphite on paper with electronics  
GOMA, Brisbane |
| 9, 10  | Anthony McCall, *Line Describing a Cone* (1973)  
30 minutes B&W 16mm film, haze machine  
Whitney Museum, New York |
| 11     | Guy Sherwin, 16mm optical sound examples  
Optical Sound Films 1971-2007 |
| 12     | Transit of Venus (2012)  
Monocular projection on cardboard sheet  
Melbourne, Australia |
| 13     | *Modulator* (2012)  
LED projector, lens, tripod, lens stand, MP4 HD 1080p video (looped)  
Melbourne, Australia |
| 14     | *Modulator* (2013)  
LED projector, lens, balsa wood, plinth, MP4 HD 1080p video (looped)  
West Space, Melbourne |
Figures 15, 16  Black Noise (2012)
Eiki 16mm film projector with lens removed, black and white film (looped),
Musicolor, amplifier, sound player, stereo sound file (looped), plinths
West Space, Melbourne

Figure 17  Dark Matter (2015)
Eight flatscreen TVs, eight USBs, MP4 HD 1080p videos (looped, stereo)
VCA Postgraduate Gallery, Melbourne

Figure 18  Diagram of a sawtooth wave.

Figure 19  Guy Sherwin, diagram of a 16mm film strip
Optical Sound Films 1971-2007

Figure 20  Guy Sherwin, diagram showing how optical sound works
Optical Sound Films 1971-2007

Figure 21  Dark Matter (2015), image from Final Cut Pro editing timeline

Figure 22  Dark Matter (2015)
Eight flatscreen TVs, eight USBs, MP4 HD 1080p videos (looped, stereo)
VCA Postgraduate Gallery, Melbourne

Figure 23  Dark Matter (2015)
Eight flatscreen TVs, eight USBs, MP4 HD 1080p videos (looped, stereo)
VCA Postgraduate Gallery, Melbourne
Introduction

The world has a pulse. My heart beats; cells buzz; day turns to night; the moon is full then new again. These pulses are signals: a million voices speaking over each other, and they add up to our world.

In this project I have set out to trace these pulses of the world and imbue them into works that make use of projected image. These works depend upon and express vibration in all its complexity and simplicity.

Moving-image projection devices are made with the intention to project a clear and perfect image, and once doing so, to be forgotten. My practice involves turning to look at these devices directly; to be inclusive of them in the fabric of the work and acknowledge them as ‘present’ objects. I want to know what they can do, how they can speak, and what they can say.

The first three chapters of this thesis consider energies at work in the world. These forces gather, cluster and cloud around each other; always together but never touching. Works are discussed which share a common property of containing within their form a mingling of both ‘signal’ and ‘noise’. I view the mingling of signals as a kind of live energy source in these works.

Chapter one investigates pulse, particularly as it relates to the human body and to the simple, observable phenomena of the world. I argue that the overlay of many individual pulses or voices gives rise to apparent, experiential complexity. Works by Alvin Lucier, Tony Conrad and Bridget Riley are examined for the ways they use and express vibration. Philosopher Timothy Morton’s ideas on the wave-like nature of causality are considered as extending the model of vibration back into the world.
Chapter two investigates chance as an artistic strategy that serves to express the coincidental and indeterminate nature of the world. Two works, one by John Cage and one by David Tudor, are compared for their different structural approaches to chance: one where chance information is recorded into the form of the work; and another where a chorus of voices is allowed to speak and to generate relations on the fly. A central idea for both artists is that of the sound-in-itself being allowed to emerge via these practices. This idea and the two methods have been incorporated into the three works of this project.

Chapter three investigates flux, defined as a flow of energy. It considers Douglas Kahn’s notion of the Aelectrosonic: a space of always-moving energy, able to be located and aestheticised via transduction. Works by Joyce Hinterding and Anthony McCall are compared as examples of two kinds of transduction: one a literal listening, and one allusive. Taking into account differences in the way sound and light behave in the world, an argument is made for the allusive model as a means to access the energy of light and image.

The next three chapters of this thesis describe the three individual works produced, in their chronological order. The earliest part of this project was informed by Object Oriented Philosophy (OOO) and this early intent, followed by its transition to a more broader look at energies, is traced through the descriptions of the works.

Chapter four describes Modulations (2012–2015), a small-scale projection apparatus comprising a compact projector paired with a found lens. My early concerns in this project with the philosophy and the ideas of Graham Harman, particularly around relation, are discussed. Harman’s model of objects in his Object Oriented Philosophy (OOO) is paralleled with the chance strategies of Cage and Tudor.

Chapter five describes Black Noise (2012), the single analogue projection work within this project. This work involves the live transduction of sound into electrical energy which is then expressed by the mechanical body of the projecting object (a 16mm film projector). Harman’s metaphor of the black hole to describe objects and the push-pull of information concealment and emission is discussed.

Chapter six describes Dark Matter (2015), a work utilising multiple flatscreen TVs. This chapter articulates my transition in thinking and approach between the first two projects and the third. This work attempts to address vibration very directly, and is prompted by infrasound (low frequency sound waves). This work is an attempt to embody frequency energy directly into the image and to re-transmit that energy out into the exhibition space.
Pulse

Frequency is everywhere: we are rhythmic beings in a rhythmic world. From the cellular activity within our bodies, to our pulse, to our circadian cycles, to the turn from day to night to day, to the moon cycle and its pull on the tides, to the seasons, there is a pulse to this world. Periodic processes govern or affect all entities, dictating the shape of our world. States shift back and forth, within and without everything.

These periodic pulses (these frequencies) have peaks and troughs in them as the signal rises and falls. As multiple frequency sources speak across one another, they interfere. Interference means there is addition at some times and places (where peaks add upon peaks), subtraction at others (where troughs add upon troughs), and states in between (where frequencies fuse).

Figure 1
Berenice Abbott, *Wave Interference Pattern* (1950s)
Gelatin silver print
Met Museum, New York

“Reality … is a gigantic pond in which trillions of frog-like entities are croaking at different speeds, across one another, through one another, modulating and translating one another.”

Where one frequency cuts into another, that gap creates a beat. Out of this overlay of beats upon beats upon signals coming from every direction, complexity arises. The philosopher Timothy Morton takes this a step further to argue for frequency and interference not just as physical experience but as causal:

“Actual, real things are happening at multiple levels and involving multiple agents, as the wave front of the single sound wave from the frog’s mouth traverses the pond to my ears. The wave becomes imprinted on the air, on the spider’s web, in the human ear. Each packet of air molecules translates the wave from itself to the next packet: trans-late means “carry across,” which is also what meta-phor means … causality and aesthetic “information” are deeply bound up with one another.”

The use of vibration and frequency as explicit strategies in art is a way to allude to the beats of the world. Significant works from 1960s minimal and optical practices coincided with a rising interest in mystical practices from Asia (such as meditation) and their associated brain states.

For his work Music for Solo Performer (1965), minimalist sound practitioner Alvin Lucier appeared live on a stage and applied a customised electroencephalogram (EEG) device. During performance he allowed his brain to go into the Alpha state: that of a relaxed or meditating brain where brain waves cycle at relatively low frequency (8-13 cycles per second). Filtration was applied to the brainwave signal to select only the low-frequency Alpha waves; these were amplified as audio signal and sent to speakers, the cones of which vibrated against percussion instruments. In this performance Lucier deploys bodily periodicity to explicitly produce acoustic rhythm. The tremor of the speaker cones and the tremor of the drums’ sounds are the expression of the tremor in his brainwaves.

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3 Morton, Realist Magic, 114.
4 Morton, Realist Magic, 112.
Minimalist composer Tony Conrad made two films, *The Flicker* (1965) and *Straight and Narrow* (1970), both characterised by their use of rapid changes between light and dark frames to stimulate an excited optic response.

*The Flicker* (1965) is a 16mm film which contains only fully black or fully white frames. Frames quickly alternate from white to black and back in changing rhythms. Conrad’s film both irritates and stimulates the eye and brain. It simultaneously turns viewers’ attention in multiple directions: towards the image, towards the projection space, inwards to their own neurophysical space.

“This formalism of light-rhythms causes in the spectator a consciously provocative irritation of perception that can produce after-images, seeing spots, and similar phenomena; in a certain sense, this is the transmission of the early cinema’s flicker to a nervous stimulation of the brain.”

Inverting the path of Lucier’s brainwave work, Conrad’s film reaches from the film projector back into the brain, speaking to its rhythmic language through *photic stimulation*.

“My … premise was that it might somehow be possible to subvert or extend the use of ultra-minimal images in a way that would emphasize the emergent complexity they make possible, rather than the images themselves.”

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The viewer’s personal neurophysical response is fully present in this work as a kind of ‘noise’ in the system. The binding of information (the program-like film strip, the sequence of frames) and noise (in the neurophysical realm) produces a shifting moiré of focal points, disturbances and hallucinations.

Bridget Riley’s *Fall* (1963) is a painting comprising a sequence of alternating black and white curved lines running vertically. This simple composition has a strong optical effect: it seems to vibrate. It’s hard to look at precisely, for the act of seeing it is always coming to your attention.
On a technical level this painting exploits “a multitude of perceptual phenomena … subtle shifts in 3D appearance, faintly colored rainbows and local deformations … arguably the most salient effect is the appearance of dynamically shifting regions of transitory apparent contrast [which] accompany the slightest change in the spatial relationship of the observer relative to the painting.”

This painting does spatially what Conrad’s film does temporally. It causes a vibration in the neurophysical space of the viewer; it creates interference.

The practice of moving image and the strategic use of flickering projected light to articulate frequency lie at the heart of this project. A flickering image signal breaks light (and images) into discrete, pulsing chunks. Flicker makes vibration implicit. Pulses of light can begin to emulate the pressure-wave transmission of sound through molecules in and of air, so that distinctions between light, sound and the periodicity of the neurophysical might be breached.

The dramatic addition and withdrawal of light to a space caused by a flicker signal has a destabilising effect on the viewer, yet its regularity lends a ‘safe’ structure. Flicker can be reassuring or terrifying or both. When multiple flicker signals coexist in a space, interference patterns are conjured with their inherent overlaps, peaks and troughs. An allusion to the beats of the world can be made plain.

### Chance

If our reality is made up of beats upon beats, the emergence of significant events (or the significant absence of them) is the result of these beats’ interference. This indeterminacy (this emergence) can be registered inside and outside of ourselves: in our relationships, experiences and realities just as much as in the part of the world we label as natural.

Consider the incoming tide. As we watch it come in we can see a patterned yet indeterminate movement at play: the tide is most certainly coming in (a periodic event), surface wind creates waves, waves lap and repeat, adding to and subtracting from each other, but

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10 Morton, Realist Magic, 24.
always adding more than subtracting. The exact shape of the advance line (the water’s edge) is not predictable, but its overall movement, the advancement, is.

It can be argued that chance is everywhere. When I see a remarkable hue in the night sky in a foreign latitude I can take that experience within and express it in a subsequent work. This is interobjective space, where encounters between things spark action\(^\text{11}\). We’re always in this space.

If vibration expresses the individual beats of the world, chance points to what happens when they sum: the synchronicities that arise. A work partially or fully derived from chance practices can simultaneously have structure yet not have it. Vacancy is left for something to erupt, something not known at the time of making. Chance practices open this gap.

John Cage (1912-92) and David Tudor (1926-96) were peers and colleagues who both used chance-based compositional models. Cage’s Zen practice informed his view of the world as “undifferentiated … one of infinite variety, flux, and change”\(^\text{12}\) and he consciously employed practices such as coin tossing to instil this indeterminacy into the very fabric of a work.

“[W]hen we hear a piece composed using chance operations … we are—according to Cagean aesthetics—hearing the rhythm of nature, the speed and flow of natural events that are not related to one another except by their co-occurrence in time and space.”\(^\text{13}\)

Cage’s Imaginary Landscape No. 4 (March No. 2) (1951) is a score for twelve radios and twenty-four players in live performance. Two players operate each radio: one controlling station selection and one the volume and tone controls\(^\text{14}\). During performance, players tune and control their radios according to the score. The audience hears anything from human broadcasts to the sounds of the atmosphere itself. Cage’s score is a listener: it hears what’s in the air around us, transducing that signal live at the very moment each instruction of the score is actuated.

This composition is a fixed structure but it lies empty until activated: it’s a framework for the energy of radio waves. Performed in different times and locations, the radio signals

\(^{11}\) Morton, Realist Magic, 64.
intercepted will always differ. Even at the end of broadcast radio some time in the future, an electromagnetic signal will exist to theoretically intercept. The score itself stays fixed but the energy it both contains and frees is always shifting. This work is not located in the score or in the electromagnetic waves to which it listens. Rather, it’s located in the balance of energies between these two states at the moment of its performance.

Cage used the I Ching (Book of Changes) as a compositional tool in this work, casting numbers between 1 and 64 and assigning them to varying parameters. The use of this limited number set is typical of Cage’s chance methods (which include such activities as reading the found faults in a sheet of paper held up to the light)\(^\text{15}\). In each case, the system he called upon represented a grid of possibilities but was restrained within a specific frame. This tension between what is fixed or held and what is free and unknown is central to understanding Cage’s chance operations.

David Tudor performed with and for Cage, and had intimate knowledge of his compositional thinking and practice. Tudor’s own indeterminate practices can be traced to an intuitive sense of his own indistinguishability from the world. “‘Why do you want to work in nature?’; Tudor responded ‘Well, it’s part of my being. It’s a question I can’t answer because I can’t get away from it’.”\(^\text{16}\)

Tudor’s indeterminate compositions utilised a multitude of voices which broadcast all at once, each with a real-time relationship within it between audio signal and audio processing. Information was layered upon information and this layering formed the works. Tudor’s scores for performance and installation were not so much scores as “a physical arrangement of devices representing a vast, though finite, range of improvisatory sonic possibilities.”\(^\text{17}\)

Tudor’s *Rainforest IV* (1973) is a performance-installation hybrid made up of a distribution of ‘coneless speakers’ (transducers) around a space. Each transducer is connected to an object: a sheet of metal, a spring, barrel and so on. Just like for Lucier’s brainwave work, the transducers receive an audio signal and they vibrate, resonating their sculptural attachments.

\(^{15}\) Piekut, “Chance and Certainty,” 142.


\(^{17}\) Rogalsky, “‘Nature’ as an Organising Principle,” 134.
Figure 5
David Tudor, Rainforest IV (1973)
Transducers, sound and found objects
Workshop in a barn at Chocorua, New Hampshire.

Figure 6
David Tudor, Rainforest IV (1998)
Transducers, sound and found objects
Visitors listening to loudspeaker-objects, Lincoln Center, New York City
Sound signal is fed into the system and directed to each resonating object by co-performers, and comprises field recordings of frogs and birds alongside the chirps of oscillators. Visitors can freely ambulate and interactively listen, “placing one’s ear against the sculptures; feeling the vibrations in one’s hand or against one’s head; and even biting an object, allowing the sound to travel through the bones in one’s head.”

From each transducer-sculpture pairing in Rainforest IV there emerges a unique resonance: a twinning of signal and resonance that emerges as a complex, unique sound-in-itself. Tudor’s objects speak of themselves and they speak of the signal. A multitude of voices-in-themselves chatter both within themselves and across each other, separate but together. Peaks, troughs and apparent synchronicities ripple through the space.

Chance has a purpose in art. It permits a work to have at once both a structured direction and an opening to the unknown in real-time. The works in this project have applied both strategies described here in their making: methodical calculations have been recorded into the structure of them (the Cage approach) and a cacophony of chattering voices-in-themselves have been deployed in a space (the Tudor approach). Chance operations in art practice can speak, like vibration, of the beats of the world and can express the synchronicities that are the result of their mixing.

Flux

The term flux means energy flow, with the specific physics definition of “[t]he number of particles flowing per unit area of cross section in a beam of particles.”

For the purpose of this project it serves to think about an extended range of flows, not limited to luminous, magnetic or electric particles, but also flows of information, of signals, of all kinds of what we can call energy. This project is in itself about energy, how to ‘down-
Figure 7
Joyce Hinterding,
ULAM from Aura series (2009)
Graphite on paper with electronics
Breenspace, Sydney

Figure 8
Joyce Hinterding,
Large Ulam VLF Loop (2014)
Graphite on paper with electronics
GOMA, Brisbane
load’ or transduce it into form, to enact a state-change (or at least attempt it) and embody that state in an artwork.

Electromagnetic energy (atmospheric information) is always vibrating and transmitting around us. Lightning strikes whistle into the upper atmosphere then back down again, while our planet itself vibrates with a continuous resonant frequency (the Schumman resonance)\(^\text{21}\). Signals are always moving.

Douglas Kahn has coined the term \textit{aelectrosonic}, which for him means to tap and hear these ever-present electromagnetic flows, rendering them as \textit{aesthetic}. His term is the \textit{aeolian} (music of the wind) extended to the electromagnetic. Kahn visualises electromagnetic energy as flowing around us always.

“Just as the wind blows across distinctions of naturally occurring and human-made, of nature and technology, so too does energy move across states as transduction. Energetic movement is in this way a continuation locatable at transformation.”\(^\text{22}\)

While Kahn uses his term to specifically refer to atmospheric electromagnetic activity, the act of transduction, and the aesthetic sonification of this, through this project I’m arguing for an extension of Kahn’s idea of \textit{aelectrosonic} to invisible energy flows of all kinds. The aesthetic visualisation of these flows cannot always be achieved by a technical act of transduction, but perhaps is possible in a variety of ways, including by allusion. It may be possible through a series of interpretive steps to achieve a similar outcome for light and images as the aelectrosonic does for sound.

Kahn’s idea can be clearly understood through Joyce Hinterding’s graphite drawings. These are works which are at once both radio antennae and drawing: they are sensitive to electromagnetic flows in the atmosphere, to the conductivity of human bodies that approach them, and to touch\(^\text{23}\).

A visitor wears headphones to listen to a drawing and is invited to touch its surface, listening to the change that occurs when their body joins the antenna loop. This touch leaves a trace on the drawing surface as graphite is disturbed, and work becomes ‘noisy’ over time: both visually and sonically.

\(^{21}\) Kahn, \textit{Earth Sound Earth Signal}, 177-178.
\(^{22}\) Kahn, \textit{Earth Sound Earth Signal}, 7.
Figures 9, 10
Anthony McCall, *Line Describing a Cone* (1973)
30 minutes B&W 16mm film, haze machine
Whitney Museum, New York
Top: a single film frame; bottom: audience insertions
The act of transducing sound from electromagnetic flux is within reach from a technical perspective. The transduction of luminous flux (light flow) is not as easy to achieve. Light has no need of a medium and travels on average 300,000 times faster than sound. Sound is medium-dependant, travelling as waves of pressure through a sea of molecules\textsuperscript{24}. This technical gap between the two complicates attempts to coincide light with sound or to treat them in parallel manner.

This project is interested in this sound-light gap as it exists and in what methods might be used to surmount it. Working with light as a medium, it’s possible to perform an allusive process, one where a literal, technical state change of energy is not necessarily performed yet the appearance of one having done might be there. For the time-based image practices which are the focus of this project, these allusive processes are best performed by artists who work outside of the screen.

Anthony McCall’s \textit{Line Describing a Cone} (1973) is a 30 minute, 16mm black and white performance-film in which a simple, thin white circular line is gradually traced. The white figure starts as point, develops into an arc then ultimately closes as a circle, ending the film. \textit{Line Describing a Cone} was designed intentionally to float in a found medium: the already-existing smoke and incense particles of the spaces where it was shown. With the reduction of smoking in public spaces the work has since been modified: found smoke has been replaced by a haze machine and the one-off performance model has been replaced by an automatic loop\textsuperscript{25}.

The thin white arc forms a spatial structure together with the smoke particles. This structure (a slowly forming cone) stretches from the screen surface back to the projector lens. As the circle slowly draws itself, more of the cone resolves. Viewers interfere with the structure, interrupting it with hands and bodies, inserting themselves as noise into the information of the beam. This viewer interception is built into and expected in the work, and as a result of this addition of signal with noise, no two showings of this piece can possibly be alike\textsuperscript{26}.

\textsuperscript{24} “What is faster the speed of light or the speed of sound?,” \textit{Lansing State Journal} (published July 28, 1993), http://www.pa.msu.edu/sciencet/ask_st/072893.html.


“This film exists only in the present: the moment of projection. It refers to nothing beyond this real time … It contains no illusion. It is a primary experience … The space is real, not referential; the time is real, not referential.”

*Line Describing a Cone* is light-in-itself, and it also alludes to the phenomenal nature of light. It makes plain our incapacity to touch all of that we can see. As in quantum physics, one observation possibility collapses another: when we disrupt the beam with our hand, the light disappears from view; we can’t have both at once. When activated it is actual, present and live; distributed all around, untouchable yet everywhere.

“…The temporariness and the permeability among different elements are an essential part of McCall’s aesthetics. As he himself states, objects “do not describe a thing but the transition from one state to another. The object is the transition.”

This project is about moving image and how it can allude to the ever-present energy flows of the world. The 16mm film strip is an interesting space to consider in this context because it carries an optical sound track area: an area that is both visual and sonic at once. One component of this project is to consider whether this strip can be a location for alternative types of transductions that that might be proposed as extensions of Kahn’s aelectrosonic.

![Figure 11](image)

Guy Sherwin, 16mm optical sound examples
Left to right: laboratory recording of mono waveform; sound made by scratching directly onto film; sound made by chemical processes to film; sound made by overprinting image information into the sound area.

Modulations

“Instead of the dull realism of mindless atoms and billiard balls … I will defend a weird realism … a world packed full of ghostly real objects signaling to each other from inscrutable depths, unable to touch one another fully.”

An interesting area of question for a practice of video projection is that of scale. Large scale begets intensity. Colour depth and brightness at large scale is spectacular and sumptuous as well as technical and costly. *Modulations* is a projection work which examines the opposite end of scale: the microcosmic. It is made from objects unspectacular, from elements ready to hand.

*Modulations* comprises a compact video projector playing a flickering image with a found lens facing it, collecting and translating the projected image as light. The 16mm projection lens waits with its front element facing the projector, aligned to catch its beam after it has travelled briefly through the air. Once caught inside the lens the image becomes only light, sparkling through its internal elements, compacting down to a series of tiny suspended points. Hologram-like, the light moves around within the lens as the visitor moves around the work. One can witness both a holding and a translation of the light as it first emits from the projector then disappears into and through the translating object.

At the very back of the lens the light becomes a compact, blinding star. Residual light signal fans out and into the air, forming a soft three-dimensional light-cone that occupies the gallery space. Eventually this cone intersects a surface (a nearby wall, a hand, a body) and a soft, powdery flash can be seen. This circular puff of light is the residue of relation between projector and lens: it speaks of the translation that has occurred.

For the visitor, ambulation around the apparatus both reveals and collapses visual information. Information hovers in a low-visibility state, hologram-like and in-between. When one looks directly into the back of the lens to see the blinding star, or uses a hand to inter-

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sect the emitted light-cone, some of what lies hidden in the apparatus is revealed. When one does this it collapses other possibilities, such as seeing the pale circle pulsing on the wall: each observation point collapses another.

This work was prompted by my optical observations of the transit of Venus in my backyard in 2012. In Modulations I seek to express the idea of a spinning, intersecting pulse by the use of cycling flicker. The video comprises a series of rapidly moving white circles on a black ground. Each white circle is too large for the frame: they constantly move downward and they eclipse the frame, the same motion happening over and over again. This eclipsing
action and the round forms speak of both spinning projector shutters and spinning planetary cycles. Flicker emitted in the projection is at once sharp yet soft, rounded yet cutting, a slightly organic glitter or shimmer rather than a strobe.

*Modulator* (2012) comprised a single miniature LED video projector not much larger than a phone and with 22 lumens (very low) brightness. Across from the projector sat a wooden lens holder intended to hold a glass element for a classroom science experiment. On the lens holder was balanced a single, found 16mm projection lens. In *Modulator* (2013) the same apparatus was mounted on a white steel and reflective acrylic plinth, the stands replaced by smaller props of balsa wood.

The image itself is derived from a loop of direct film (camera-less film) made by adhering black circles directly to clear 16mm, video recording the projected loop then inverting the recorded image. The images are fragments that contain only sparse and purely graphic information.

The rounded-edge to the image lends a fluidity to the flickering movement; an organicism is implied but when examined at the root level isn’t really present (being no more than stickers on film stock). The everyday elements making up the work and the manner of their presentation and arrangement speak to classroom science experiments and the wonder of everyday phenomena waiting to be read.

Working in the realm of video I cut the short film loop into smaller fragments, each representing a different speed of movement (rhythm) of the object eclipsing the frame. To compose the complete video sequence I arranged these tiny fragments in repeating patterns on the timeline.

The work employs *chance* in the composition of this video timeline. The chance operation takes the form of a random number table with two columns used to select a) a clip from 17 available; and b) the number of times (up to 17) to repeat it in the timeline.

Each fragment of video holds a different movement of the shapes within it; repeating a fragment down the timeline generates a repetitive rhythm (a frequency). When a new clip is added to the timeline, it generates a new frequency and a ‘gear shift’ of results. The random and tabular approach leads to unexpected rhythmic juxtapositions in time and is freedom from the traditional shaping of a timeline as beginning, middle and end. The timeline becomes a stream with none of these structural limits: it assembles itself, and it can potentially go on forever.
Figure 13
Modulator (2012)
LED projector, lens, tripod, lens stand, MP4 HD 1080p video (looped)
Melbourne, Australia (image: Matthew Stanton)

Figure 14
Modulator (2013)
LED projector, lens, balsa wood, plinth, MP4 HD 1080p video (looped)
West Space, Melbourne (image Matthew Stanton)
This work alludes to flux: in and around its apparatus Modulations raises a small, vibrating zone (a flux) in the gallery space. An energetic exchange is taking place, transduction is happening in front of our eyes as the signal passes from projector to air to lens back to air again.

In the simultaneity and overlap of beats in the world, there arises some kind of relation between beats, or at least the appearance of relation. How close do two signals need to be to be related (or be seen as such)? How far apart before the perceived relation breaks? Do objects possess a field of influence at all, and if so what happens when they come together?

Is the relation we see that of synchronicity: “significant coincidence of physical and psychological phenomena that are acausally connected?” Or is it true entanglement per quantum physics, where “two particles interact at some point in time [and] the properties of these particles … remain connected at future times?” Modulations concentrates this question of relation versus coincidence into a small apparatus, and asks, do these objects make any sense of each other?

When this research project began it was timed with a period of significant developments in realist philosophy, specifically those identifying under the umbrella of Speculative Realism. This work attempts to address some current thinking about reality and objects in Graham Harman’s Object Oriented Philosophy (also known as Object Oriented Ontology, or OOO).

“reality is churning … the arena of the world is packed with diverse objects, their forces unleashed and mostly unloved. Red billiard ball smacks green billiard ball. Snowflakes glitter in the light that cruelly annihilates them; damaged submarines rust along the ocean floor. As flour emerges from mills and blocks of limestone are compressed by earthquakes, gigantic mushrooms spread in the Michigan forest … All of these entities roam across the cosmos, inflicting blessings and punishments on everything they touch, perishing without a trace or spreading their powers further.”

31 Law and Rennie, A Dictionary of Physics.
In OOO, Harman posits the world as made up of a proliferation of individual things. For Harman all these things (objects) are real, but realness should not be confused with substance or materiality. We can imagine, visualise or agree on an object without it having material form in the world. OOO is a de-anthropomorphised worldview in which there is no life/non-life distinction.

For OOO every object is withdrawn. It is always more than the sum of the parts, pieces or quarks that make it up. It is also more than the sum of its relations in the world: its place in politics, in capital, in social context. An object holds something unique in itself, and it always holds something to itself. Black hole-like, they keep their secrets and our knowledge of a thing is always finite.

For Harman objects don’t only conceal their information; they reveal or emit information about themselves, sparkling with qualities. When objects relate to each other they do so in aesthetic space, responding to the emitted qualities and surface information of the other, translating and digesting.

I see vivid parallels between Harman’s philosophy of a proliferation of unique objects expressing themselves in the world, and Cage and Tudor’s compositional strategies, which made space for the voices of things-in-themselves to emerge. Harman’s world can been seen as one of voices, signals, beats and flux; one populated by entities with something concealed within waiting to emerge. Cage sought to reveal concealed information in objects (the emergence of sounds-in-themselves) through his application of chance practices in composition. Tudor’s individually voiced objects chatter across each other, revealing something of themselves, speaking together but also alone and internal.

Modulations is a work which seeks both to evoke the wonder of everyday phenomena and to address this together-but-aloneness of objects in the world. We can interchange the terms objects, signals or voices with beats, and can consider Modulations in the light of the mixing of any of these things. How do they mix, and do they truly ever? In this work I have endeavoured to unearth a voice-in-itself for each object in the chain. The projector flickers its flicker, the lens glitters its glitter, the light-cone shimmers its shimmer, all together yet separate at once.

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35 Harman, “Indirect Causation,” *The Quadruple Object*. 
Black Noise

The second work produced in this research project, \textit{Black Noise}, is an assemblage of objects bound together by audio and electrical signals, where information changes state from one end of the system to the other.

The work begins with a sound signal: an audio track containing synthesiser oscillations that is played but never heard. This signal travels through an amplifier to a converting device (a Musicolor), which turns audio signal into electrical energy. The energy is used to power an analogue 16mm film projector, which slowly clicks through a loop of film with its projection capability largely disabled.

A Musicolor is a hand-built home entertainment device popular in the 70s-80s and built by its owner from kit instructions. It takes incoming sound frequencies and converts them to electrical signal with the intention to power coloured party lights: it is a homemade ‘\textit{visual music}’ box. Now a found object, each one was originally built by its owner, and each one is idiosyncratic: a little different in its internal wiring or design.

An analogue film projector has a great deal in common with a sewing machine: they both feed material (film or fabric) through their similar mechanisms using a series of teeth and tensioning elements. A sewing machine (or a guitar effect) can be controlled by a foot pedal. As you develop your sewing skills you can control the speed of the machine precisely, deciding how much power to send to it by your pressure on the foot controller. As an analogue device, a sewing machine is very responsive to current. While not intended to, a film projector is capable of responding like a sewing machine does to modulations of power: it can start, stop and run slow, barely inching the film forward. In this work there is no sewing machine foot pedal, but there is the Musicolor box.

The Musicolor modulates the flow of current to the projector based on frequency and amplitude of the audio it receives, and this flow of variable power causes interesting distortions in the projector’s operation where the projector can begin to speak: of itself and of its signal. Each part of a projector needs a different amount of current to start. The lamp lights easiest; then, if there's enough power, the film is moved past the gate and the
shutter spins, even if just a little. The speaker buzzes as the sound-exciter lamp switches on and off again and again with the raise and drop in power flow, and as bursts of photons are detected by its system. Finally, projection of light occurs when there is enough current to do it all: light the lamp, spin the shutter and turn the sprockets to move the film past the projector’s gate.

Threaded on the projector is a repeating loop of black and white film containing an image of a full moon. There is no lens in the projector: the projected ball of light seen on the wall is the result of a refractive interaction between the moon image on the filmstrip and the curved interior of the projector’s halogen lamp. Removing the lens denies the image in its literal form but allows it to express itself another way (through refractive interactions). Image is allowed to emerge as image-in-itself. The image ultimately still survives in the work as material surface on the filmstrip: close examination by the viewer can reveal it.

The originating image was shot from a moving vehicle at night in Cootamundra, 2011 while I was there to visit The Wired Lab, a sound art project space in rural Australia. We had finished our activity for the day and were heading back to town, and as we travelled I tried to track the giant and luminous full moon by hand with my camera, recording while the bouncing movement of the vehicle interfered. The resulting image is a glowing white moon-circle zipping in and out of the black frame, fraught with energy. I hand-processed a 16mm film work-print in black and white and the clear moon image traces rhythmic, circular arcs upon its surface.

This work inverts the logic of the image in Modulations, where a ‘blank’ image was intended to evoke a cosmic, planetary movement. In Black Noise the film contains a real image of the astronomic - a diaristic glimpse which is passed through a series of gates or limits and converted from the poetic into information and phenomena. The image on the strip ultimately acts as punch tape, allowing light through, withholding it, modulating it.

Fluctuations in audio signal, while hidden from the ear, are transformed as they travel through the system and are expressed by small movements in the projector’s mechanism. The projector twitches, it flashes, it clicks through frames. These phenomena expressed by the projector speak of the buried but always moving sonic signal within the system.
Figures 15, 16
Black Noise (2012)
Eiki 16mm film projector with lens removed, black and white film (looped),
Musicolor, amplifier, sound player, stereo sound file (looped), plinths
West Space, Melbourne
“[An] object can be viewed as a kind of black hole whose interior has receded infinitely from view, but which also leaks a certain amount of radiant energy … And this is precisely what objects are … inscrutable holes of withdrawn energy that somehow still emit fragrance or radio signals.”

Like Modulations, Black Noise is also prompted by readings of OOO. While not bound to any strict philosophical position, this work attempts to make a poetic link with Graham Harman’s vivid descriptions of objects: their black hole-ness, and the way information bubbles along their surface. In Black Noise much information is baffled, restrained or hidden (withdrawn). What information does escape is cryptic and occurs in dimensions other than where the information originated.

Black Noise contains multiple pulses at its core: a pulse of vibrating audio signal (although never heard), a pulse of fluctuating electrical current, a pulse of the moon zipping through the film frame. Chance overlays and interactions occur between these pulses where they meet. Sometimes when the projector has enough energy to play, there is nothing but black in the frame and the energy is withheld at the level of the projector, light reflected back within. Sometimes the moon image and electrical current align: a fluttering globe of light is the result. The film loop is the punch tape, the program for release of this information.

A zone of energy (a flux) shuttles back and forth in the system, at times expressed or withheld. Image is deliberately withheld, sound too, and this stifling has an unusual result: the projector body itself chatters with energy. The projector emerges as voice-in-itself.

“this is … Goethe’s critical eye as performed phenomenologically in his Theory of Colours (Goethe, 1967 [1810]), now migrated, resident in the relationships between objects, machines and hardware.”

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36 Graham Harman, Guerrilla Metaphysics (Chicago: Open Court, 2005), 184.
Dark Matter

Between the first two works in this project, *Modulations* and *Black Noise*, and the final one, *Dark Matter*, lies a large gap both in time and in thinking. The first two projects share several features: a strong interest in Graham Harman’s ideas about objects, a subtlety of flicker, and a withholding or baffling of information. These two works each rely on a delicate arrangement of ‘just right’ elements in order to function correctly. Both works share a potential inaccessibility, and the issues that can bring for visitor perception and interaction. These two works do not overtly tell the visitor how to access them but rather allow shadows and fragments of themselves to be seen.

I had concern about my excessive reliance on philosophy in the first two works. An artwork should not be burdened by having to stage a philosophical concept; it should be allowed to exist for and in itself. But my largest consideration in this final project was how to be very clear that image could transmit in a form of energy.

In this work, *Dark Matter*, I set out to do a number of things: to make overt use of frequency; to make a work that would seem to actually embody and transmit energy; to demonstrate the use of optical sound as potentially transductive; to allow objects in the space to speak, vibrantly, as themselves. I shifted my prior trajectory of withdrawing information into the assembly, instead using it to send energy outwards: energy that occupies the devices, the room, and the neurophysical space of the viewer.

*Dark Matter* is made intentionally for flatscreen TV. It is made to manifest the potential of the TV as light-bringer but also to test its limitations as a media display device; to traverse boundaries of analogue and digital, and boundaries of sound and vision. My intention is for a vividly experienced *un-locateability*, where the work sits somewhere along the axes of light, sound, image and object, always travelling between them, never still.

This work is extensible depending on available space, with the number of flatscreen TVs variable from two to infinity. Each screen in the space plays its own video file of a flickering, noisy black and white image with accompanying sound. Each video stream is unique but is part of an overall set. Screens are distributed around the room in a manner both for-
Figure 17

*Dark Matter* (2015)

Eight flatscreen TVs, eight USBs, MP4 HD 1080p videos (looped, stereo)

VCA Postgraduate Gallery, Melbourne (image Matthew Stanton)
mal and casual: they lean in the same portrait-orientation as each other against the wall, some facing toward the visitor, some turned away to hide their signal.

Each screen speaks its own program; they chatter over each other, they vie for viewer attention. Though loosely composed in the space, they each shed enough light to link them to the next in a flickering network. Visitors are immersed in a shifting shower of projections, reflections, and calls for attention. Image is always being torn away; another screen in the corner of your eye is vying for your attention. The image will not stand still long enough to be seen, or sound long enough to be heard. A pattern appears to be there but it is one resistant to decoding: one can only surf on one’s own constantly shifting attention.

Moving image has a granularity to it. 16mm film comprises 24 discreet frames per second; the video image 24, 25 or 30 frames. This frame rate gives the human eye and brain enough information to compose a moving image, without an excess of data needing to be stored and moved. We can measure rhythm (frequency) in per-second terms: moving image has a very coarse granularity (a low frequency). When sound and image flow side by side into a recording device or out onto the timeline or out through a speaker or screen, they flow in very different ways. Digital sound possesses a very fine granularity relative to that of moving image (e.g. 960000 samples per second): its only limits are computational. In a digital video editing context, sound is technically not hinged to the timeline frame rate in the same clunky, low-frequency way that image is. There is a disconnect in the editing space between the two streams (sound and image), just as there is a disconnect in the way light and sound travel in the real world.

In thinking about un-locateability I wanted this to occur in the work across as many axes as possible. To this end it was important to construct a push-pull of attention between image and sound, on both a technical and perceptual level.

To broach the disparity between image and sound granularity on the timeline, I locked my editing moves to the lesser frequency: the image at 24 frames per second. This 24Hz frequency is the pulse which informs every cut and clip in this work; it flows through every part of the work whether sound or image.

In 2014 I participated in ‘The Bottom End’, a masterclass on listening to and using infra-sound (low frequency sound at the bottom of or below human hearing range) conducted by Australian sound artists Cat Hope and Dave Burraston. For two days we occupied a school gymnasium and listened intensively to low frequency sound waves on a system of multiple subwoofer speakers. Where we couldn’t hear sound waves, we felt them, vibrating through the very fabric of the building itself.
Low frequency waves are so slow and so large that we are capable of noticing each peak as it passes through our bodies: their wavelike nature is accessible and perceptible to us; it is made plain. Affected by my listening experience at the workshop, I wanted to work with infrasound waveforms both as images (and in a mutated, nonliteral way) as the sound in this work.

I was already working with direct film in my projects (the practice of working by hand directly to a 16mm film strip) and to some extent with optical sound. I had the question: could low frequency waves be transmitted as both image and sound at once? Could the film strip act as delivery for this conceptual image-sound object?

Consider an image of a sawtooth sound wave. A pure straight line rises and falls; we can read the peaks and think of the ‘shape’ of the sound they will make. A waveform is a minimal yet informationally dense image: it speaks visually of the sonic information it describes.

![Figure 18](Diagram of a sawtooth wave.)

Sound is vibration: literally the vibration of molecules in the air, causing pressure waves which reach our pressure wave receptors: our ears and our microphones. Our bodies are made to feel the (literal) pressure of sound, all of the time. Rapid addition and subtraction of sound to a space causes actual pressure differences in the room, detectable by our ears and, at the lowest frequencies, by our whole bodies.

Image can mimic this sound pressure variation by flicking on and off, creating a kind of rhythmic visual pressure. For a flicker image, the higher the contrast between frames (i.e. if the image is very bright, and the drop or gap is very black) the higher the stimulus - the higher the pressure gap. Flicker means a temporal figure-to-ground switch and back again, a dramatic seesawing of presence and absence. As in Conrad’s *The Flicker*, the incessant variation and the sense we are trying to make of it are the experience, not the image itself.

Where there’s a cut in the flow of visual (or sonic) information, our cognitive selves invest energy in making sense of that gap. Momentary subtractions (of a moving image frame, or
of a sound) can be highly stimulating at the neurophysical level. The harder the cut, the greater the discontinuity, the greater the stimulation. We see echoes; the join comes alive: it is strange. Between the states of on and off, something else arises.

On a strip of 16mm film, there are sprocket holes down only one side. In the narrow strip on the sprocket-less side, sound is recorded as an image of a waveform. When played on a projector, the strip first passes a gate where the image part of the frame is shown between turns of the shutter. Almost a second later the same frame of film, having passed over several sprockets, reaches the sound exciter lamp. Where light passes through clear sections of film on the sound edge, it is received and amplified as sound signal. Where the film is black, light (and therefore sound) are withheld. Difference in the image on the sound strip causes difference in the sound. In an optical sound system, image, light and sound are one.

It is possible to draw on or graphically manipulate this optical sound area of the film and produce sounds by this mark making. When I make a mark in the frame of a clear piece of 16mm film, my mark obscures the light and appears, when projected, as a black image on a white frame. If I trail this mark into the sound area of the film, I also get a sound from my drawing. In playback the projector will compile and mechanically interpret this strip into 24 frames per second of moving image and sound.
The form of the low frequency sawtooth waveform was my visual and sonic prompt for this work. I cut sections of clear 16mm film leader 144 frames long: at 24 frames per second this equals six seconds duration when projected. This length was arbitrary, a human-scaled object: a nice length of film to lay across the table and draw, as well as fitting on the projector in a nice-sized loop, neither too long or too short. I drew long, diagonal ‘sawtooth’ forms onto my film strips.

To transcribe my film image into the digital I photographed it using an optical printer (a device used for special effects and format changes in analogue film). This procedure differs from the traditional method of digitisation (telecine) in that there is freedom of lighting and framing options. Telecine privileges a ‘pure’ image reproduction, whereas optical printing allows for graphic and temporal reinterpretations. In the course of this transcription process, moving light around on the film surface revealed the particulate mess it was already carrying as the residue of the drawing and handling processes.

To transcribe the sound I played each loop through my 16mm projector, allowing the optical sound system to read the edge of the drawing, recording it through the projector’s output directly to my digital sound recorder. Essentially this soundtrack was a digital record of the stream of photonic activity that occurred in the reading of each strip of film: a stream of particulate information.
Once digitalised, I married the two disparate transcribed streams (image sequence and sound file), then I cut and separated each single pulse (or wave) I could locate in my drawings. There is an issue of representation here: representing these things just as they are causes an energy drop. Sidesteps, transcriptions and modulation are techniques to introduce more energy into the system.

Think of a moving image, flowing, with sound in sync. Now lay a pattern of cuts and modifications across the top. The pattern modulates the stream, and by the simple act of cutting one constructs beats. In *Dark Matter*, image flickers on for two frames with no sound, then sound is heard for two frames with no image. A strange relationship of pressure variances emerges between the missing moments of sound and image - a directing of attention back and forth between the two.

On the upright flatscreens, the optical sound area of the image has been left visible, lying at the bottom of the frame. The sound heard emitting from the speakers on board each TV screen is in fact the sound of that bottom 25% of the frame image. It is literally the sound of particulate noise picked up on the surface of the film, incurred by my drawing, my re-photography, my handling. The noise is real: we can see what we hear, hear what we see. It is the ‘dark matter’ this work is named for.

Each screen is playing its own individual video stream, uniquely generated using a two-column random number table, numbers generated on an iPhone app. The first column is a number between 1 and 27 (the total number of clips) and the second also a number between 1 and 27 (how many times to repeat the segment). Duration and number of clips generated within this system is variable, infinite. Each screen does its unique re-telling of the same fundamental data set.
Leaning rather than mounting the screens draws attention to them as more than mere passive display devices. The glitter of light on a bezel, the palpable heat they generate, the details of their vents, their less-than-audiophile sound reproduction, their unique video signals all speak of the screens as objects-in-themselves. Some of the screens are turned away: we can experience the sensation of the image without actually seeing it. The screens are present in the room and they are speaking.

*Dark Matter* appeared in four contexts in 2015: as eight screens in a solo show at VCA Postgraduate Gallery (Melbourne); as two screens in the group show *Who Is Mr Favisar* at Trocadero Gallery (Melbourne); as two screens (both turned to face the wall) in the group show *Proud* at Margaret Lawrence Gallery (Melbourne); and as an extended solo show comprising eleven screens and the addition of four speakers over three rooms at the Mildura Palimpsest Biennale #10 (Mildura).
Figure 23

Dark Matter (2015)
Eight flatscreen TVs, eight USBS, MP4 HD 1080p videos (looped, stereo)
VCA Postgraduate Gallery, Melbourne (image Matthew Stanton)
Conclusion

This practice-led research has explored the use of analogue and digital moving image and projection as a way to express what I see as the energetic fabric of the world: a multitude of pulses speaking over each other. This project asks how relation arises between events and things and if it does at all. Are we just patterning things ourselves?

A key feature shared by the three works produced is the de-centralised relation between what is broadcast by the projector (the image) and what the effect of the image is in the space (the projector’s voice). The zone of these works extends from the body of the projector, around the room and into the neurophysical space of the visitor. The work is never located in only one of these spaces but rather shuttles back and forth between them.

Vibration, indeterminacy and energy flow have been my major areas of theoretical and artistic study in this project. I’ve used my images as tools, and I have sought to consider a zone beyond the image, where the projection might express itself as an energetic force, a voice-in-itself.

Just like the individual beats or frequencies that make up the fabric of life but seemingly do not truly touch, my set of theories and interests revolve into and out of view, speaking at different levels of intensity and in different ways throughout the projects I’ve produced.

My use of flicker has made allusion to energy, and my use of overlapping signals has attempted to make allusion to the complexity of relation. I’ve endeavoured to embody always-moving energy in these works, by making the works themselves always-moving. For the visitor to one of these works, patterns can be chased but full decoding stays elusive. An aspect of the work can revolve into prominence then on closer examination, slip away to be replaced by another: there is never true stillness. These works are made in order to argue that between image, object and space, there can be energy.
Bibliography


McCall, Anthony. ““Line Describing a Cone” and Related Films.” *October* 103 (2003).


Appendices

Works presented for examination in *VCA Art Masters Show*, December 2015 at Victorian College of the Arts, Melbourne Australia.

Four LED projectors, lenses, monitor stands, acrylic mirrors, balsa wood, media players, MP4 HD 1080p video files (looped); images: Matthew Stanton

Ten flatscreen TVs, USBs, rubber grips, media players, MP4 HD 1080p video files (looped, stereo); images: Matthew Stanton

Figure 28  *Dark Matter* (2015)
Ten flatscreen TVs, USBs, rubber grips, media players, MP4 HD 1080p video files (looped, stereo); image: Matthew Stanton

Figure 29  *Dark Matter (Extraction)* (2015)
Four 8-inch monitor speakers, iPods, .AIF files (looped, mono) flatscreen TV, USB, rubber grips, media player, MP4 HD 1080p video file (looped); image: Matthew Stanton

Figures 24, 25

*Modulations* (2015)

Four LED projectors, lenses, monitor stands, acrylic mirrors, balsa wood, media players, MP4 HD 1080p video files (looped); images: Matthew Stanton
Figures 26, 27

*Dark Matter* (2015)

Ten flatscreen TVs, USBs, rubber grips, media players, MP4 HD 1080p video files (looped, stereo); images: Matthew Stanton
Figure 29

*Dark Matter (Extraction)* (2015)

Four 8-inch monitor speakers, iPods, AIF files (looped, mono) flatscreen TV, USB, rubber grips, media player, MP4 HD 1080p video file (looped); image: Matthew Stanton

Figure 28 (left)

*Dark Matter* (2015)

Ten flatscreen TVs, USBs, rubber grips, media players, MP4 HD 1080p video files (looped, stereo); image: Matthew Stanton
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