

Digital Innocence

Between hand and screen.

by

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I hereby declare that I am the sole author of this thesis.

This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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ABSTRACT

Screens mediate an ever-increasing part of our experience today. While the space within our screens is indispensable - as perceptually 'real' as embodied experience itself - this space tends to exclude the hands and body in favour of the eye and mind. This bifurcation does not recognize or allow for the integration of body and mind that is both fundamental to our well-being and vital to the process of making things. Moreover, immersion within our screens dulls an awareness of ourselves in relation to them.

This thesis is an exploration of the immense potential that resides in the space between our hands and screens. Through a series of themed meditations and experimental set-ups, my research aims to prove that reconciliation between digital and embodied mediation can simultaneously offer enchantment to both our bodies and our minds, and furthermore, that the empowered hand is essential for the maturation of digital technologies.

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And every helping hand along the journey.

for
virtual craftsmen

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“Why, on what lines will you look, Socrates, for a thing of whose nature you know nothing at all? Pray, what sort of thing, amongst those you know not, will you treat us to as the object of your search? Or even supposing, at the best, that you hit upon it, how will you know it is the thing you did not know?”

~ Plato¹

¹ cited in Michael Polanyi *Knowing and Being* ix

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“A role for the tangible, the haptic, is essential for any account of our physical encounter with digital media, given our increasingly computationally enhanced lives. Any conceptual framework we embrace to make sense of our lives amid technologies needs to have space for tactility, or even better, incorporate it in its very fabric.”

~ Susan Kozel 'Closer' 38

This time, I remember to push my knees as far across the wheel as possible, tucking my body in to establish a firm contact between the machine and myself. I slap a fist-sized ball of wet clay down onto the wheelhead, and with my right hand I carefully edge the speed lever forward. I inspect my crude dome of clay as I adjust the lever, fine-tuning its velocity until the clay spins energetically. I proceed to swirl my hands around in the water bucket placed on the far left corner of the wheel; find my sponge and squeeze its contents over the rotating clay. As I toss the sponge back in the bucket, I feel my empty palms reflected back at me in the wet sheen of the prepared clay. Conditions are perfect; I'm ready to throw.

First contact with the clay is crucial; my primary manipulations must bring the clay into perfect equilibrium, centered precisely upon the wheelhead. Without proper centering, the living clay will never feel truly anchored, minute vibrations will resonate down through the entire process, becoming a structural flaw plaguing the throw



fig. 1.1 Opening Clay for a Japanese Bowl.

from start to finish. I press my right hand firmly upon the top of the clay, cupping my palm accordingly as the clay pushes back. My left hand supports the perimeter of the clay, framing it in horizontally as I lean forward and actively transfer my weight down through the wheel. The material is powerful; for a few moments, it resembles an elemental struggle between man and material – I throw the entirety of my physical strength and bodily weight into a triangle formed between arms, chest and clay; but then, the clay finally submits to me, becoming a docile hemispherical dome spinning beneath my palms. I can sense its perfect roundness through visual inspection, but it is better felt under the hands, through the velvety feeling as surfaces of skin and clay slide past each other without a single vibration.

Once again, I fish around for my sponge and reapply water to the surface of the clay; sufficient lubrication is essential at all points during a throw. With my left middle finger extended at a forty-five degree incline to the vertical, I engage the clay for the first time with designed intentions; drawing the material back to create a

cone-shaped incision that penetrates down into the core of my clay hemisphere. My other hand is always there to support and guide operations; maintaining the balance so inherent to throwing clay. Although I cannot see how far my fingertip is from the surface of the wheelhead, I intuitively gauge when to stop excavating, leaving enough clay for the base of my vessel. I rotate my left finger to the vertical and draw it towards my body, watching until the clay takes on an ashtray-like shape; it is out of this rather banal foundation that I will produce my creation.

After several passes back and forth across the flattened clay base – an essential step to ‘compress’ the clay and avoid cracking during firing – the clay is ready to come to life, its low thick walls drawn up from the wheelhead to become anything from bowl to mug to vase or teapot. To do this, I must pull the clay, literally grasping it between carefully modulated fingertips and drawing it upwards through a series of ‘pulls.’ This stage of throwing requires an incredibly attuned conversation between my material and my hands, an im-

mersive awareness predicated upon the integration of eye and hand - holistic oversight tempered by intuitive feeling. Minute variations in finger alignment and timing – the clay must always be worked in tune to the revolutions of the wheel – have drastic effects on the success of a throw, resulting in uneven thickness, warped form or worse; catastrophic disintegration as the clay yields to constant centripetal forces. This time, my beginner hands meet moderate success; the clay remains balanced above the wheel long enough to pass as a vase. Applying some minor adjustments to the rim and a few final touches leaves me with a satisfied sense of completion - I know that this piece is at its apex; to work it any longer would only be counter-productive.

* * *

As a designer and a maker, I can think of nothing that defines me more than my hands. My hands make sense of the world around

me and act upon it. Through practice, my hands become skilled, possessed of an innate intelligence. This intelligence is both deeply satisfying yet impossible to articulate. Through my hands, I am able to channel my intentions into material existence; they are the key ingredient facilitating an ability to express myself in the world. Yet – more often than I would like – I find the role of my hands reduced to mere interface devices, their immense potential subjugated to technologies that ask nothing more from them than the most minute, repetitive operations: keystrokes, clicks, taps and swipes.

Even more troubling is a realization that during significant portions of my waking hours, my hands have withdrawn from my conscious awareness. Increasingly, I find myself in a bifurcated state characterized by an acute dislocation of my rational mind/eye complex from the sensing/feeling of embodied existence. To my mind, my interface with screens most clearly concretizes this phenomenon; by hours spent online, 'logged-in' and 'available.' The space within my screens is quickly becoming a tangible place as perceptually 'real'



*fig. 1.2 Caravaggio 'Touching' 1607.
Modified detail from Caravaggio's Michelangelo Merisi da
Madonna del Rosario.*



*fig 1.3 Hiroshi Sugimoto 'Al. Ringling, Baraboo,' 1995.
An image from Sugimoto's 'Theatres' series inspired by this vision: "Suppose
you shoot a whole movie in a single frame?"*

as my embodied experience itself; evidence of the contemporary existence of an alternate, digitally-mediated realm flowing alongside and permeating through all of my material experience.

The tendency to imagine ourselves inhabiting – or immersed within – the space of our screens amplifies a desire to believe wholeheartedly in digitally simulated experience. Moreover, our digital technologies seem invariably driven to enhance this sense of transparency; where larger screens, higher-resolutions or otherwise ‘seamless’ interfaces facilitate a shift in focal awareness out of the embodied, and into the space of digital mediation. Digital mediation perpetuates a sense of ‘immersive’ disembodiment – a sense of immersion predicated on the dislocation of mind from body. In simulated environments, minimizing the presence of our bodies works quite well to promote a sense of illusion, but simultaneously allows us to forget that digital environments shape us as much as we shape them. In fact, in many ways, contemporary culture has begun to adopt digital characteristics without even realizing it: we begin to

think lightly, skim the surface rather than explore the depths, have access to more, but know less. A disembodied immersion within our screens seems to dim our awareness of how we are in relation to them; and without this awareness, we have become ‘innocent’ to their effects. Losing an awareness of self in relation to our screens is a type of blindness similar to the old adage about the man holding a hammer – everything begins to look like a nail.

Paradoxically, digital mediation still relies entirely on corporeal framing in order to make sense. This is because everything we see on a screen is a ‘semblance’;¹ it is not real in the sense that we could reach out and touch it. Images on our screens are semblances because they resemble something other than themselves; they are the “bearers of our idea” of something else.² Observe a digital image of an apple, for example. We see the apple immediately. Without much effort, we can imagine the apple’s weight, its scent, how it would taste as we bite into it. We are able to do this because, in the past, we have held that apple in our hands; we have smelled and eaten it. Observ-



*fig. 1.4 Fuji apples.
Although simply a collection of digital information (pixels), we
can still imagine how good these apples would taste.*

ing the image of an apple recalls everything we already know about 'appleness.' Yet what we do not see are the thousands of individual pixels composed to resemble the apple. We simply do not register that the apple is in fact a codified matrix of digital information, raw data that remains completely meaningless without the addition of one crucial element: our embodied experience of it. Digital information is only meaningful when framed through "the [necessarily embodied] sense or imagination that perceives it."³

Our ability to transpose ourselves, assigning our idea of 'apple' to this aggregation of pixels, points to a crucial human capacity for 'virtual' thought. The virtual – simply defined as our ability to "be in excess of one's own state"⁴ – existed between my hands and the clay on the potting wheel; where my capacity to extend myself virtually allowed me to translate intention into material form. The virtual capacity operates between our technologies and ourselves, and is a crucial factor enabling our awareness of how to be in relation to them. Yet our virtual faculty does not seem to extend into our screens. We

are able to extract images from their surfaces, but operations within the digital medium tend to be characterized more by a sense of systematized 'givenness' than virtual potential. Brian Massumi agrees, stating that the virtual – a term used quite loosely in modern language – is not synonymous with the digital; that in fact "digital technologies have a remarkably weak connection to the virtual, by virtue of [their] enormous power for the systematization of the possible."⁵ This suggests that if we were to practice a virtual attitude towards the digital, we might discover immense untapped potential. But it also then necessitates the reciprocal extension of the digital into our embodied space.

We can no longer consider our screens autonomously from our hands. Even as digital mediation becomes increasingly capable of simulating embodied experience, embodiment alone confers the capacity to make experience 'real.' Through a series of themed meditations and constructed experiments, the thesis aims to suggest that reconciliation between embodied and digital mediation might si-

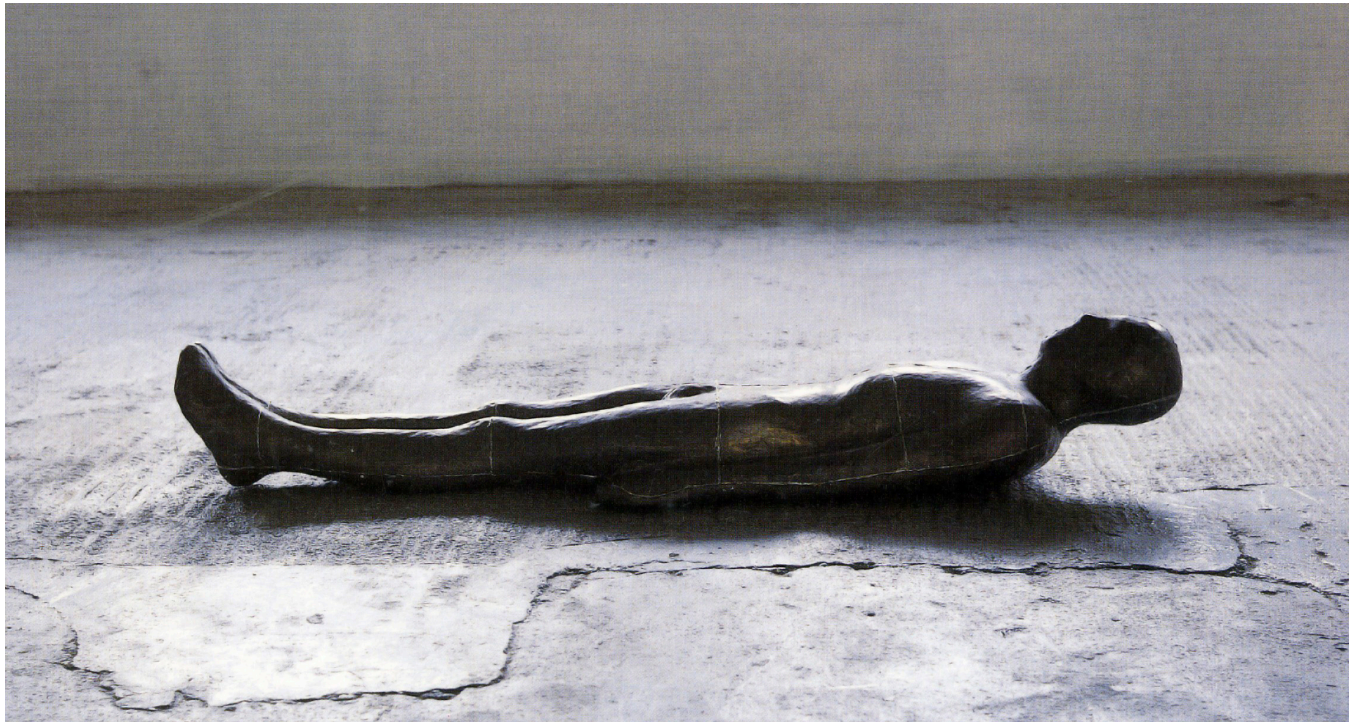


fig. 1.5 Antony Gormley 'Rise,' 1983-84.

There must be a celebration of the body to balance the inevitable rise of the virtual world...The body is a ground on which a balance can be struck between the internal registration of direct experience – whether that's plunging into the sea or climbing a mountain, or making love to someone that you care very much about, all of which reinforces us – and linguistic or coded negotiation with the outside world. The body is the ground in which these two activities relate.

It's the most important territory at the moment.

~ Antony Gormley, 2000 A.D.

multaneously offer enchantment to both our bodies and our minds. At the heart of the thesis lies a wholly architectural problem; a question of discovering a reconciling – and necessarily spatial – ‘third’ in which the opposites can unite.⁶

This necessity for a third option begins to explain why - throughout the thesis - I employ analog means to explore digital phenomena. Use of the analog – defined as the continuous transformation of an impulse from one qualitatively different medium into another⁷ – is imperative in order to cycle out of the realm of digital mediation, since beneath its elaborate constructs, the entirety of the digital medium can be understood as self-similar. As its most essential, everything digital is composed from a numerically based system of codification always in its primary state reducible to simple binary logic: a zero or a one, on or off, high or low. As such, any operations wholly within the digital remain subject to the same systematization of the possible.⁸

Throughout this thesis I consistently use analog means to test digital phenomenon. Transcribing each project through my hands categorically declines a desire for digital mediation to remain digital and instead reconciles it with embodied reality. This working method creates an exciting interplay between codified expression and intuitive feeling and begins to test my ‘slow hunch’ – that the digital can once again return to the domain of the hands. These installation projects intend to reaffirm the vital and continued role of corporeality in an age seemingly insistent upon perfecting the technologically mediated production of experience. In an era capable of total digital simulation, it remains touch above all else – even when virtually applied – which confers legitimacy upon reality, and as such challenges any modern claim to impart this legitimacy solely through digital means.⁹

The thesis possesses an overall gestalt – a durable cohesion emerging out of the juxtaposition of selected phenomenon, work-

ing methods, and projects – yet maintains a sense of porosity. The thesis is an open-ended framework rather than an airtight hermetic capsule, where new life can always potentially emerge from its pores. Seen from the perspective of digital mediation, the thesis wants to be low-definition media.¹⁰ High-definition media is characterized by being well filled with data, where low-definition media – through discarding a desire for seamless resolution – insists on subjective participation and completion by the audience. As a result, a strain of humanism emerges as a central ambition of the thesis; a rare variety compared to a lot of contemporary work using digital technologies, where the celebration of machinic autonomy tends to be favoured over the human dimension.¹¹

My research actively desires your participation; it invites involvement on both perceptual and performative levels. I hope that your analog act of reading this document will in fact offer virtual en-

gagement, and catalyze meaning as much from the rational complex of mind, eye and intellect as from the affective, sensing complex of body and hands.

* * *

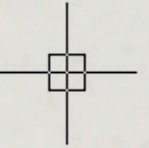
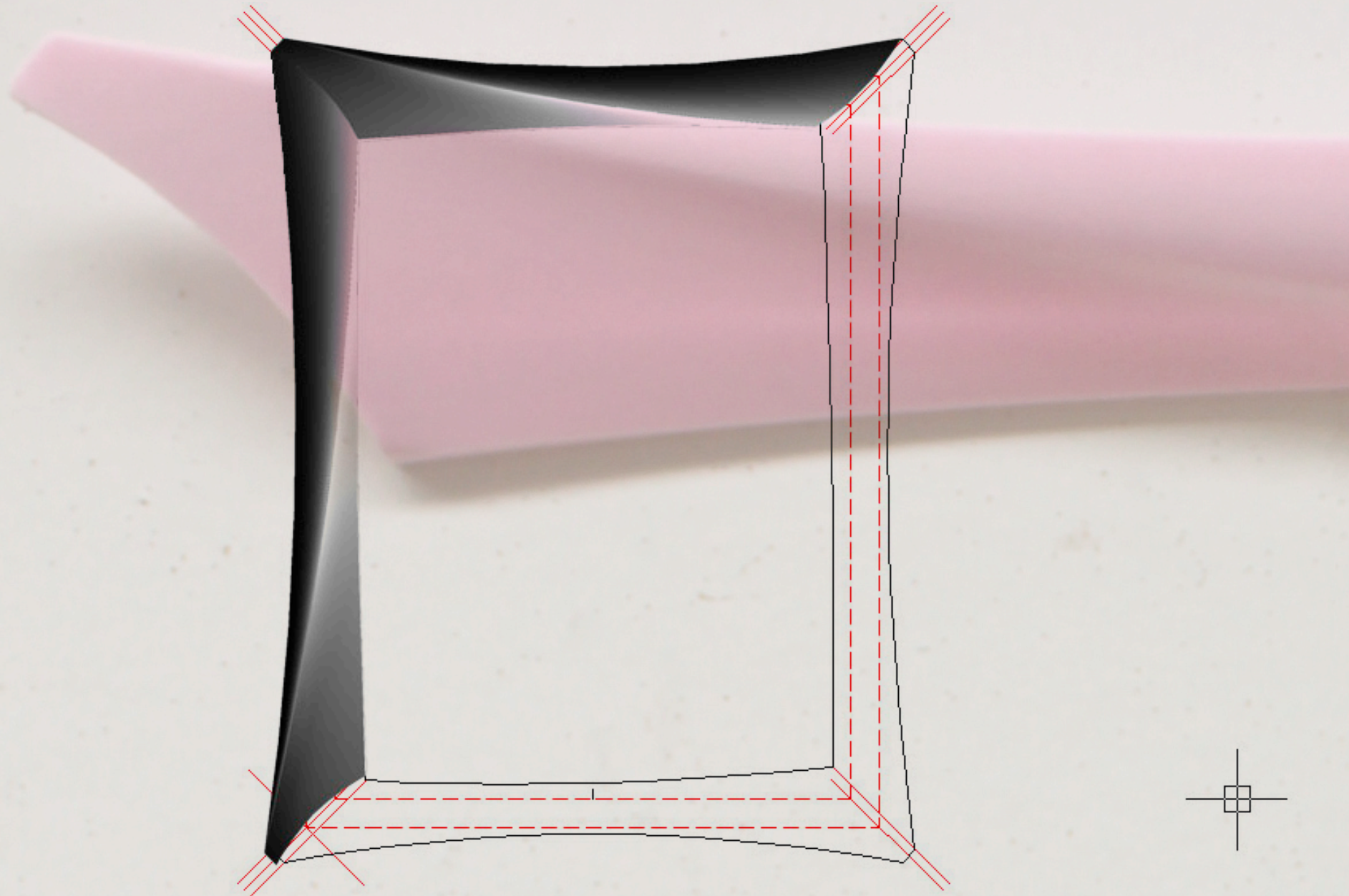
The 'Exploded Frame' is an introductory project intended to begin a conversation focused around the potential for symbiosis between embodied and digital mediation. Each side of this frame represents a stage in the digital production process from conception to material realization; and moreover, the framing remains incomplete without both material and digital elements. The elements, in order, counter-clockwise from bottom: AutoCAD setting out, Rhino three-dimensional geometry, CNC milled foam prototype, and CNC milled but hand finished poplar.

(overleaf)

*fig. 1.6 'Exploded Frame' digital elements.
CAD setting out lines & Rhino 3 dimensional model.*

(underleaf & following page)

*fig. 1.7 'Exploded Frame' material elements.
CNC milled prototyping foam, CNC milled & finished poplar.*







*fig. 1.8 'Exploded Frame' exhibition view.
Photograph by Johnathan Wong.*

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MEDITATIONS

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“Each layer of digital abstraction, no matter how well it is crafted, contributes some degree of error and obfuscation. No abstraction corresponds to reality perfectly. A lot of such players become a system unto themselves, one that functions apart from the reality that is obscured far below.”

~ Jaron Lanier 'You Are Not a Gadget' 97

v. sublimate¹

1. *To raise to high place, dignity, or honour.*
2. *To act upon (a substance) so as to produce a refined product.*
3. a. *To extract by or as by sublimation;*
b. *To be produced as the result of sublimation.*
4. *To exalt or elevate to a high or higher state;*
5. *To transmute into something higher, nobler, more sublime or refined;*
6. *To refine away into something unreal or non-existent; to reduce to unreality.*

Contemporary experience is highly mediated by digital technologies. In particular, it is through our screens - the characteristic physical manifestations of the digital - that we have begun to filter our perceptions and understanding of embodied things. It may seem something of a paradox to imagine the immaterial space of our screens having such a concrete effect on our



*figs. 2.1 & 2.2 Geoffrey Mann - 'Attracted to Light' (left) 'Flight' (right)
Mann's work explores the possibilities and impacts on the physical form of digital media and
manufacturing. Both 'Attracted to Light' and 'Flight' materialize the motions of animals
through space and time.*

~ Digital By Design 44

lived experience, yet digital mediation now occupies a central role in all aspects of our lives. Digital media augment the production and consumption of meaning, offering a proliferation of immaterial images through which we claim to 'know' things – paintings, buildings, objects, events – that we may never have encountered outside of their representations.² Our meaningful images - central to our understanding of self and the world around us – have undergone a change of state; constructed in equal measure from digital representations as from physical realities. This reflects a condition I like to call 'sublimation.'

I use sublimation as a metaphor to describe the abrupt movement of physical material into its immaterial digital representation. In science, sublimation is an energetic process describing the transition of matter from a solid directly into a gaseous state without ever becoming liquid, a condition where the weakening of intermolecular forces between particles causes the stable definite shape of matter to dissolve into a gaseous cloud with no definite shape or volume.³

A digital photograph of an oil painting is sublimating then, as it dissolves a definite painted surface into a malleable matrix of tonal information. Digital information resembles the gaseous state since codified data has no definite shape; the oil painting does not even exist until recomposed into its meaningful image – now only one of an infinite number of possibilities.

It is important to realize that the digital image is not just a copy of the original. Just as things tend to get 'lost in translation,' I argue that some kind of transformation, or mutation, always occurs in the process of sublimation. Typically, a sense of purification and refinement accompany the transition into digital space; a phenomenon supported by a tendency for digital constructions to be characterized by Platonic purity "free of farts, dirt, and untidy bodily fluids."⁴ Generally, within sublimated reality – and especially artifacts gestating from digital media –, this sense of purification predominates; physical things seem to be stripped of their inconsistencies and inherent material authorities as they are digitally distilled. Specifically,

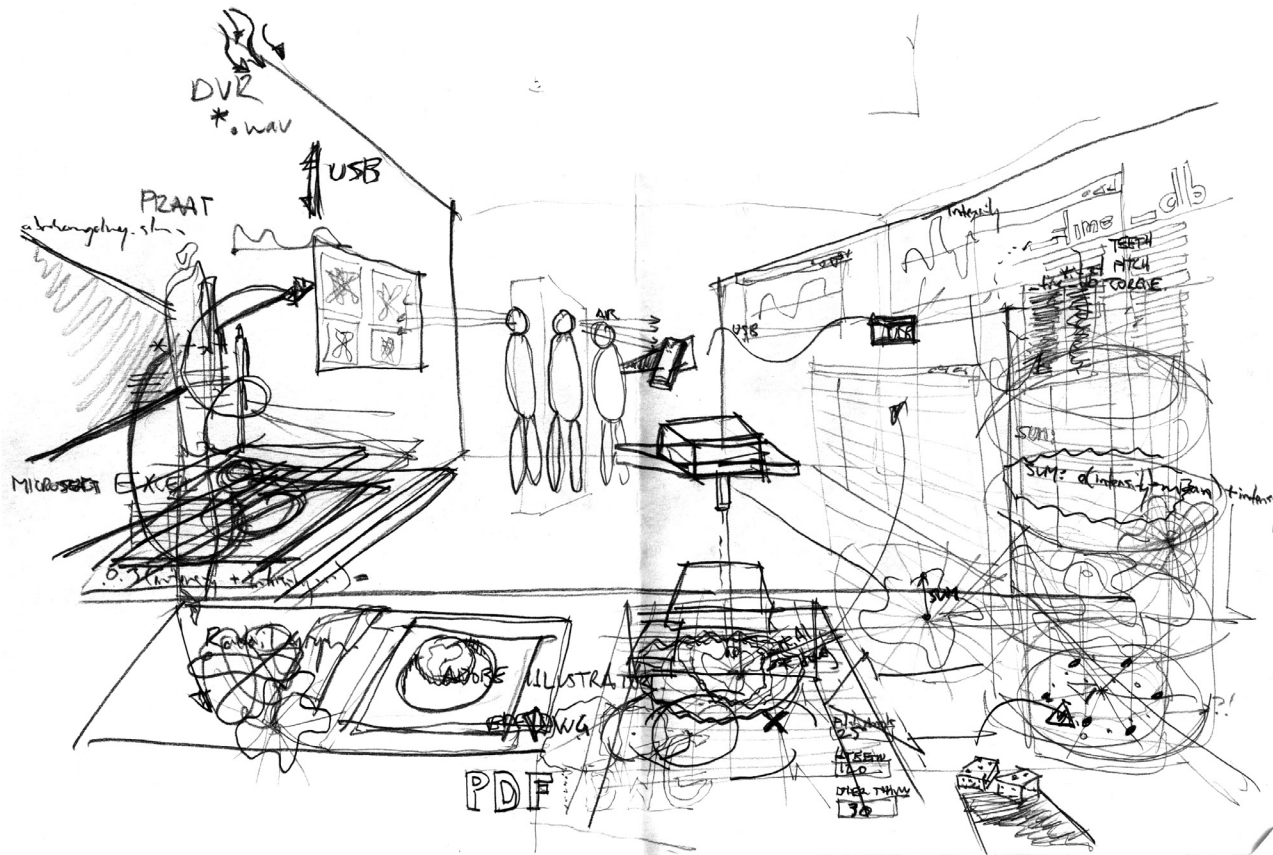


fig. 2.3 Cycle of Transcription.
 Sketch diagram: making of 'Screen #7 - Hand'.

one has only to look at conventional digital production practice to see this in effect; in digital fabrication, choice materials are invariably engineered for consistency, mainly flat sheet products desirable for their predictable and highly controllable properties, ostensibly facilitating a desire for seamless production unfettered by the uncertainties of reality.

Yet digital sublimation is not simply about extracting the vitality and richness from material experience. One of the most powerful attributes of the digital medium seems to be its capacity for the transcription of information between diverse – and possibly infinite – modes (or languages) of expression. Transcription injects an immanent potential into digital expression, where working between various modes - some gaseous (raw data), some more liquid (such as visual digital representations) and others solid (fabricated prototypes) – facilitates a continuous cycle of exploration and potentially endless opportunity. Within a cycle of transcription, I can overcome the limit state of any mode by simply translating my intention into

an alternate language, format, or software. Working without digital mediation does not offer this type of potential; in material, both mistakes and gravity exercise a different authority.

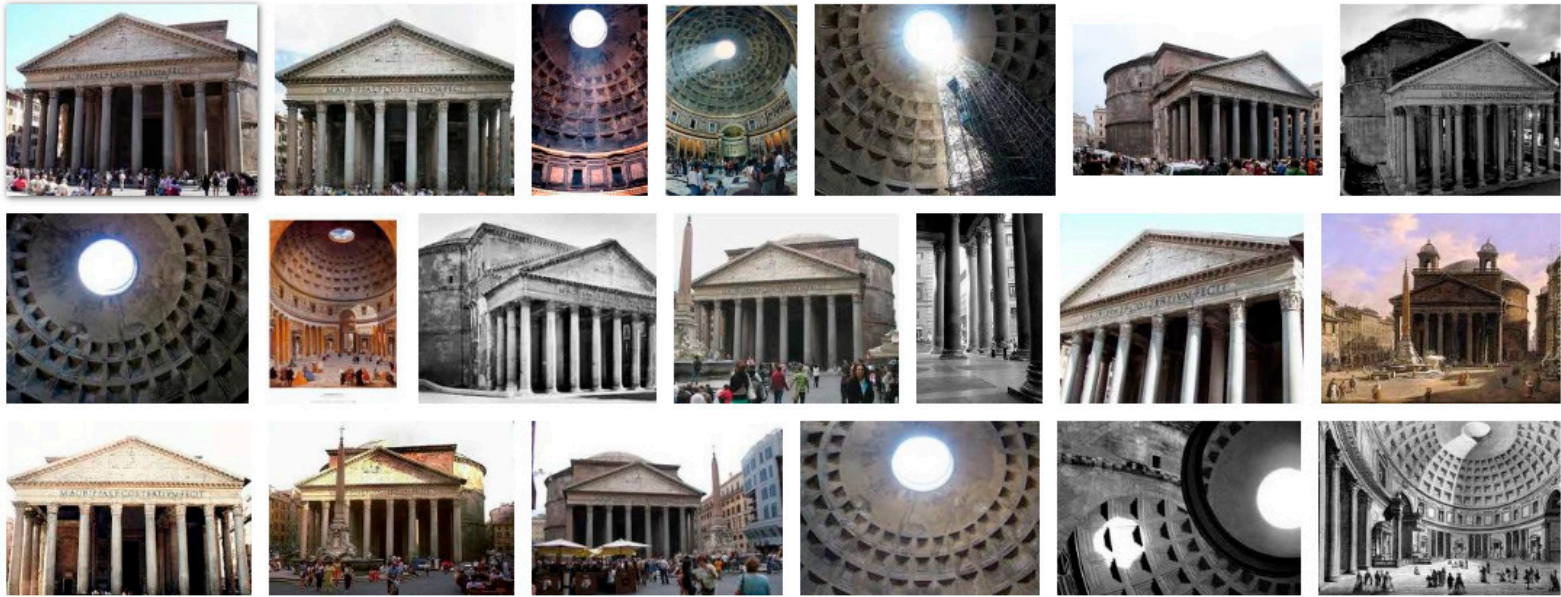
Transcribing celebrates the elusive possibility of subjectivity in digital expression. Framing the reality encoded in a digital database through transcription is a necessarily subjective process, since, as we know, digital information lacks any material specificity: it can “just as easily be rendered as a sound file, a static image...not to mention any number of forms that do not correlate so neatly with our sensory capacities.” The choice of how and when and what part of the digital to frame (as well as the paths leading between many possible framings) falls entirely to the most qualified selective processors of information we possess – our bodies.⁵ Framing digital information negates thinking of sublimation and transcription as objective processes, and instead suggests that no manipulation of data can escape further mutations brought about by the act of framing itself. This condition is reminiscent of the Augustinian impossibility of

Memory – where the ‘object-in-the-world’ can never correspond to its ‘image-in-memory,’⁶ and calls into question an unwavering belief in ‘sublimated realities’ as objective representations of reality itself. Google Earth will always be more about Google than the earth.

Sometimes, it is easy to recognize the transformations inherent between material things and their digital sublimations. Take Hadrian’s Pantheon in Rome, for example; “one of the grand architectural creations of all time: original, utterly bold, many-layered in associations and meaning, a container for a kind of immanent universality.”⁷ On the ground in Rome, the Pantheon asserts a commanding physical influence; it is a deeply affective space imbued with meaning, both symbolic and spiritual. Yet as any online information aggregator will reveal, the Pantheon has a digital existence as well. This existence is made tangible through hundreds of thousands of ‘hits,’ visual material in the form of photographs, drawings, and paintings; plus an additional data multiplication in the form of scholarly writing, travel guides, and personal blog posts to name but several. The

building and urban space surrounding it have become a sublimated reality; fully imaged, uploaded and digitally recomposed. Yet this reality of the Pantheon now lacks two dimensions; depth and time. Distillation into digital representation has refined away many of the more delicate nuances responsible for making this building one of the ‘grand architectural creations of all time.’ Online, you will not experience the Pantheon’s proportions in relation to your body, its gentle acoustic reverberations, unparalleled relationship to the sun, nor the haptic sense derived only from truly inhabiting the space.

At other times, the interplay between sublimated and physical realities is far more complex. Observe the contemporary forms that text; for example, has taken in its journey alongside developing technologies. In the case of early inscriptions, heavy stone and clay tablets enslaved text to its medium. Developments in media technologies, from papyrus, to parchment and eventually paper, began to allow text to circulate more freely. Today – largely a result of the printing press and telegraph – highly developed modes of produc-



*fig. 2.4 Google Images 'Pantheon Rome.'
Page one of Google Image search August 29th 2010.*

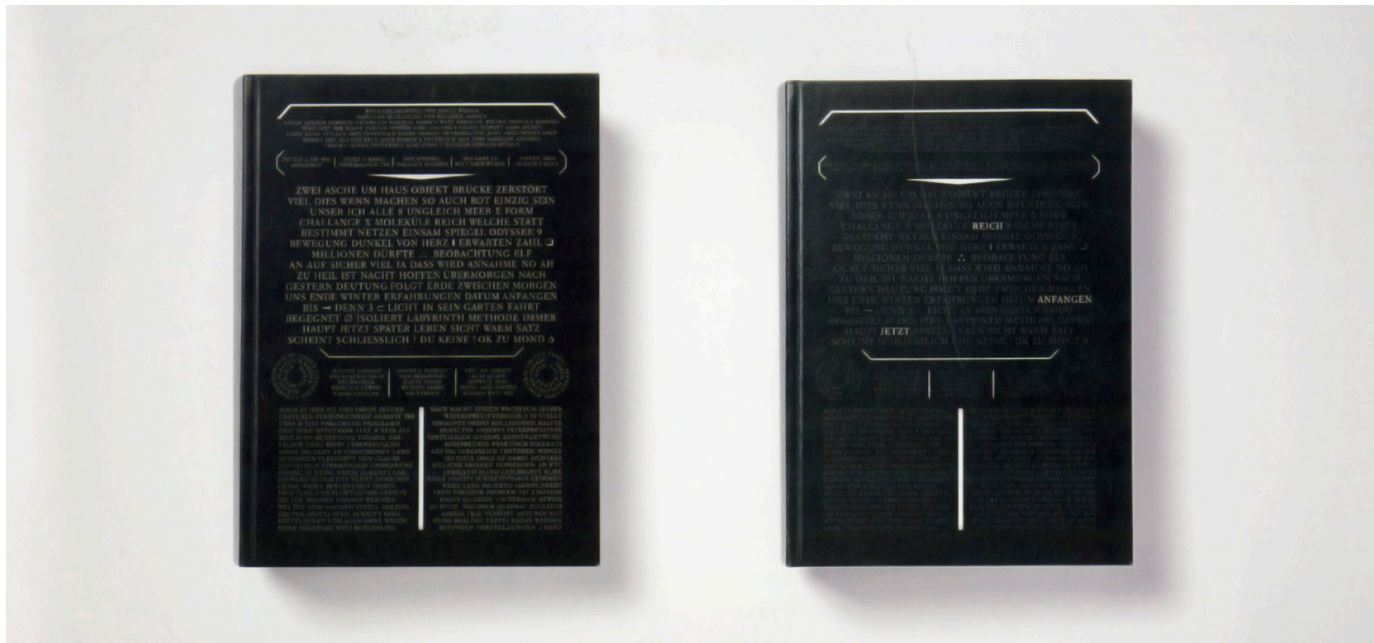


fig. 2.5 Stijn Ossevoort 'Archeology of the Future.'

In his book, Ossevoort sought a more intimate integration between the electronics and the object... The book, released as a limited edition of 150, integrates in its cover a series of printed heating elements, which change the colour of the thermo-chromic ink used, revealing a series of words and symbols, as the ink changes from black to blue.

~ Digital By Design 39

tion, dissemination, and storage of text have become readily available in the form of digital word processing, high-bandwidth internet and handheld reading devices. For the first time in human history, it is possible to consume a completely dematerialized form of text that travels to you; text has become digital content entirely independent of any sort of physical substrate.⁸

Generally, as a phenomenon seen from the perspective of physical things, sublimation seems to imply a general trend away from 'hardware' in favour of 'software.' Yet, far from becoming obsolete, the book (an ostensibly antiquated end-user interface for the consumption of text) assumes a new significance as physical hardware. The sublimation of content might in fact release the book – as a physical artifact – from the limitations of cheap mass-production. I argue that the ability to own entire libraries in digital format does not fully represent the analog act of reading; that, paradoxically, the sublimation of the book might in fact reinstate a desire for the paper manuscript as a high quality, meaningful artifact. The proliferation

of digital content itself promotes an awareness of reading as a primarily embodied experience; a realization that the true satisfaction of reading perhaps comes as much from the thing we hold in our hands as the content itself. New reading technologies are beginning to understand this. Apple's iPad may be the first truly successful digital reading technology precisely because its physical presence and 'natural' gestural interface recognizes that the hands – as well as the mind – are crucial to the experience of reading.

What seems to remain essential to the process of sublimation is recognition of its human dimension. Our hands and bodies always frame digital constructions; and sublimated realities remain meaningless, or at best, "brittle simulacra of the real,"⁹ until they manage to resonate with the space and time of embodied experience. The capacity of the digital to 'bring-forth' novel possibilities seems, in fact, to emerge from a space that is somewhere between embodied and digital; but includes aspects of both. Although it is easier to conceptualize this boundary zone as a space, what becomes readily appar-

ent is that the true creative potential of digital sublimation emerges not from space at all, but from the temporal.

Time is a decidedly independent variable in digital constructions. The digital medium breaks from 'natural' modes of temporality, making it possible for the instant to overlap with the infinite. The convolutions and folding of digital time releases potentials otherwise unrealizable in material alone; empowering expressions which both collapse and extend traditional conventions governing the temporal. Geoffrey Mann's evocative sculptures are evidence of this digital capacity; transcribing an instant in time into duration via photographic motion capture and three-dimensional printing technologies. These sculptures are effective because they do not simply emphasize the digital ability to manipulate time, but achieve it in a manner that resonates with an ingrained, human sense of temporality. Mann seems to understand that as much as digital media destructure established spatio-temporal conventions, they also paradoxically reprioritize the role of subjective human enframing "as a

means to reintroduce temporality into information."¹⁰

* * *

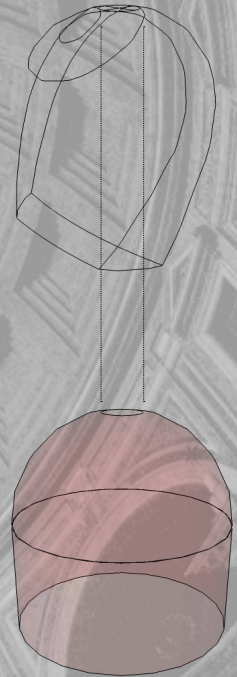
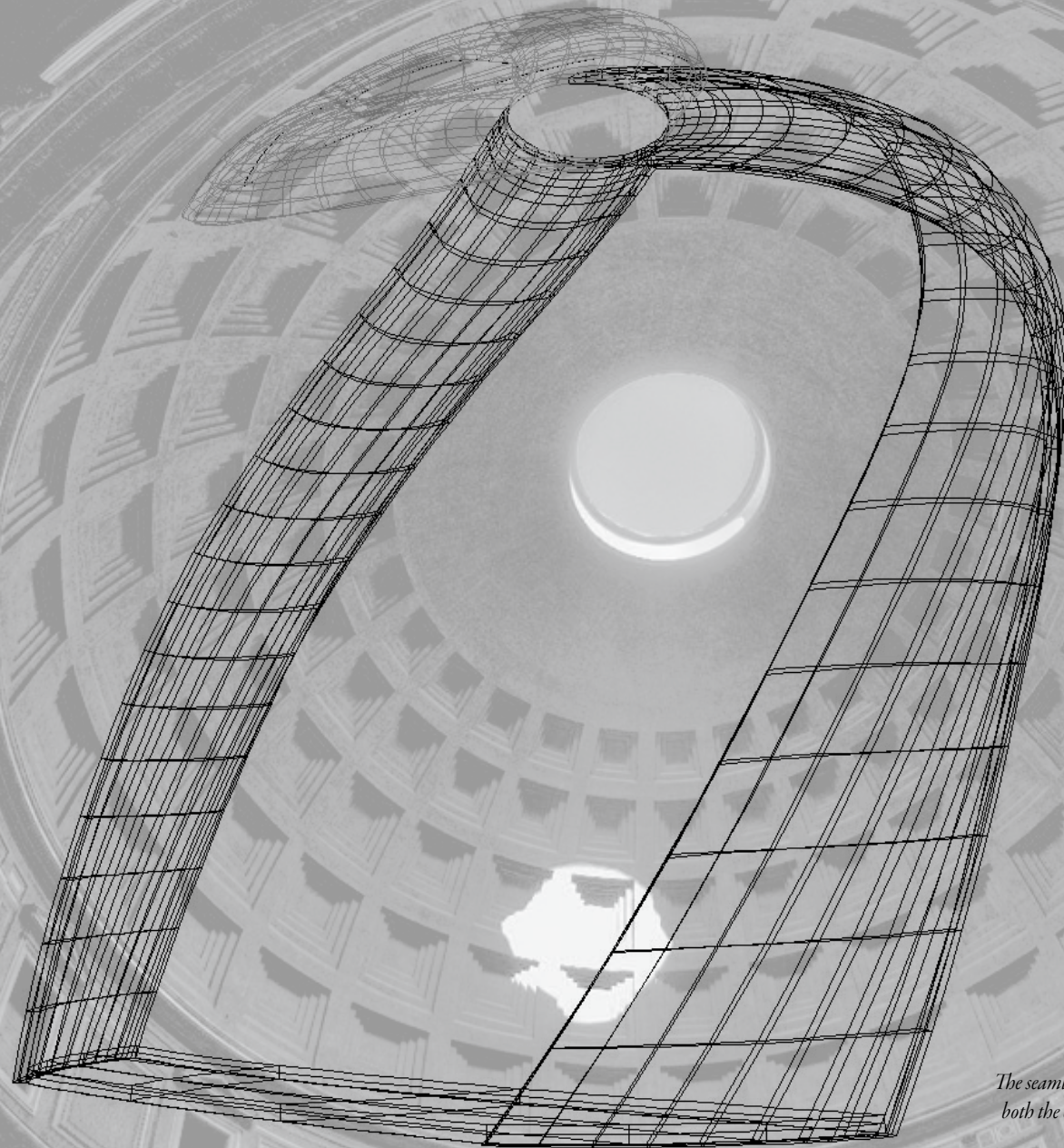
The following work, entitled 'Frozen Duration', is an exploration in sublimated realities. A series of digital transcriptions concretize in sculptural form the ephemeral qualities of sunlight and time within the interior of the Roman Pantheon. Through charting the course of sunlight on the winter and summer solstices, the graceful form of this sculpture represents the symbolic intersection of sky and earth; its very existence proof of a digital capacity to give form to the immaterial and render time durable.

(overleaf)

fig. 2.6 Digital transcription of sun over time.
SketchUP shadow tracing & Rhino 3 dimensional modeling.

(underlayer)

fig. 2.7 Interior of the Pantheon.
A disc of sunlight framed through the oculus.



The seamless circles around and above the great interior described both the cosmos and Roman rule. The role of giving the Pantheon life was assigned to the sun, the master planet...





Winter Solstice



Summer Solstice

10101010011100011101000110

(from left)
figs. 2.8 -2.11 Artifact views I, II, III, IV.
Rendered Rbino 3 dimensional model.

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“New! Explore the Earth in 3D on Google Maps”

~ Google homepage May 16, 2010

In 1964, Marshall McLuhan implored us to consider that “our human senses, of which all media are extensions, configure the awareness and experience of each one of us.”¹ Our media continue to structure our perceptions, but today, rather than our media simply extending our senses, we seem to identify more with an extension of ourselves into mediated environments; a sensation of existing *within* the media themselves. The enhancement of digital technologies has led to a saturation of mediated experience, resulting in a sense of immersion “that draws [our] bodies into the experience of virtuality.”² Realistically, though, the sort of mediated ‘immersivity’ we experience today has very little to do with the body at all; simulation technologies rely upon a dislocation of mind and body in order to more effectively turn illusion into experience. On all fronts, digital technology seems relentlessly driven to enhance the production, distribution, and consumption of simulated immersive environments. Larger screens, on both our desks and in our



figs. 3.1 & 3.2 The Avatar Experience. Movie Screenshot (left) Audience (right)

living rooms, provide sharper image resolution and greater depth of colour. Mono audio quickly graduated to stereo, and on to various enhanced configurations of ever-more realistic surround sound. Today, our latest commercially available technologies offer simulation in three dimensions, where the partial occlusion of our vision yields the illusion that our screens in fact possess depth.³

Digital simulation is most refined in virtual reality (VR) environments. VR – simply defined as an interactive, immersive experience created by a computer⁴ – seems to push a tendency for immersive displacement of the senses to its extreme. As Simon Penny writes, “VR technology, far from including the body in a virtual environment, actively excludes the physical body...one does not take one’s body into VR, one leaves it at the door while the mind goes wandering.”⁵ Even without the grounding of corporeality – or perhaps the direct consequence of lacking a corporeal capacity to distinguish the illusory from the actual – our experiences within digitally-simulated environments become very perceptually ‘real.’

Digital simulation can even continue to distort our experience for some time after exiting the immersed condition. For example, some viewers report experiencing depression and suicidal thoughts upon returning to their mundane, ‘grey’ realities after watching James Cameron’s immersive spectacle *Avatar*. Ostensibly, it is our perceptual ability to *enter into* the alien world of ‘Pandora’ – achieved via impressive digital processing and three-dimensional viewing technology – that exacerbates the “separation anxiety some individuals experience when they depart the movie theatre.”⁶ Although ‘Avatar Blues’ can be easily dismissed as simply a pop-culture phenomenon, similar psychological stresses are emerging within the experiences of U.S. Air Force UAV operators. These are pilots who fly remote-controlled drones from domestic bases; observing the field of battle through a bank of screens, and invested with the ability to terminate the enemy with only a few keystrokes. At the end of a shift, these pilots return home to have dinner with their families and sleep in their own beds. Pilots are discovering that their minds struggle with this

kind of perceptual ‘whiplash,’ and need some time – usually most of their hour-long commute home – to recover a balanced state of mind.⁷

These phenomena point to the validity in neuroscientist Humberto Maturana’s assertion that “whenever we have an illusion, we really have it. In our experience we cannot differentiate between what we call a perception and what we call an illusion.” Nor can we differentiate between mind and body in simulated environments; since both experiences, illusory and perceptual, remain framed through our corporeality and thus seem “*affectively* identical: from the standpoint of the experiencing, feeling body, simulation and perception are, quite simply, indiscernible.”⁸ Implicit within this reasoning is the notion that simulation is a human capacity, that all perceptual experience is in fact simulated by our minds, based on external sensory cues. VR, then, - and by extension more conventional simulated digital environments – can more exactly be understood as “the *technical supplementation* of the human capacity for simulation.” Digital tech-

nology, as supplement, “becomes entirely integrated into the process of simulation that lies beneath and encompasses perception.”⁹

Conceiving of digital simulation as a supplement to perception - that “which provides something necessary to another ‘original’ entity, but which is nonetheless considered to be extraneous to that original”¹⁰ - concedes a necessarily performative role for the viewer in framing perceptual experience within digital simulations. Perceptual immersion - despite the best efforts of technological enhancement today - remains inescapably linked to the corporeal. As such, McLuhan would most likely consider digital media to be quite ‘cool,’ since, despite a general enthusiasm for increased ‘bandwidth,’ these media still require the participation of a subjective human viewer to complete them.¹¹ Inherent within McLuhan’s notion of cool media is the cooling off of outer sensation, stimulating a condition where the viewer “begins a furious fill-in or completion of senses that is sheer hallucination;”¹² a notion which begins to substantiate the fact “that the embodied mind actually *creates* what it sees.”¹³ A capacity for



*fig. 3.3 Toni Frissell 'Lady in the Water,' 1947.
The immersive dislocation of mind and body.*

hallucination (the apparent perception of an external object when no such object is present) demands a repositioning of the viewer as *active participant* in constructing subjective experience, and puts to test conventional formulations that tend to envision the viewer more as a passive content-absorber than actively creating their own experience. Representation, from the use of perspective in painting to cinema, tends to envision a split in the viewer's identity between physical space and the space of the representation. Simulation, on the contrary, attempts to place the viewer in a single coherent space encompassing the physical space and the virtual that extends it.¹⁴ Neither of these recognize the mediating space of corporeality; and thus fall short of explaining how bodily processing may have “the effect of ‘making it real’ for the participant.”¹⁵ Without the addition of hallucination, notions of representation and simulation seem insufficient to explain why we might feel sad after watching a mildly meaningful drama, or distraught after working a shift in a flight simulator.

Hallucination – although often used interchangeably with the term ‘illusion’ – differs from illusion in one specific aspect. While both suppose an “apparent perception of an external object which is not actually present,” it is only illusion which predicates this upon a *false belief*.¹⁶ Illusion could be characterized by the experience of the construct in *The Matrix*, or the life of Truman Burbank in *The Truman Show*, both epitomizing instances where the illusion of reality precludes an awareness of reality itself. The importance of hallucination, then, seems to be in introducing the viewer as proactive participant in framing their individual perception – ultimately endorsing an awareness of experience and thus an ability for critical reflection upon it.

The argument for awareness in human experience is a dominant theme pursued in the work of Olafur Eliasson. His projects – many of them utilizing the possessive pronoun *your* - call for an actively engaged spectator, with a central ambition to “encourage individual awareness, reflection, and ultimately a greater consciousness of the



*fig. 3.4 Olafur Eliasson 'The Weather Project,' 2003.
An immersive environment installed in the Tate Modern turbine hall, London UK.*

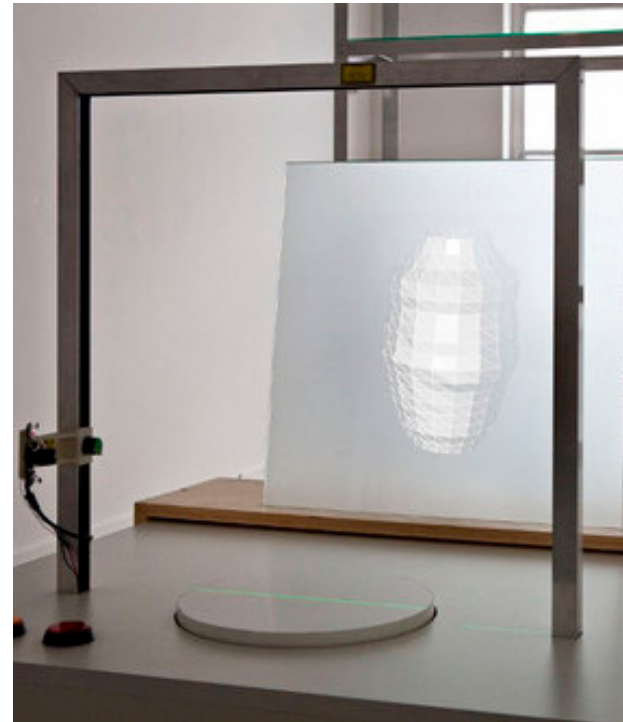
workings of large economic and political frameworks.”¹⁷ According to Eliasson, the cultivation of the proactive subject allows for a “heightened sense of him – or herself in the act of perceiving and acting, and by extension for the conscious ownership of all manner of processes of cognition that tend to be standardized, automated, and otherwise impoverished by a mediating world.”¹⁸ Eliasson achieves this partly through a functional transparency, divulging the mechanisms that drive his affects. Thus, “the smooth surface of illusion and its technical construction then form two poles between which the visitor can move.”¹⁹ In his *Weather Project*, for example, Eliasson produced a highly immersive environment for the turbine hall at London’s Tate Modern, and then revealed the functioning of the fully-mirrored ceiling to visitors observing it from above. The irony of the *Weather Project* is made evident in the reactions of spectators, both overwhelmed by the effects of immersion, yet fully aware of themselves as occupying an artificially-constructed environment. In this respect, Eliasson’s work follows on from Marcel Duchamp, who

argued that the recipient completes a work of art, that “the spectator brings the work in contact with the external world by deciphering and interpreting its inner qualifications and thus adding his contribution to the creative act.”²⁰ At its most provocative, what these philosophies seem to consummate is a realization that the “kind of engagement offered by consumer culture is by comparison less one of heightened activity than simply a ‘more developed form of sedentarization,’ less interactive than ‘interpassive,’ a field on which we do not truly act so much as receive a limited opportunity to manipulate its givenness.”²¹

Notions of subjective performativity seem central to transcending the potentially systematizing influence of digital simulation on experience. Achieving this goal within digital simulations suggests maintaining a mental awareness, where “we are aware of what we are doing as we are doing it,”²² but as well suggests the inclusion of the analog, active potential of human participation in experience; invigorating our virtual capacity through the engagement



fig. 3.5 Sboji Hamada pauses while throwing a pot.



*figs. 3.6 & 3.7 Unfold Studio 'L'Artisan Electronique.'
A virtual potting studio; 'clay' is molded through a gestural interface which can then be
three-dimensionally printed off site.*

of our full sensory complex. For the most part, however - despite the emergence of fully 'immersive' mediation - participation in digital environments today does not offer much in the way of true immersion; engaging instead only a limited portion of the full human sensorium while limiting possibility within prescribed and predetermined rule systems. A videogamer, for example, is far more restricted than he imagines due to the predetermined rules of gameplay; an indication that this type of play appeals to only a thin slice of human experience, and by extension, a relatively narrow demographic.

In contrast, through use of his hands and eyes alone, the experienced potter throwing a large jug on a wheel exists within a total state of immersion; where his minimal technology (wheel, hand tools) remains supplemental. The implementation of digital mediation to facilitate this deeper sense of immersion is, so far, relatively rare, but not unknown. *L'Artisan Electronique*, an installation which implements digital technology to virtually mold clay, and then later 'prints' the vessels using stereolithography, begins to explore the po-

tentials which exist when digital simulation is employed to create relationships between the virtual and the actual.²³ This reconception of digital immersion suggests a particularly generative potential, since for the digitally-empowered, active performer "the relationship between the virtual and the actual is one of surprise, for the virtual promises something different to the actual it produces, and always contains in it the potential for something other than the actual."²⁴

The argument that technology is inherently incapable of perfectly simulating the embodied experience of the tactile arts will undoubtedly always exist. Throwing clay on the wheel - your hands getting dirty and wet - remains a uniquely corporeal experience. Skiing, a doubles tennis match or bowling will most likely be - in the reality of the act - always richer than their mediated simulation, despite how immersive it may have become. Yet, there is no doubt that technology is well on its way towards the ability to seamlessly mediate these corporeal experiences through digital simulation. So perhaps it is less a question of whether '*Wii Sports*' can become a re-



*fig. 3.8 Avatar Glasses.
Author.*

placement for the actual experience of playing golf or going bowling; not as much about whether playing '*Guitar Hero*' can stand in for the experience of playing in a band; but more about a necessity for cultivating an awareness of - and desire for - proactive, generative subjectivity within our mediated environments.

* * *

These are the cheap plastic glasses which were included with my admission to Cameron's *Avatar*. Via stereoscopy, my 'Avatar glasses' alter my mental perception of light in order to create the illusion of three-dimensional depth. The lenses are circularly polarized to create an effect which regulates the angle of light entering each eye; thus while two images are projected simultaneously, only one image at a time reaches each respective eye. This partial occlusion of my sight induces my mind to believe there is depth, when in fact there is none. This depth seems to extend beyond the screen as well

as in front, fully immersing me in an illusory environment while at the same time inviting the complete detachment of my mind from my body and immediate material surroundings. The glasses immerse me in a digitally mediated realm. When the glasses are performing to full effect, I exist in a detached and passive relationship to my environment; I no longer desire popcorn or feel particularly close to the person in the seat next to me.

The usefulness of the glasses is limited. Until I have paid admission to a movie screened using appropriate technology, these glasses remain simply the mediocre product of a mass-production injection molding process. A useful lifespan of approximately 2.5 hours - unless, like I did, you decide to keep them after the movie - means the glasses are highly disposable and rather valueless. My cheap 'Avatar glasses' are merely symbolic of our highly-refined, elaborate technologies for three-dimensional digital simulation.

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“Yeno, the sixth patriarch, once saw two monks watching the flag of a pagoda fluttering in the wind. One said, ‘it is the wind that moves,’ the other said, ‘It is the flag that moves’; but Yeno explained to them that the real movement was neither of the wind nor the flag, but of something within their own minds.”

~ Okakura The Book of Tea 42

There is much lamenting that today we are witnessing a degradation of our capacity to pay attention; that under the influence of constant stimulation – a condition made pervasive by the ubiquity of digital mediation – our minds begin to suffer from a sort of attention deficit disorder at a cultural scale. Researchers believe that exposure to continuous streams of digital stimulation may undermine our ability to focus.

The problem of attention has been a fundamental issue in psychology since the late nineteenth century, emerging largely in response to societies increasingly saturated with sensory input.¹ Although the concept of attention is complex and remains rather elusive even today, it is generally equated with the conscious ability to focus; a literal narrowing of perception that protects our minds against a constant bombardment of external stimuli, thus allowing coherent thought to take the place of meaningless reverie.² Attention, then, can be understood as a function of perception; and is

something we call upon constantly in order to function cohesively within society. Yet, as we know from trying to focus on one thing for too long, attention is impossible to maintain indefinitely. In any number of ways, attention is inevitably limited; evidence that our minds are naturally inclined to wander, to be distracted from one thing to the next. In fact, we know that attentiveness “consistently contains within it the conditions for its own undoing” – that focused perception must eventually give way to states of distraction, reverie, dissociation, and trance.³

Yet digital stimulation constantly demands our attention. Defined in this way, digital distraction can be more clearly understood as the constant and rapid shifting of our focused attention from one thing to the next, rather than simply a reduced capacity for attentiveness overall. Being distracted, therefore, does not indicate inattentiveness; but instead connotes an incessant shifting of conscious focus in response to external stimuli. This is a condition we find increasingly common in daily existence, yet for the most part, we have been

able to manage these demands through multitasking; cultivating the ability to balance family with work, or completing drawing revisions while responding to incoming emails. Distraction, however, is an engineered form of attention; a sort of enforced attentiveness that seems to impede other, less structured, modes of perception. Constant exposure to novel and unexpected stimuli – proven to be some of the most effective methods for capturing and maintaining attention⁴ – interrupts the natural tendency for our minds to wander while conditioning us to accept as natural a desire for novel and frequent stimulation.

We can trace the consequences of digital stimulation on perception back to biological roots. Researchers believe that the constant stimuli provided by ubiquitous media - arriving in the form of regular bursts of information - generate frequent dopamine responses in the brain; the effects of which can be addictive.⁵ As such, exposure to digital stimulation generates a pleasurable response in our brains, conditioning our minds to an existence within continual

states of partial distraction. This is a mental state which persists even while spending long, seemingly focused, periods of time watching television, movies or browsing online – these all in fact being media which quite effectively engineer novelty in order to maintain viewer attention.⁶ Far from being distracted away from our screens by calls of reality, we tend to become captivated by them – the screened environment has been described as exerting a magnetic ‘pull’ on the psyche. Increasingly, we feel compelled to stay connected, check our email and maintain an ‘online’ presence in our networks. This phenomenon is especially apparent in younger generations and amongst children who have developed alongside computation. Teachers and parents alike report that the screen possesses a fascinating and captivating potential; that, for children, there indeed seems to be some kind of ‘magic’ to the screen.⁷ Walter Murch – a renowned film editor – is able to outline highly refined and subtly nuanced techniques he employs in order to achieve this very effect; numbers of scene changes per minute can be reduced to an almost mathematical

formula.⁸ Since digital media are engineered to induce distraction, and our brains are wired to enjoy it, it is hardly a surprise to regularly discover considerable unplanned hours ‘wasted’ online or watching television.

Our desire for digital stimulation has been compared more to cravings for food or sex than addiction to drugs or alcohol; a type of addiction which is essential, but counterproductive in excess.⁹ Although our brains – as receptors of sensory information – seem almost infinitely adaptable to increasing sensory inputs, excessive stimulation has the effect of inflaming our higher brain mental processes, leaving us hyper-sensitive to all external stimuli; a condition where our mental control equipment, “instead of being like a gyroscope, is like a radar.”¹⁰ It has been generally believed that this increased stimulation could be managed through improved multi-tasking skills. Yet research is now proving that, instead of becoming more capable at managing information, we instead become less capable of filtering out irrelevant information; thus experiencing de-

creased overall mental acuity and increased stress levels.¹¹

As it turns out, although our brains are immensely adaptable, our minds –the processes which help us focus and process stimuli – are not wired to accept massive amounts of incoming stimulation. The dopamine that our brains release in response to digital stimulation is a neurotransmitter believed to be closely associated with teaching behaviour, setting up a cycle where stimulation in turn conditions our minds to expect and desire further stimuli, even when they are completely unnecessary. Our perceptual conditioning for novel stimulation has lasting effects on our thought processes, evidenced in the “persistence of fractured thinking and lack of focus, even after multitasking ends.”¹² The addictive properties of dopamine might even make us less effective at using reason to control our impulses, undermining higher-level cortical authority and this making our minds more susceptible to impulsive behaviour.¹³ Furthermore, this conditioning may have parallel implications in our ability to structure our desires; leading to a degradation of durability

both perceptually, and in culture overall.

Evidence of this begins to be seen reflected in our relationship to material artifacts; where our conditioning for novelty drives cycles of consumption. Specifically, today we see an increased obsolescence of objects over any time past; and more crucially, a dramatically reduced *lifespan* of material things. In other words, the operations of consumption patterns in society today seem dictated less by reason (do I need a new phone?) than by impulse (I want a new phone.) Structured by the paradigm of distraction and novelty, the ‘obsolescence of desire’ becomes a central facility within the operations of capitalist society.¹⁴ In fact, capitalism is predicated upon a continual cycle of novelty; being fundamentally an economic logic based on accelerated change and circulation which demands the rapid switching of attention from one thing to another, and necessarily produces a regime of reciprocal attentiveness and distraction.¹⁵

A conditioning for novelty also seems evident in the contemporary operations of architecture and design. The notion of ‘iconic’

design responds to this logic. Our conception of the iconic generally embraces creations predicated solely on their formal qualities, whose primary object is an ability to secure a brief moment of cultural attention. Although these creations claim a sort of mediocre credibility through generating economic revenue – the so-called Bilbao-effect – in actuality they struggle to offer much beyond a fleeting presence on the glossy pages and screens of our visual media. These types of projects underscore the limits of a cultural desire for novelty; a desire which in the long term is altogether never that rewarding.¹⁶

It is with some concern that I acknowledge what seems to be a growing inability to leave a distracted state; a cultural anxiety when faced with the prospect of ‘disconnecting.’ I wonder whether – apart from biological cravings – a desire for distraction is somehow linked to an ability to ignore an underlying passivity of mind; that without digital stimulation we would start to hear the awful silence which begins to accompany the death of our imaginations. McLuhan as-

serts that our media are not passive; that in fact they have the effect of shaping those who use them.¹⁷ This, along with recent discoveries surrounding the plasticity of the human mind, suggests that our perceptions may actually be shaped – or at least distorted – by our technologies; that how we access information in fact changes how we think. As information becomes ever more plentiful and attainable, our thought processes seem to take on a staccato quality; we increasingly resort to skimming over the surface of information rather than assimilating it through invested explorations into the depths of knowledge.¹⁸

It is difficult to demonize this effacement of deep knowledge in favour of a broad but shallow familiarity with things; since, as we know, there is simply far more information available than can be assimilated. Yet, the effects of digital mediation on perception have a rather malign quality to them, especially when viewed from the perspective of thinkers such as Guy Debord and Michel Foucault. Both reframe the development of technology – particularly, of spectacle

– as strategies of isolation tending towards the production of docile subjects. In much the same way as McLuhan argues that the content of a medium blinds us to its effects¹⁹, digital media in the form of the television set or computer monitor “has little to do with the visual contents of these screens...but rather with the construction of conditions that individuate, immobilize, and separate subjects, even within a world in which mobility and circulation are ubiquitous.”²⁰ The prevalence of handheld digital devices begins to confirm this assertion; where a group of people might be sitting together in a coffee shop, but communicating only through their respective technologies.

Constant digital stimulation tends to displace modes of mental reverie. The systematizing influence of the digital “reinforces the irrelevance and dereliction of whatever is not compatible with [its] formats,” and is rather unwelcoming to those mental states which do not align easily with digital “rhythms, images, speeds, and circuits.”²¹ What we seem to deprive ourselves of, when sitting down in front

of the television or computer to absorb a block of engineered digital media, is the capacity of alternative – and undistracted – mental states to nourish and revitalize the mind. Maintaining a constant flow of stimulation is our preferred choice, especially in the context of ‘relaxing;’ we invariably sit down with a movie, in front of the television or surf online content instead of taking this time to listen to our inner rhythms. This suggests that there remains value to be found in swerves into inattentiveness; of movements into “temporalities that are not only dissimilar to, but also fundamentally incompatible with capitalist patterns of flow and obsolescence.”²² It seems to be in the relaxed moments just before falling asleep, for example, that our imaginations are best able to produce creative solutions and insights. In contrast, existing in continually distracted states exhibits a tendency to erode any imaginative and creative capacity which would - without the constant dull buzz of distraction - emerge naturally. In short, the phenomenon of distraction, by providing a constant stream of novel stimuli, seems to eliminate moments of bore-

dom; making extinct those moments when lessened external stimuli provided the mind some clarity to look inward and synthesize new material.

The cultivation of boredom - which I argue to be the deprivation of novel stimulation - offers some clues towards escaping from a culture of distraction. Boredom, as conventionally defined, is a verb; expressing a condition whereby we are “wearied by dullness, tedious repetition, unwelcome attentions; [boredom] is a cause of ennui or petty annoyance.”²³ Indeed, through Georg Simmel – although he never uses the term *distraction* – we learn that the continually distracted state may in fact engender boredom in that it conditions “an experience of sensory stimulation as sensory overload that leads to boredom, exhaustion, and indifference.”²⁴

Yet this conventional wisdom can be inverted, enabling a renegotiation where “hidden in the innovation of distraction and shock is a despair that nothing further will happen,” and that underlying the conditions of boredom and waiting “is the anticipation that

something (different) might occur.”²⁵ Unlike the façade of constant novelty, boredom is truly radical in that it helps to sustain subjectivity; the cultivation of boredom in fact works to disassemble the logic of distraction, unveiling our fetish for newness and shock as simply manifestations of the commodity form.²⁶ Inherent within this logic is the capacity for boredom to nourish and revitalize the mind; since, as the Russian formalists wrote: “*boredom habituates renewed perception*, opening up differences that make a difference, and refusing the ceaseless repetition of the new as the always-the-same.”²⁷ The tensions inherent within anticipation may indeed possess a much-needed capacity to renegotiate contemporary structures of perception; breaking down perpetual cycles of obsolescence and celebrating duration even in the age of ‘real-time’ existence; where we are constantly connected and instantly gratified.



fig. 4.1 Mobile phone.
Author.

* * *

My relationship to my mobile phone is intense. It accompanies me everywhere, it distracts me, it wakes me up in the morning (by request), and at times it is an unwelcome intrusion on my solitude. Sometimes I feel compelled to leave it behind, or turn it off entirely. I find this both therapeutic and traumatic. I find the solitude of being 'unavailable' enables me to centre myself in the world of real things, to focus my attention more effectively. Yet this solitude can also be fraught with anxiety, where 'disconnecting' feels something like losing the use of a sensory function. To me, the phone is not simply an object; it is an extension of my presence in the digital world.

I am inseparable from my phone. Sometimes I check it even if I know no one has called; a behaviour that is undoubtedly conditioned by my desire for stimulation. It probably doesn't help that my phone also doubles as my watch, so checking the time is an easy justification for picking it up all together too frequently.

This is a technological prosthetic. However, my phone does not represent me as a person; I do not subscribe to the idea that this device is somehow a signifier of my value systems, or how I'd like to be perceived by others. It is the potential afforded by the object, not the object itself, which I value.

Aside from 'operating' the phone, I realize that I have no true engagement with it as an object. I do not understand how it works, I cannot fix it; I am subject to opaque and fluctuating whims of a technology which I cannot fully comprehend. Why can't I use my North American phone in Europe? Once my expectations exceed the capability of this phone in particular - and I expect this will happen quite quickly - I will desire a new device entirely. The old phone, as well as the new one, are both part of an ongoing disposable commodity cycle driven in part by the obsolescence of desire.

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“We have only to speak of an object to think we are being objective. But, because we chose it in the first place, the object reveals more about us than we do about it.”

~ Gaston Bachelard ‘The Psychoanalysis of Fire’

In a reversion reminiscent of the pre-industrial era, digital technologies once again offer the potential to empower the individual with the means of production. Digital tools and networks offer vast potential for small scale and collaborative innovation by eliminating the need to possess the capital of a wealthy industrialist, while also furnishing the means for global dissemination. With minimal investment in the proper combination of hardware and software, nearly anyone can acquire the tools to take professional quality photographs, produce studio grade audio recordings or edit and process video. Moreover, digital tools are becoming increasingly easy to use. Every development in the human-computer interface, for example, provides an improved sense of ‘transparency’ between the user and the digital medium.

Ironically, the ongoing desire for maximizing transparency between digital space and ourselves in fact promotes a different kind of opacity; in that the objects we use to interface with the digital medi-



*fig. 5.1 Apple iPod generations.
The presence of the object is refined away further in each successive generation.*

um must necessarily recede entirely out of our conscious perception in order to become transparent. The material presence of 'digital objects' has become secondary to their virtual capacities – specifically, their capacity for connecting us to digital space. For the most part, the material objects through which we gain access to digital space are supplemental – “necessary to another 'original' entity, but nonetheless considered to be extraneous to that original.”²¹ In fact, these objects - here understood as any artifact possessing or dependent upon a screen² - have ostensibly become external to the relationship they now merely signify. Invariably, the artifacts of the digital are disposable and devalue quickly over time; they seem to have no inherent value unto themselves. This seems to exemplify Baudrillard's assertion that “to become an object of consumption, an object must first become a sign.”²³ Although it is obviously impossible to complete a phone call without the phone object, the argument here is that our conception of these objects sees the material artifact as external to the function it performs; thus allowing it to become sim-

ply an object of consumption and nothing more. In other words, it is the 'virtual' capacity of digitally enabled objects that makes them valuable; whereas the artifacts themselves increasingly become interchangeable and disposable. In fact, in the best design, the digital artifact strives to become as perceptually - or functionally - transparent as possible; effacing itself to digital content as the crafted frame does to the autonomous artwork.⁴

We generally refer to this effacement of objects via the minimization of perceptual and functional friction in the context of making our objects more 'user-friendly,' or 'intuitive.' Undoubtedly, improved ease of use is critical to the development of our objects, and we can see evidence of this fact in the increased availability, reliability, portability and operational simplicity of our material things. Yet, the logical paradox here is that as our objects - and especially our technologies – become ever more capable, less is required from the human side of the interaction. The enhancement of objects reduces the human role to “no more than minimal action and input,”



fig. 5.2 Hulger 'P'Phone,' 2003.

Technology always looks forwards, never backwards. Why? What started as an artistic and fashionable pun on mobile telephony soon began to resonate with people's feelings, attracting press and buyers worldwide.

~ Digital By Design 197

where often a “slight motion of hand or eye suffices; no dexterity is called for – at most, reflexes.”⁵ Moreover, as the development of our objects and technologies continues apace, an inversion seems to occur, where objects become more complex than human behaviour relative to them; effectively suggesting a notion of human passivity in relation to our objects.⁶

Ironically, as interface objects assume an increasingly dominant role in our daily experience, their significance as material artifacts seems to be declining. More than ever, our artifacts – and especially those associated with the digital – fall prey to ever-faster cycles of obsolescence. Structured by the obsolescence of function, of quality and desire – or combinations thereof – objects begin to impose their disjointed rhythm upon human beings; “an unpredictable and sudden manner of being present, of breaking down or replacing one another without aging.”⁷ More than ever before, today we begin to see ourselves consistently outliving our objects; resulting in a contemporary condition in which “it is we who observe the

birth and death of objects; whereas in all previous civilizations it was the object and the monument that survived the generations.”⁸ The implications of this decline in durability - beyond the inherent environmental and cultural problems arising from feverish consumption - may even extend into decoding deeper issues underlying the human condition. Hannah Arendt notes that the “reality and reliability of the human world rest primarily on the fact that we are surrounded by things more permanent than the activity by which they were produced...potentially even more permanent than the lives of their authors.”⁹ The implications of this assertion are rather troubling; our reality is see-through, and our material artifacts are disposable rather than reliable.

The idea that our material artifacts in fact begin to reflect a human ontology of being-in-the-world is not so far-fetched. Beyond the notion that the durability of artifacts confers a sort of reality and reliability upon the world, it seems that - while appreciating the vastly increased capabilities of their objects - people also desire some

friction within their relationship to them. For example, in the 1950s when Betty Crocker first released instant cake mix, it already had the egg included. This cake mix turned out to be a complete marketing failure. When revisiting their strategy for the product, the marketers decided to take out the egg, this way the consumers would be required to add their own.¹⁰ Sales skyrocketed. This counter intuitive discovery seems to point to an underlying desire for human agency in relation to our objects rather than simply passive consumption. While not necessarily convenient, objects with a commanding presence demand active human engagement, they have the capacity to “draw one outside of oneself” and catalyze an awareness of a reciprocal conversation between things. What’s more, they educate us.¹¹

Actively engaging our artifacts counters an age-old concern surrounding the increasing capabilities of our technologies; reversing a phenomenon where machine intelligence replaces human competence. The uncritical enhancement of technology seems to leave the end-user serving only as a passive witness and consumer of

experience instead of a participant in it, lending credence to Jared Lanier’s notion that “focusing too much on the software might even make things worse by shifting the focus from the people.”¹²

Far from ‘downloading’ human agency to our tools, the difficult and incomplete should remain positive events in our understanding; these qualities stimulate us as simulation and facile manipulation of complete, fit-for-purpose objects cannot.¹³ It is the very incompleteness of tools that makes us better at using them, through challenging us to rise out of complacency, forcing us to adapt, improvise and ‘reformat’ our perceptions.¹⁴ Imperfect tools tend to dethrone any fixation on technique in favour of a “knowledge which allows [us] to see beyond the elements of technique to its overall purpose and coherence.”¹⁵ In short, a little bit of friction between us and our objects keeps us aware of their autonomous existence; reminding a culture (which seems to have forgotten) that they remain carriers of meaning as artifacts unto themselves, if we only choose to see them in this light. It is this friction which may in fact allude



*fig. 5.3 Meret Oppenheim 'Object,' 1936.
A 'luncheon with fur' redefines our perception of a simple place-setting.*



*fig. 5.4 Acoustic guitar.
Author.*

back to the possibility for a deeper connection with our artifacts and tools; “to know that we are using these things to go somewhere, to achieve something, to deepen ourselves and our knowledge.”¹⁶

* * *

More than just a mute object, the guitar as an instrument is both cognitively demanding and psychically rewarding. The instrument is alive, the wood and strings register their age and ambient temperature; causing minute dimensional shifts which slowly detune the instrument over time. The wood radiates; absorbing vibration and resonating a uniquely nuanced sound outward. This is an object which speaks, an object possessing emotions; at times cheerful, but sometimes moody.

I have an animated relationship to my guitar; it responds to my intentions, and yet I need to listen to it in order to improve...there is a friction between myself and the guitar which I must respect. ‘Play-

ing the guitar’ suggests a certain relationship between myself and the instrument; an interaction which is not prescribed or wholly rule-based, but instead one which provides a platform for creativity and expression. The guitar and I are both active parts of a conversation; any musician knows that each guitar has a voice of its own.

The guitar is alive; it is responsive in a way that resonates with me on a human level. This responsiveness is nothing like that of a digitally constructed interaction; rather, it is nuanced in quality and versatile in potential. My guitar changes over time, improving as I improve. The wood of its body ‘opens up’ as I play it...the very vibrations I create through playing are necessary ingredients to this process. Partly as a result of this mutual bond, I feel a strong connection to the guitar as an object; I would not easily decide to replace it with a new model.

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“In a way, the entire human being is in the hands; our destiny is written in the hand.”

~Renate Hiller “On Handwork”

The past century has seen a structural shift in both the production and consumption of knowledge. Explosive digital technologies of computation, data transmission and storage have released a torrential abundance of information, the very ubiquity of which strains our human resources of time and attention. Relative to information, the cost of our time is drastically increased. The primary consequence of this “is [a] growing emphasis on speed at the expense of depth.”¹ Traditionally, the conversion of information to knowledge has always demanded an investment of time to absorb depth and nuance; however, the speed of modern information cycles seemingly precludes the ability for deep thought. Moreover, the decreasing lifespan of intellectual capital seems to suggest an erosion of a cultural ‘market for depth.’ This has caused a shift of intellectual authority away from traditional producers of depth - experts - to the broader public; a phenomenon most evident in online resources such as Wikipedia.

So far, the system works because it is able to mine intellectual capital. However, this suggests “that today’s ‘cult of the amateur’ will ultimately be self-limiting and will require continuous fresh infusions of more traditional forms of expert knowledge.”²² The realization implicit in this – namely, the continued relevance of and necessity for expertise – constitutes a central tenet within the thesis; and more importantly, a crucial question arising out of the post information revolution society.

Modern information technologies tend to facilitate the erosion of traditional modes of knowledge generation; very often, their increasing efficacy and ease of use remove a necessity for individual intellectual focus.³ For example, research which once would have required a substantial investment of time and deep thought can now be completed through several quick online searches. These technologies are undeniably useful, yet inherent within their use is an accompanying distortion in patterns of human thought and work. This becomes especially evident in the interface between technol-

ogy and human hands:

“The type of work which modern technology is most successful in reducing or even eliminating is the skillful, productive work of human hands, in touch with real materials of one kind or another. In an advanced industrial society, such work has become exceedingly rare, and to make a living by doing such work has become virtually impossible. A great part of the modern neurosis may be due to this very fact; for the human being, defined by Thomas Aquinas as a being with brains and hands, enjoys nothing more than to be creatively, usefully, productively engaged with both his hands and his brains.”²⁴

The marginalization of the hand in relation to technology is nothing new; it is, in fact, a phenomenon that can be traced back to the advent of the industrial era, where increasing mechanization of the production process was paralleled by the work of the hands.



*figs. 6.1 & 6.2 Hiroshi Sugimoto 'Baltic Sea, Rügen 1996.' (left) 'Black Sea, Ozulce 1991.' (right)
Sugimoto has pursued this series of 'Seascapes' over the length of his career. Each photo is compositionally
identical, but to the expert eye, each offers unique nuances on the theme.*



figs. 6.3 & 6.4 'Carving wood.' (left) 'Hammering the surface texture of a bronze bird.' (right)

Making things with my hands means a lot to me. I could even say that when I sculpt or mold nature's materials it has an almost therapeutic effect. They inspire me and lead me on to new experiments. They transport me into another world. A world in which, if eyesight fails, my fingertips see the movement and continuous emergence of geometrical forms.

~ Tapio Wirkkala



figs. 6.5 & 6.6 'Sketching birds.' (left) 'Slicing rye bread.' (right)

Our hands have been disadvantaged ever since; performing rapid, repetitive, mechanized movements according to the rhythm of machines. This is a pervasive condition even today, commonly evidenced by the repetitive strain injuries which result from extended computer use. The development of new gestural and haptic interface technologies has acted to re-empower the human hand, yet these enhancements only begin to recognize the primary significance of the hand in our apprehension of experience.⁵ Quite ironically, it is the skilled work of the human hands themselves which ensures the continued relevance of humans in the human-computer interface. Even despite the prevalence of 'expert systems' and the ability to offshore labour, it remains the intuitive capacities and innate intelligence of the human hand which cannot be transmitted through a wire or replicated by these rule-based systems.⁶

More than anything else, it is the hands which develop manual ability and skill; the hands themselves become 'expert,' possessed of an innate intelligence which is beyond articulation. As such, it seems

as though the true loss in our hasty and inattentive information culture is less one suffered by the mind, than that suffered by the hands. As notions of work become increasingly abstracted – 'knowledge-workers' replacing skilled craftsmen – a parallel abstraction occurs in the work of the hands. As simple information-shufflers, we lose the age-old pleasure of seeing evidence of ourselves expressed in the world, as well as the cognitive and psychic satisfactions that accompany it...acquiring and maintaining skill is one of life's greatest pleasures. As manual skill is uploaded into digital technologies, we run the risk of losing some of the intrinsic, personal worth that accompanies it.⁷

The use of computation and digital technologies does not preclude the development of skill; if anything, these technologies offer fresh potential through their immense capacity as tools. This all depends on *how* we choose to use our technologies. In fact, they are nothing more than modern tools; and thus it remains necessary to actively engage them – to *practice* them. Practice is a form of learning



fig. 6.7 'Kizaemon-Ido' tea bowl.

There are three main kinds of Tea-bowls, those originating in China, Korea, and Japan, respectively. The most lovely are from Korea, and men of Tea always give them first place....The finest are called meibutsu, signifying the particularly fine pieces. There are twenty-six bowls registered as meibutsu, but the finest of them all is that known as the Kizaemon Ido. This bowl is said to contain the essence of Tea....

~ Soetsu Yanagi The Unknown Craftsman

which requires an investment of time and reflection - commodities not commonly available within the modern day logic of flow and distraction. However, most people would agree that “to reach a satisfying level of engagement, you must acquire and maintain an expertise: [that] anything worth doing takes practice.”⁸ Practice stands at the opposite end of the spectrum from instant gratification, offering a deep satisfaction and pride, but requires a dedication which sees things through to maturity. Once achieved, practiced skill is yours to keep; tangible evidence of personal self-worth. It is little wonder that there is a lasting appeal to mastery of this sort.⁹

Mastering a skill affects more than an abstract sense of self. Through long practice, the conversation between hand, mind, and eye matures, conferring a uniquely human capacity for intuition and reflection – an ability to be outside of oneself. Anton Bachleitner describes this from the perspective of a master puppeteer:

“It takes at least three years of work to say you are a puppeteer. The most difficult job technically is to be able to feel the foot contact the floor as it actually happens. The only way to make the puppet look as though it is actually walking is by feeling what is happening through your hands. The other thing which I think you cannot really train for, but can only discover with very long practice and experience, is a change in your own vision.

The best puppeteer after some years will actually see what is happening on the stage as if he himself was located in the head of the puppet, looking out through the puppet’s eyes – he must learn to be in the puppet. This is true not only in the traditional actor’s sense, but in an unusual perceptual sense. The puppeteer stands two meters above the puppet and must be able to see what is on the stage and to move from the puppet’s perspective. Moving is a special problem because of this distance, because the puppet does not move at the same time

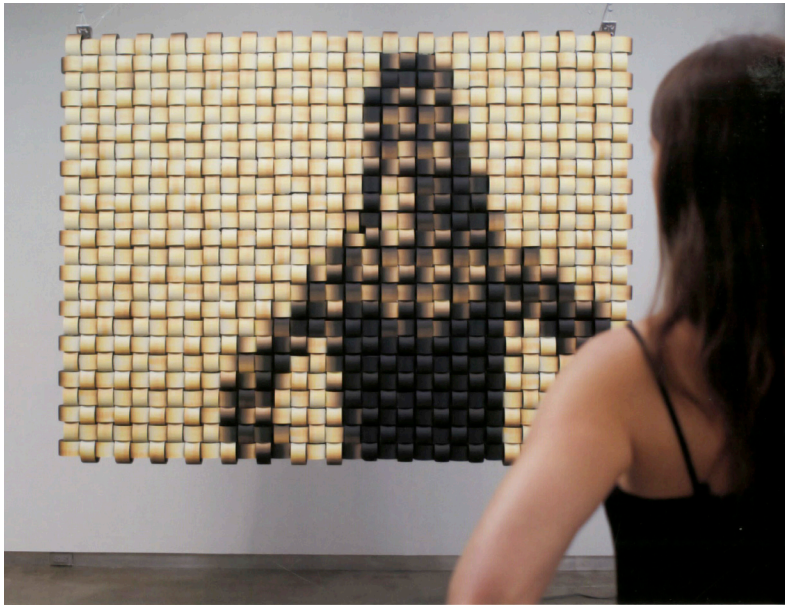
your hand does.

Also, there can be several puppets on the stage at the same time, and to appear realistic they must react to each other as they would in real life. So again the puppeteer must himself be mentally on the stage and able to react as a stage actor would react. This is something I cannot explain, but it is very important for a puppeteer to be able to do this. The problem is greater with certain plays, where the puppet may fly, as often happens in operas, or may drop through a hole, as in Der Golem, or do something else that is unusual. These are situations where the danger of tangles can be very great.”¹⁰

Feeling through your hands invokes notions of intuition. We commonly affiliate our intuitive capacity with a sense of touch: when capitalizing on intuition, something *feels* appropriate, or we might have a *feeling* for the solution or the correct way forward. Intuition – a capacity conferred only through repeated practice - con-

solidates the central position of the expert in information culture. Intuition in fact indicates a continued possibility for expert knowledge generation; an ability to withstand the torrent of information transmitted through digital media. Intuitive thought resembles an internal search engine, aggregating massive quantities of information within the emotional register before offering the results to the conscious mind. Instead of being ‘weighed down with information,’ mastery in fact offers an avenue independent of conscious analysis; an emotional response which - biologically speaking – is actually quite empirical.¹¹

In stark contrast to the easily accessible external storehouse of information offered through digital mediation, knowledge absorbed internally works to generate an increased sense of awareness. The internalization of skill through mastery allows us to push what we already know into the subconscious background; ‘opening up’ our awareness to the task at hand, and providing an increased sense of inhabiting our work. This phenomenon explains how puppeteers



*figs. 6.8 & 6.9 Daniel Rozin 'Weave Mirror.' (left) 'Wooden Mirror.' (right)
Rozin's mechanical mirror series presents us with striking examples of a digital technology that has the warmth of analogue media. Each mirror in the series is composed of hundreds of physical fragments, rather like analogue 'pixels', which can move individually to reconstitute the images that appear before them.*

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can learn to be ‘in’ the puppet; or a master carpenter’s extension of himself into the wood.¹² The ability to ‘become the thing on which we are working’¹³ is evidence of a highly developed human capacity for empathy; an ability to extend our minds through our hands and tools with complete transparency. This ability to shift our ‘focal awareness’ explains why we feel as though we hammer a nail with our hand; or can exist *within* a computer or television screen.¹⁴

The mastery of skill is evidence of the inseparability between hand and mind. As Robertson Davies astutely pointed out in *What’s Bred in the Bone*, “the hand speaks to the brain as surely as the brain speaks to the hand.”¹⁵ The hands and mind are intimately linked in conversation; as such, intelligence and knowledge cannot be attributed to the mind alone. Each play an equal and crucial aspect in the apprehension of experience and the generation of knowledge; and each possess a discrete intelligence. The connection between mind and hand is reflected in the connection between thinking and doing; the modern separation of which has been criticized for the degrada-

tion of modern experience.¹⁶ The rise of digital practice - with its ocular centric bias – demands a critical questioning of this unnatural dislocation of human experience away from the synesthetic and tactile in favour of the purely rationalized mind and eye. It begs a reconsideration of the premise that “intelligence is a purely mental phenomenon, that the mind can be educated without the participation of the body.”¹⁷

The continued importance of the hands lies in their reality-conferring qualities; hands act as a kind of ‘reality check’ for purely mental processes. In a mediated age characterized by a ‘pathology of immediate perception,’ this faculty of the hands becomes evermore imperative – affording a method for grounding the simulations of digital mediation in material existence.¹⁸ Conceiving of digital constructions as complete without realizing them in material form can easily break the cycle of ‘circularity,’ or feedback, between head and hand – the same conversation which is essential to human experience and knowledge generation. This is a condition exacerbated

by the computer, but institutionalized by the blueprint in the late nineteenth century. Representation premised on a 'hands-off' approach – digital simulations disconnected from reality – tends to favour rational, deterministic thinking while repressing the role of intuition. This same approach also works to disable an essential relational understanding of context, scale, and appropriateness that comes naturally to the hands.

Perhaps the most troubling aspect emerging from the ungrounded use of digital technologies (the digital remaining digital), is the notion that we no longer need to make mistakes. In digital environments, the implications of errors are reduced, or eliminated entirely through implementation of the 'undo' function and the potential for infinite data backups. Although these features are obviously essential to computing environments, removing the friction of error-making also tends to negate a certain authority which is exercised by material, and in the process enables a sort of passivity to characterize operations within the digital. Erroneous decision-

making is an essential ingredient in cultivating expertise; making mistakes forces *active engagement*, and demands critical involvement to determine what went wrong. 'Learning from our mistakes' is more than simply a clichéd expression; it reflects the honest assertion that "technique develops by a dialectic between the correct way to do something and the willingness to experiment through error."¹⁹ Without the grounding reality of mistakes, there is a danger of becoming couched in a false sense of security, or drifting aimlessly via curiosity and never improving.²⁰

As Sherry Turkle puts it, "All too often, experiences with simulations do not open up questions but close them down." In her opinion, working entirely within digital (software) environments "fosters passivity, ultimately dulling people's sense of what they can change in the world." This can lead to a tendency to take things at 'interface value.'²¹ By extension, the downplaying of the real, physical world in favour of simulation could also limit imagination; especially in children developing within computing environments.²² Turkle's ob-



fig. 6.10 Tapio Wirkkala 'Sketch for glass bowls.'

Wirkkala never wrote about his work; all that is known about his design philosophy is contained in a few interviews and his prolific, illustrated correspondence with clients, partners, assistants, friends.

~ Tapio Wirkkala 12



figs. 6.11 & 6.12 George Nakashima 'Lounge Chair plus Free-form Arm,' 1962. (left) 'Conoid Cross-legged End Table,' 1960-61. (right)

There is a mystery in the creative process and its relation to craft; the infinite moves into dark waters...

Craftsmen work to produce beauty, at least as a function of a useful object, but it need not be art.

~ George Nakashima

servations - although perhaps quite perfunctory – seem to reassert the poverty of new digital tools when not engaged with an ‘expert’ mentality.

A common response inherent within a passive, uncritical approach to the digital medium is the notion that these tools naturally afford us freedom, that intrinsic to them is a capacity to supplement and invigorate imagination - creativity without recourse to mastery. As Crawford puts it, “identifying creativity with freedom harmonizes quite well with the culture of the new capitalism, in which the imperative of flexibility precludes dwelling in any task long enough to develop real competence.”²³ But the reality of it, ironically, is that creativity in fact emerges from “a mastery of the sort that is cultivated through long practice.”²⁴ Creativity is a product of expertise; and as such is intrinsically tied to the qualities of duration, intuition and empathy which characterize it.²⁵ It is a form of expert knowledge, which - as Frank Levy would have it – is “knowing what to do when the rules run out or there are no rules in the first place.”²⁶ This

knowledge, or intuitive capacity, remains the unique province of the experienced human even despite the proliferation of ‘knowledge-based’ work and the development of ‘expert systems’ to replace human judgment.²⁷

The continued relevance of the expert mentality is an essential ingredient in the contemporary interaction between humans and our digital tools; expertise being the very thing which separates intuitive human judgment from rule-based machine intelligence.²⁸ When used as a tool through which we are able to extend our awareness, the digital medium offers unprecedented capacity for human expression and creativity. It is as Steve Mann asserts, that “what we need are not technologies that predict and replace human activity, but systems that expand and enhance human possibility.”²⁹ The digital medium, through offering the promise of reuniting visual thinking with manual dexterity and practiced knowledge, does in fact offer the potential for more satisfying and incisive work.³⁰



fig. 6.13 Mug.
Author.

* * *

The mug is a handcrafted object. I know because I made it with my own hands; I formed the wet clay on the wheel, attached the handle, trimmed and glazed it. This is the only mug like it in existence; and considering my amateur skill on the potting wheel, may remain unique indefinitely. In some way, it is an embodiment of me; a material instantiation which ages as I do. It calls on both my senses and memory; as I lift it to my lips, the profile of the rim recalls the act of forming it, the feeling of the wet clay sliding through my fingers.

This is a simple object, formed from a single earthen material then rendered durable by intense heat. Its simplicity is wonderful. It is through this simplicity that it is formally legible; it is this simplicity through which I am able to sense finer nuances and character within the object. It is a sort of simplicity which eludes any prescriptive function; allowing the mug to become many things or simply a vessel for storing paperclips and pens.

I associate its use with a sense of ritual; this is an object with which I take a warm drink; grasping the handle to lift it, and repeating. It may not epitomize the perfect mug, but it suits its use quite well, and I cannot see how it would cease to function short of breaking or being misplaced. This is a stable object; I have a calm relationship with it. It does not disturb me, or the space around me. It is up to me when I decide to put hot water into it, sip a coffee or even ignore it for long periods of time. But, somehow, I know that I will eventually come back to it. The inherent slowness of the mug is immensely satisfying; it is something I made and will always have that story to tell.

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“I have come to realize that the most important place where my work exists is not in the museum gallery, or in the screening room, or on television, and not even on the video screen itself, but in the mind of the viewer who has seen it. In fact, it is only there that it can exist.”

*~ Bill Viola
printed in Townsend Art of Bill Viola 205*

cerns; it catalyzes experience which has to be seen and felt, experience whose affect cannot be mediated in secondary forms. As Eliason points out, his works constitute “devices for the experience of reality,” an assertion that begins to reveal the philosophy at the core of his entire enterprise, specifically, an “argument for an imbedded and exhilarating being-in-the-world.”² In a very essential way, each of these artists is deeply involved in renegotiating perceptions of the human experience; invariably creating spaces of immersion which operate on all levels; mind, body and spirit. As Viola points out, “it’s not [about] head knowledge, not intellectual knowledge...I think that the person who is able to embody something rather than just repeat it...and to say it persuasively, is somebody who is operating on all levels – so it’s felt, it’s expressed in a language that is captivating and inspiring.”³ This issue of being is a central tenet in each oeuvre; a question which is, rather paradoxically, invariably made manifest through the ostensibly mediating effects of digital technologies.

Viola exemplifies this paradox in particular; his modes of pro-

found spiritual reflection are effected with “precisely that technology that promises the most authentic simulacrum of reality,” proof that the creativity and inspiration that arises from mastery of a medium can in fact work to elevate the tool beyond its inherent limitations.⁴ Viola aligns directly with the thesis in his belief that “to be truly useful, any technology has to be unconscious...we need to know that we are using these things to go somewhere, to achieve something, to deepen ourselves and our knowledge.”⁵ Working with technology in this way seems to liberate intention from the limits of convention, infusing the blind implementation of mediation with a subjective awareness of its effects. Moreover, deploying technology in unconventional – or completely transparent – ways encourages a capacity for heightened consciousness in the viewer, where the “smooth surface of illusion and its technical construction then form two poles between which the viewer can move.”⁶

The functional subversion of technology seems to be entwined with – partly emerging from, yet partly inspiring - a mode of

thinking characterized by a questioning and experimental process. McCall exemplifies this in his categorical repurposing of cinematic mediation; noticing that it was “precisely the spectacular, dramatic incident that audiences craved from performance,” and creating work that was consciously determined not to give the audience what they wanted.⁷ Instead, this refusal led him to the unprecedented decision to embrace “the perception that nothing will change, in the sense of producing any great variety,” and began to develop the homeostatic permutational strategies that eventually came to reflect the central preoccupation within his work.⁸ Eliasson’s method, as well, is indicative of a mode of thinking “that opens out into risky and inconclusive territory – a field of trial and error, false starts, ongoing puzzlings, and delightful discoveries.” In a welcome diversion from the typically rational and systematized process encouraged by the digital medium, Eliasson encourages speculation over declaration, and “follows his curiosity in a process of attentive inquiry that lets intellectual and emotional sparks fly.”⁹ Viola, as well, is possessed of a

wide-ranging curiosity. His works commonly result from the extensions of direct personal observation of the everyday; something his notebooks reveal through a “deep personal search for the sublime in both written and visual form.”¹⁰

These are artists who are staunchly opposed to the climate of instantaneity characterized by industrial modernity, cultivating “an art of duration and absorption rather than of immediate satisfactions and revelation; an art that refuses the spectacular control over the image, and which embeds its audience within its structures.”¹¹ Their works consistently require a long time in order to be properly apprehended, prompting a spatial and temporal self-consciousness that serves to “amplify the manner in which the very apprehension of the world is inherently tied to the body.”¹² Viola’s recent use of extreme slow motion in his work *The Greeting*, and as well, McCall’s multiple hour extension of *Long Film for Four Projectors*, are evidence of this desire for the temporal reshaping of perception. Shifting our temporal perception has the effect of deepening the experience of

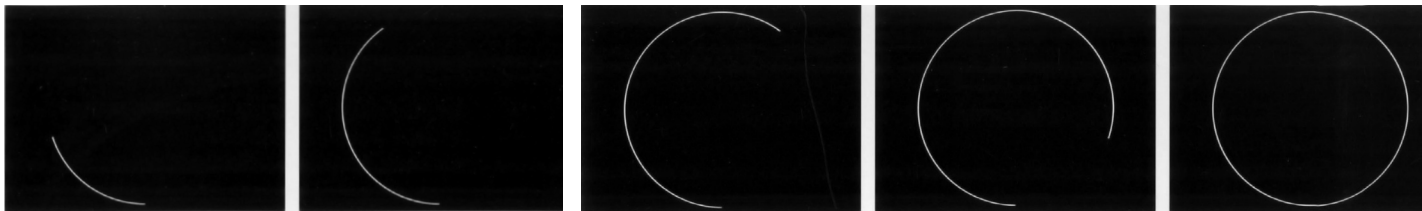


fig. 7.1 Anthony McCall 'Line Describing a Cone sequential frames,' 1973.

In Line Describing a Cone, McCall articulates the beam of the projector as a three-dimensional volume in space. Over a period of thirty minutes, in a dark room filled with mist, a volumetric form emerges out of immaterial light..Viewers are free to encounter the work from multiple viewpoints – to walk into the conical shape of light, to stand inside of it, or even to lie under it – resulting in an intensely corporeal experience.

~ Biesenbach/Marcoci 'Take Your Time' 194

the moment, revealing the “lived durée [as] not a question of length, but of depth and intensity.”¹³

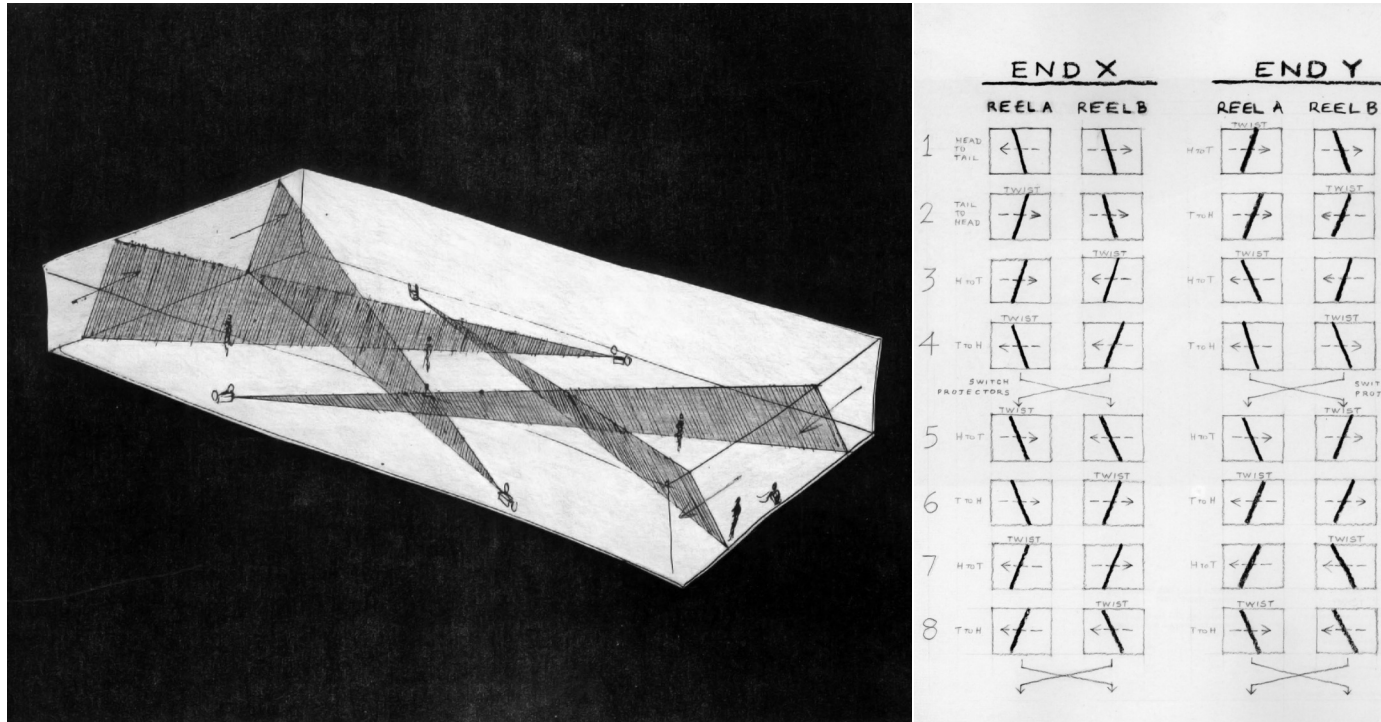
Most crucially to the aims of this thesis is the assertion that we emerge from these works literally changed; that “the work alters our awareness of our place in the world and our relationship to time and materiality.”¹⁴ In some way, each of these artists has found a way to employ technologies of mediation in an entirely renegotiated fashion; refocusing attention away from the illusion of a seamlessly mediated lived experience, and instead constructing sublimely affective moments which may indeed offer a renewed perception of what it means to be in the world today.



fig. 7.2 Anthony McCall 'Long Film for Four Projectors,' 1974.

...Long Film for Four Projectors is an experiential phenomenon...the piece feels nearly religious, or sublime, against the spectacular culture of the moving image in which we live today. Exhaustive and materialist, the true content of this work is the viewer's inability to take it all in (the work is too long, nearly seven hours in duration, and it happens all around you)."

~ Eamon 'The Solid Light Films' 11



figs. 7.3 & 7.4 Long Film for Four Projectors 'Schematic' (left) 'Reel Permutations' (right)



fig. 7.5 Olafur Eliasson 'Notion Motion,' 2005.

Ultimately, Notion motion proposes an evocative cancellation of the line along which each body understands itself as apart from its surroundings, a reduction of our estrangement from a now more fully enveloping universe.

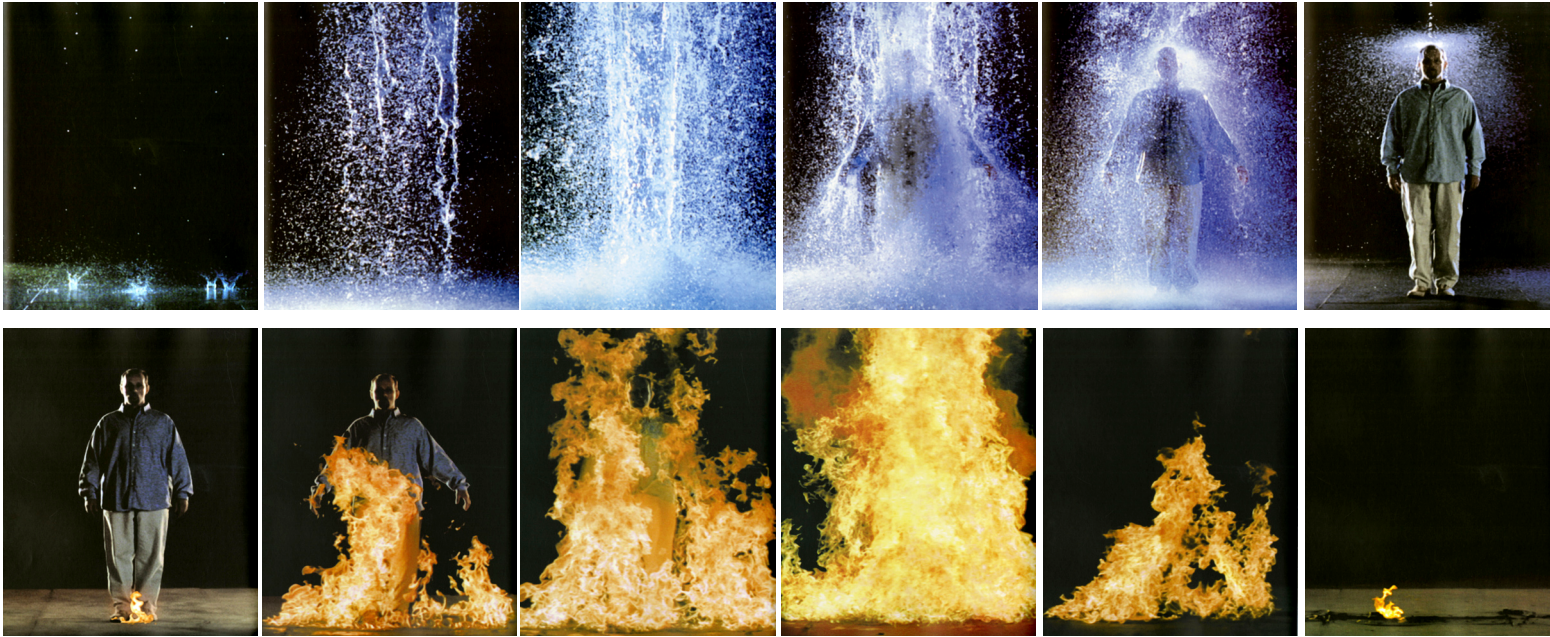
~ Grynsztejn 'Take Your Time' 18



figs. 7.6 & 7.7 Olafur Eliasson 'Model Room,' 2003.

A touchstone work in his oeuvre, Model room is crucial in pointing to a mode of thinking that opens out into risky and inconclusive territory – a field of trial and error, false starts, ongoing puzzlings, and delightful discoveries.

~ Grynsztejn 'Take Your Time' 26



*fig. 7.8 Bill Viola 'The Crossing' stills.
Selected frames extracted from Viola's video installation; a man is immolated by
both fire and water respectively. Projected onto either side of a single screen.*



fig. 7.9 Bill Viola 'The Greeting' stills.

*Modernity's conception of linear, uniform time is anathematic to Viola's practice, and to his ideas of human spirituality. What we see in *The Greeting* is the extension of the significant moment: where the density of life so sediments the flow of time that it slows to an almost imperceptible process. Paradoxically, Viola could not so easily achieve this reversion to what is, more or less, a medieval idea of time, without using film."*

~ Chris Townsend 'The Art of Bill Viola' 16

WORKS

The following works conclude this thesis. It is my belief that the acts of design and making are inherently decisive; the resulting constructions are products of a necessarily critical and synthetic decision-making process. A culmination in made work is both natural and appropriate for this project, on one hand providing concrete and tangible proof of concept, yet on the other hand remaining open, subjective and capable of catalyzing further thought – all essential ambitions underlying the entirety of my research.

Common themes run throughout my design work – many should be familiar after reading the preceding thesis meditations. These include notions of sublimation and transcription through digital mediation, immersion, boredom and contemplation, and of course, the constant, probing and playful inclusion of the hands in experience. Synthesizing my research through design requires rational, overtly conscious and codified forms of expression yet does

not exclude the inarticulate knowledge - the feelings, intuitions and skill - that I believe my hands possess. This recognizes the premise that our minds and our bodies understand more than we consciously know; that our subconscious, emotional registers are in fact quite empirical if we only allow them to inform our conscious decisions.

I have purposely not offered critical rationalization of my work. In my opinion, analyzing the work in this way serves only to restrict its potential by replacing a multitude of differing, subjective interpretations with a single 'correct' explanation. Instead, I hope that the work maintains a generative potential by offering singular experiences over time; where excruciating boredom in one viewer might be counterbalanced with enchantment in another. This is an experiment in the unconventional use of digital mediation in order to construct a durability of nuance and essence instead of content-laden distraction.

Screen #1: LOOM

Flash animations weave together with dyed polyester string.

The 'Digital Loom' operates in the conventionally unutilized space between digital projector lens and screen surface. The work generates topologically distorting forms and sinuous patterns of light at the chance encounters between projected animations and string; it is a sculpture that realizes wonderful complexity out of the integration of simple digital graphics and minimal material form.

(overleaf)

*fig. 8.1 Digital animation still frames.
Simple geometries in white light.*

(underlayer & following page)

*fig. 8.2 Tools & Materials.
Materials used during construction of the 'Loom'.*



Movement 1

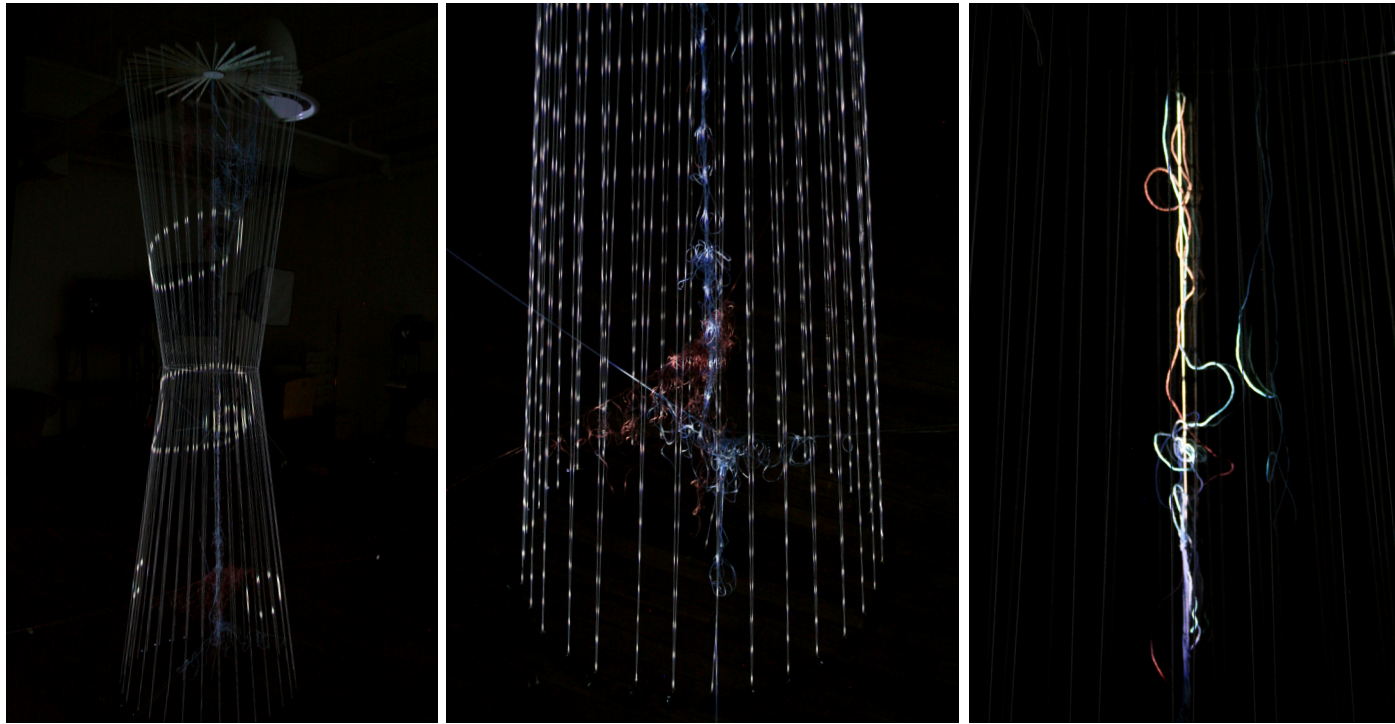
Movement 3

Movement 5

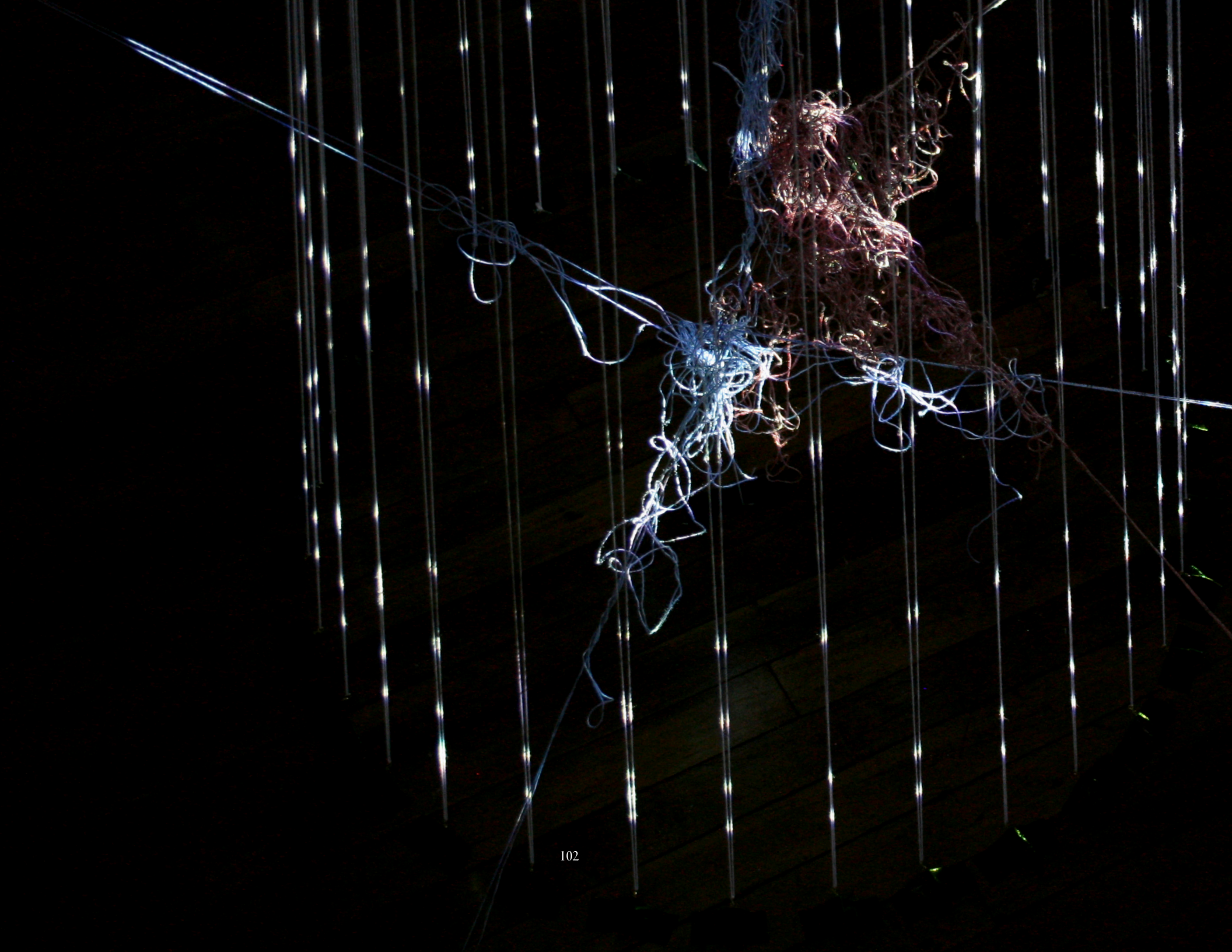
Movement 7

Movement 10





*figs. 8.3 - 8.5 Digital Loom stills.
'Crazy Circles' (left) 'Cage' (centre) 'Core' (right)*







Screen #2: ROOM

FSR circuits paint an inhabitable lightroom.

Coding framework in collaboration with Daniel Galway.

This work invites our bodies and hands into the space of the screen. By inhabiting the screen - or perhaps instead folding the screen around us - I am trying to experiment with the notion that digital technologies can create true immersion: the truly satisfying sensation which the potter has while he throws clay on the wheel, or a skilled carpenter attains as he crafts from wood. The handle objects are sensors, transcribing the embodied action of our hands into data which is then cycled through a framework of digital graphics-processing. These graphics are projected back onto the screen around you, thus completing a continuous cycle of digitally augmented but entirely embodied experience. Depending on which handles are activated, the occupants can subtly affect the colour, speed and intensity of the space they occupy. This project explores the possibility of integrating digital technology, our hands, and our bodily processing of perception into a coherent whole.

(overleaf)

fig. 8.8 Code implementation.

Excerpt from Processing code framework.

(underlayer & following page)

fig. 8.9 Inhabitable screen space.

Constructed from numerous lengths of white yarn.

```

import processing.serial.*;
import cc.arduino.*;
import fullscreen.*;
import processing.opengl.*;
Arduino arduino;
FullScreen fs;
ThreadLogic OutputSetA;
ThreadLogic OutputSetB;
int SelectedOutputSet;
int DrawExclusive;
final int FALSE = 0;
final int TRUE = 1;
int crazyFactor = 0;
float a = 0;

void setup () {
  size (2560,768,OPENGL);
  arduino = new Arduino(this, Arduino.list()
[1], 57600);
  arduino.pinMode(0, Arduino.INPUT);
  arduino.pinMode(1, Arduino.INPUT);
  arduino.pinMode(2, Arduino.INPUT);
  arduino.pinMode(3, Arduino.INPUT);
  arduino.pinMode(4, Arduino.INPUT);
  arduino.pinMode(5, Arduino.INPUT);
  arduino.pinMode(6, Arduino.INPUT);
  arduino.pinMode(7, Arduino.INPUT);
  OutputSetA = new ThreadLogic(1);
  OutputSetA.setup();
  OutputSetA.SetSensorMap(0,1,2,3);
  OutputSetA.SetDrawPerimeter(TRUE,col
or(255,0,0));
  OutputSetA.SetDrawLimits(0, 90, width/2,
height);
  OutputSetA.CreateShapes();
  OutputSetB = new ThreadLogic(2);
  OutputSetB.setup();
  OutputSetB.SetSensorMap(4,5,6,7);
  OutputSetB.SetDrawPerimeter(TRUE,col
lor(0,255,0));
  OutputSetB.SetDrawLimits(width/2, 90,
width, height);
  OutputSetB.CreateShapes();
  SelectedOutputSet = 1;
  ellipseMode(CENTER);
  rectMode(CORNER);
  smooth();
  frameRate(60);
  background(0);
  fs = new FullScreen(this);
  fs.enter();
}

void draw () {
  noStroke();
  fill(0, 0, 0, 50);
  rect(0, 0, width, height);
  strokeWeight(1);
  OutputSetB.
SetColorCrossover(OutputSetA.
GetColourSense());
  OutputSetA.
SetColorCrossover(OutputSetB.
GetColourSense());
  if(OutputSetA.SensorSet.
GetSensorAVGValue(SENSOR_POSITION)
> 200) {
  OutputSetA.ScatterShapes();
  OutputSetB.ScatterShapes();
}
  OutputSetA.update();
  OutputSetB.update();
  if(DrawExclusive == TRUE){
  if(SelectedOutputSet == 1)
  OutputSetA.draw();
  else
  OutputSetB.draw();
}
  if (frameCount % 60 == 1) {
  OutputSetA.OutputDebugInfo();
  OutputSetB.OutputDebugInfo();
}
}

void keyPressed() {
  if (key == '1') {
  if(SelectedOutputSet == 1)
  SelectedOutputSet = 2;
  else
  SelectedOutputSet = 1;
}
  if (key == 'x') {
  if(DrawExclusive == TRUE)
  DrawExclusive = FALSE;
  else
  DrawExclusive = TRUE;
}
  else if(key >=0x30 && key <= 0x39) {
  OutputSetA = new ThreadLogic(1);
  OutputSetA.setup();
  if(SelectedOutputSet == 1)
  OutputSetA.keyPressed(key);
  else if(SelectedOutputSet == 2)
  OutputSetB.keyPressed(key);
  else
  }
}

float Set_GravityFactor = 0;
float GravityTarget = YMin;
ThreadLogic(int indexValue){
  OutputSetIndex = indexValue;
  println("ThreadLogic() - create -
OutputSetIndex = " + OutputSetIndex);
}

void setup() {
  SensorSet = new SensorArray();
  SensorSet.SetSensorArrayReferenceMo
de(SENSORARRAY_REF_ZERO);
  SpeedSensor = new
  ActuationSensorControl();
  SpeedSensor.
  SetRateOfActuation(COEFF_
SPEEDADJUST);
  SpeedSensor.SetAttackSlope(1);
  SpeedSensor.SetAttackWeight(2);
  SpeedSensor.SetDecaySlope(0.1);
  SpeedSensor.SetDecayWeight(0.5);
  SpeedSensor.
  SetIntensityInputPercentage = (float)
  Set_IntensityInputPercentage = (float)
  Set_IntensityInput / SENSOR_MAX_VALUE;
  CalcNumEllipseShapes = (int)
  (Set_IntensityInputPercentage *
  (CONST_MAX_ELLIPSE_QTY - CONST_
MIN_ELLIPSE_QTY));
  if(CalcNumEllipseShapes < CONST_
MIN_ELLIPSE_QTY)
  CalcNumEllipseShapes = CONST_
MIN_ELLIPSE_QTY;
  ExistingNumEllipseShapes =
  ellipseShape.size();
  if(CalcNumEllipseShapes <
  ExistingNumEllipseShapes) {
  for(int counter = 0; counter <
  (CalcNumEllipseShapes); counter ++){
  EnhancedEllipse ellipse1 =
  (EnhancedEllipse) ellipseShape.
  get(counter);
  ellipse1.ReloadTimer((int)(CONST_
ELLIPSE_LIFETIME + random(CONST_
RANDOM_ELLIPSE_LIFETIME)));
  }
  }
  if(CalcNumEllipseShapes ==
  ExistingNumEllipseShapes) {
  for(int counter = 0; counter <
  (ExistingNumEllipseShapes); counter ++){
  EnhancedEllipse ellipse1 =
  (EnhancedEllipse) ellipseShape.
  get(counter);
  ellipse1.ReloadTimer((int)(CONST_
ELLIPSE_LIFETIME + random(CONST_
RANDOM_ELLIPSE_LIFETIME)));
  }
  }
  if(CalcNumEllipseShapes >
  ExistingNumEllipseShapes) {
  for(int counter =
  ellipseShape.add(new Enhance
dEllipse(this,random(XMin+25,XMax-
25),random(YMin,YMax),random(ELLIPSE_
SEED_SMALL),random(ELLIPSE_SEED_
SMALL), random(5,1)));
  }
}

void update() {
  SensorSet.ReadSensorArraySensors();
  SensorSet.DoCalculations();
  CalculateColourShift();
  CalculateSpeedSenseInput();
  EllipseShapeSpawner();
  GravityWhileInactive();
  UpdateEllipseShapes();
  upperWave.TickWave();
}

void draw() {
  for(int counter = 0; counter <
  ellipseShape.size(); counter ++){
  EnhancedEllipse ellipse1 =
  (EnhancedEllipse) ellipseShape.
  get(counter);
  ellipse1.RunInfluenceAllPoints();
  ellipse1.ConstrainPoints();
  ellipse1.Draw();
  }
  upperWave.DrawWave();
  if(drawPerimeterEnable == TRUE)
}

void EllipseShapeSpawner () {
  int Set_IntensityInput;
  float Set_IntensityInputPercentage;
  int CalcNumEllipseShapes = 0;
  int ExistingNumEllipseShapes;
  Set_IntensityInput = SensorSet.
GetAverage(SENSOR_INTENSITY, 50);
  Set_IntensityInputPercentage = (float)
  Set_IntensityInput / SENSOR_MAX_VALUE;
  CalcNumEllipseShapes = (int)
  (Set_IntensityInputPercentage *
  (CONST_MAX_ELLIPSE_QTY - CONST_
MIN_ELLIPSE_QTY));
  if(CalcNumEllipseShapes < CONST_
MIN_ELLIPSE_QTY)
  CalcNumEllipseShapes = CONST_
MIN_ELLIPSE_QTY;
  ExistingNumEllipseShapes =
  ellipseShape.size();
  if(CalcNumEllipseShapes <
  ExistingNumEllipseShapes) {
  for(int counter = 0; counter <
  (CalcNumEllipseShapes); counter ++){
  EnhancedEllipse ellipse1 =
  (EnhancedEllipse) ellipseShape.
  get(counter);
  ellipse1.ReloadTimer((int)(CONST_
ELLIPSE_LIFETIME + random(CONST_
RANDOM_ELLIPSE_LIFETIME)));
  }
  }
  if(CalcNumEllipseShapes ==
  ExistingNumEllipseShapes) {
  for(int counter = 0; counter <
  (ExistingNumEllipseShapes); counter ++){
  EnhancedEllipse ellipse1 =
  (EnhancedEllipse) ellipseShape.
  get(counter);
  ellipse1.ReloadTimer((int)(CONST_
ELLIPSE_LIFETIME + random(CONST_
RANDOM_ELLIPSE_LIFETIME)));
  }
  }
  if(CalcNumEllipseShapes >
  ExistingNumEllipseShapes) {
  for(int counter =
  ellipseShape.add(new Enhance
dEllipse(this,random(XMin+25,XMax-
25),random(YMin,YMax),random(ELLIPSE_
SEED_SMALL),random(5,1)));
  }
  }
  for(int counter = 0; counter <
  ellipseShape.size(); counter ++){
  EnhancedEllipse ellipse1 =
  (EnhancedEllipse) ellipseShape.
  get(counter);
  ellipse1.SetClipLimits(XMin, XMax,
YMin, YMax);
}

void CalculateSpeedSenseInput() {
  float SpeedInputPercentage = (float)
  SensorSet.GetPercentageActuationfromAvg
(SENSOR_SPEED, 50);
  CurrentSpeedSense = SpeedSensor.Cal
culateActuation(SpeedInputPercentage,);
  CurrentSpeedSense = constrain(Current
SpeedSense,0,100);
  CurrentSpeedSense = 100 -
  CurrentSpeedSense;
}

void EllipseShapeSpawner () {
  int Set_IntensityInput;
  float Set_IntensityInputPercentage;
  int CalcNumEllipseShapes = 0;
  int ExistingNumEllipseShapes;
  Set_IntensityInput = SensorSet.
GetAverage(SENSOR_INTENSITY, 50);
  Set_IntensityInputPercentage = (float)
  Set_IntensityInputPercentage = (float)
  Set_IntensityInput / SENSOR_MAX_VALUE;
  CalcNumEllipseShapes = (int)
  (Set_IntensityInputPercentage *
  (CONST_MAX_ELLIPSE_QTY - CONST_
MIN_ELLIPSE_QTY));
  if(CalcNumEllipseShapes < CONST_
MIN_ELLIPSE_QTY)
  CalcNumEllipseShapes = CONST_
MIN_ELLIPSE_QTY;
  ExistingNumEllipseShapes =
  ellipseShape.size();
  if(CalcNumEllipseShapes <
  ExistingNumEllipseShapes) {
  for(int counter = 0; counter <
  (CalcNumEllipseShapes); counter ++){
  EnhancedEllipse ellipse1 =
  (EnhancedEllipse) ellipseShape.
  get(counter);
  ellipse1.ReloadTimer((int)(CONST_
ELLIPSE_LIFETIME + random(CONST_
RANDOM_ELLIPSE_LIFETIME)));
  }
  }
  if(CalcNumEllipseShapes ==
  ExistingNumEllipseShapes) {
  for(int counter = 0; counter <
  (ExistingNumEllipseShapes); counter ++){
  EnhancedEllipse ellipse1 =
  (EnhancedEllipse) ellipseShape.
  get(counter);
  ellipse1.ReloadTimer((int)(CONST_
ELLIPSE_LIFETIME + random(CONST_
RANDOM_ELLIPSE_LIFETIME)));
  }
  }
  if(CalcNumEllipseShapes >
  ExistingNumEllipseShapes) {
  for(int counter =
  ellipseShape.add(new Enhance
dEllipse(this,random(XMin+25,XMax-
25),random(YMin,YMax),random(ELLIPSE_
SEED_SMALL),random(5,1)));
  }
  }
  for(int counter = 0; counter <
  ellipseShape.size(); counter ++){
  EnhancedEllipse ellipse1 =
  (EnhancedEllipse) ellipseShape.
  get(counter);
  ellipse1.SetClipLimits(XMin, XMax,
YMin, YMax);
}

ellipseShape.size(); counter ++){
  EnhancedEllipse ellipse1 =
  (EnhancedEllipse) ellipseShape.
  get(counter);
  ellipse1.SetClipLimits(XMin, XMax,
YMin, YMax);
}

void ScatterShapes() {
  for(int counter = ellipseShape.size()-1;
  counter >= 0; counter--){
  EnhancedEllipse ellipse1 =
  (EnhancedEllipse) ellipseShape.
  get(counter);
  ellipse1.SetPoint(PT_XY,GenerateNew
Target(XMin,XMax,50), GenerateNewTarg
etX(YMin,YMax,50));
  }
}

void UpdateEllipseShapes(){
  for(int counter = ellipseShape.size()-1;
  counter >= 0; counter--){
  EnhancedEllipse ellipse1 =
  (EnhancedEllipse) ellipseShape.
  get(counter);
  if(ellipse1.GetTimer() <= 0) {
  ellipseShape.remove(counter);
  }
  else if (ellipse1.GetTimer() == CONST_
ELLIPSE_POP_THRESHOLD) {
  ellipse1.SetPointTarget(PT_
WH,random(5,10), random(5,10));
  ellipse1.ShapePoints[PT_WH].
SetPointDefaultX(Speed)ellipse1.
ShapePoints[PT_WH].
GetPointDefaultX(Speed) * 2);
  ellipse1.ShapePoints[PT_WH].
SetPointDefaultY(Speed)ellipse1.
ShapePoints[PT_WH].
GetPointDefaultY(Speed) * 2);
  ellipse1.ReloadTimer(ellipse1.
GetTimer() - 1);
  }
  else {
  ellipse1.ReloadTimer(ellipse1.
GetTimer() - 1);
  }
  if (ellipse1.PointsStopped(PT_WH)
== TRUE)
  ellipse1.SetPointTarget(PT_WH,
random(ELLIPSE_SEED_MEDIUM) *
random(8,3), random(ELLIPSE_SEED_
MEDIUM) * random(8,3));
  ellipse1.SetShapeColor(newColour);
  ellipse1.SetShapeSpeed(CurrentSpe
edSense);
}

float GenerateNewTargetX(float MinVal,
float MaxVal, int Distance) {
  return GenerateNewTarget(MinVal,
MaxVal, Distance);
}

float GenerateNewTargetY(float MinVal,
float MaxVal, int Distance) {
  float newTarget;
  if(GravityTarget < YMax)
  newTarget = GenerateNewTarget(Gravi
tyTarget, MaxVal, Distance);
  else
}

newTarget =
GenerateNewTarget(MinVal, MaxVal,
Distance);
return newTarget;
}

float GenerateNewTarget(float MinVal,
float MaxVal, int Distance) {
  MinVal += Distance;
  MaxVal -= Distance;
  float newTarget =
  random(MinVal, MaxVal);
  return newTarget;
}

float GetColourSense(){ return ((float)
SensorSet.GetAverage(SENSOR_COLOUR,
200) / (float) SENSOR_MAX_VALUE) *
100;
}

void SetColorCrossover(float crossoverVal)
{ ColourGenerator.SetSecondaryValue(cro
ssoverVal); }

void CalculateColourShift() {
  ColourGenerator.SetPrimaryValue(this.
GetColourSense());
  newColour = ColourGenerator.
CalculateColourPriSec();
}

void DrawPerimeter(){
  boolean originalStroke = g.stroke;
  float originalStrokeWeight =
  g.strokeWeight;
  boolean originalFill = g.fill;
  int originalFillColor = g.fillColor;
  int origoiMode = g.colorMode;
  noFill();
  colorMode(RGB);
  strokeWeight(CONST_PERIMETER_
STROKE);
  stroke(perimeterColor);
  rect(XMin, YMin, XMax, YMax);
  g.colorMode = origcolMode;
  g.stroke = originalStroke;
  g.strokeWeight = originalStrokeWeight;
  g.fill = originalFill;
  g.fillColor = originalFillColor;
}

void SetSensorMap(int sensor0, int
sensor1, int sensor2, int sensor3) {
  SensorSet.SetSensorMap(sensor0,sens
or1,sensor2,sensor3);
}

void SetDrawLimits(int Xmin, int Ymin, int
Xmax, int Ymax) {
  XMin = Xmin;
  XMax = Xmax;
  YMin = Ymin;
  YMax = Ymax;
}

void SetDrawPerimeter(int enableFlag){
  if(enableFlag != 0)
  drawPerimeterEnable = TRUE;
  else
  drawPerimeterEnable = FALSE;
}

void SetDrawPerimeter(int enableFlag,
color drawColor){
  if(enableFlag != 0)
  drawPerimeterEnable = TRUE;
  else
  drawPerimeterEnable = FALSE;
  perimeterColor = drawColor;
}

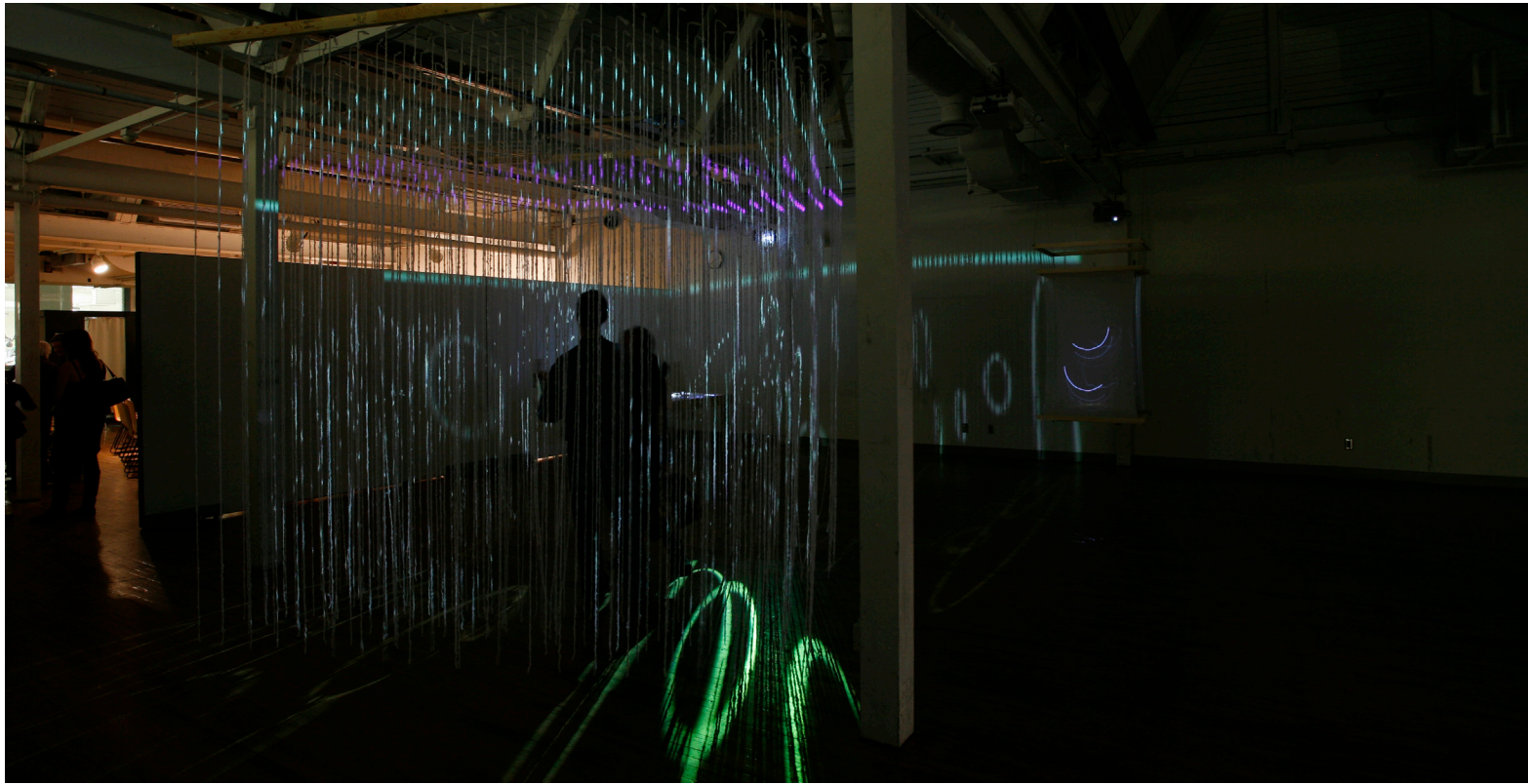
void keyPressed(char keyVal) {
  EnhancedEllipse ellipse1 =
  (EnhancedEllipse) ellipseShape.get(0);
  if (keyValue == 'q') {
  for(int counter =
  0;counter<2;counter++) {
  ellipse1.SetPointDirChangeFactor
(counter,ellipse1.ShapePoints[counter].
GetX_DirChangeFactor() + 0.001,ellipse1.
ShapePoints[counter].GetY_
DirChangeFactor() + 0.001);
  }
  if (keyValue == 'a') {
  for(int counter =
  0;counter<2;counter++)
  ellipse1.SetPointDirChangeFactor
(counter,ellipse1.ShapePoints[counter].
GetX_DirChangeFactor() - 0.001,ellipse1.
ShapePoints[counter].GetY_
DirChangeFactor() + 0.001);
  }
  if (keyValue == 'w') {
  for(int counter =
  0;counter<2;counter++)
  ellipse1.SetPointInfluenceFactor(
counter,ellipse1.ShapePoints[counter].
GetXInfluenceFactor() + 0.01,ellipse1.
ShapePoints[counter].GetYInfluenceFactor()
+ 0.01);
  }
  if (keyValue == 's') {
  for(int counter =
  0;counter<2;counter++)
  ellipse1.SetPointInfluenceFactor(
counter,ellipse1.ShapePoints[counter].
GetXInfluenceFactor() - 0.01,ellipse1.
ShapePoints[counter].GetYInfluenceFactor()
+ 0.01);
  }
  if (keyValue == 'c') {
  if(ellipse1.IsComplexShape() == TRUE)
  ellipse1.SetComplexShape(FALSE);
  else
  ellipse1.SetComplexShape(TRUE);
  }
  if (keyValue == 'x') {
  if(ellipse1.
GetPointSlopeCompensation(PT_XY) ==
TRUE)
  ellipse1.
SetPointSlopeCompensation(PT_XY,FALSE);
  else
  ellipse1.
SetPointSlopeCompensation(PT_XY,TRUE);
  }
  if (keyValue == 'n') {
  if(ellipseShape.add(new
EnhancedEllipse(this, random(width),
random(height), random(ELLIPSE_SEED_
MEDIUM), random(ELLIPSE_SEED_
MEDIUM), random(0.5,1)));
  ellipse1 = (EnhancedEllipse)
ellipseShape.get(ellipseShape.size() - 1);
  ellipse1.
SetPoint(1,mouseX/4,mouseY/4);
  }
  if (keyValue == 't') {
  if(ellipse1.GetShapeSpeed() < (CONST_
POINT_SPEED_LIMIT - 10)) {
  ellipse1.SetShapeSpeed(ellipse1.
GetShapeSpeed() + 10);
  }
  }
  if (keyValue == 'g') {
  if(ellipse1.GetShapeSpeed() > 10) {
  ellipse1.SetShapeSpeed(ellipse1.
GetShapeSpeed() - 10);
}
}
}
}

```

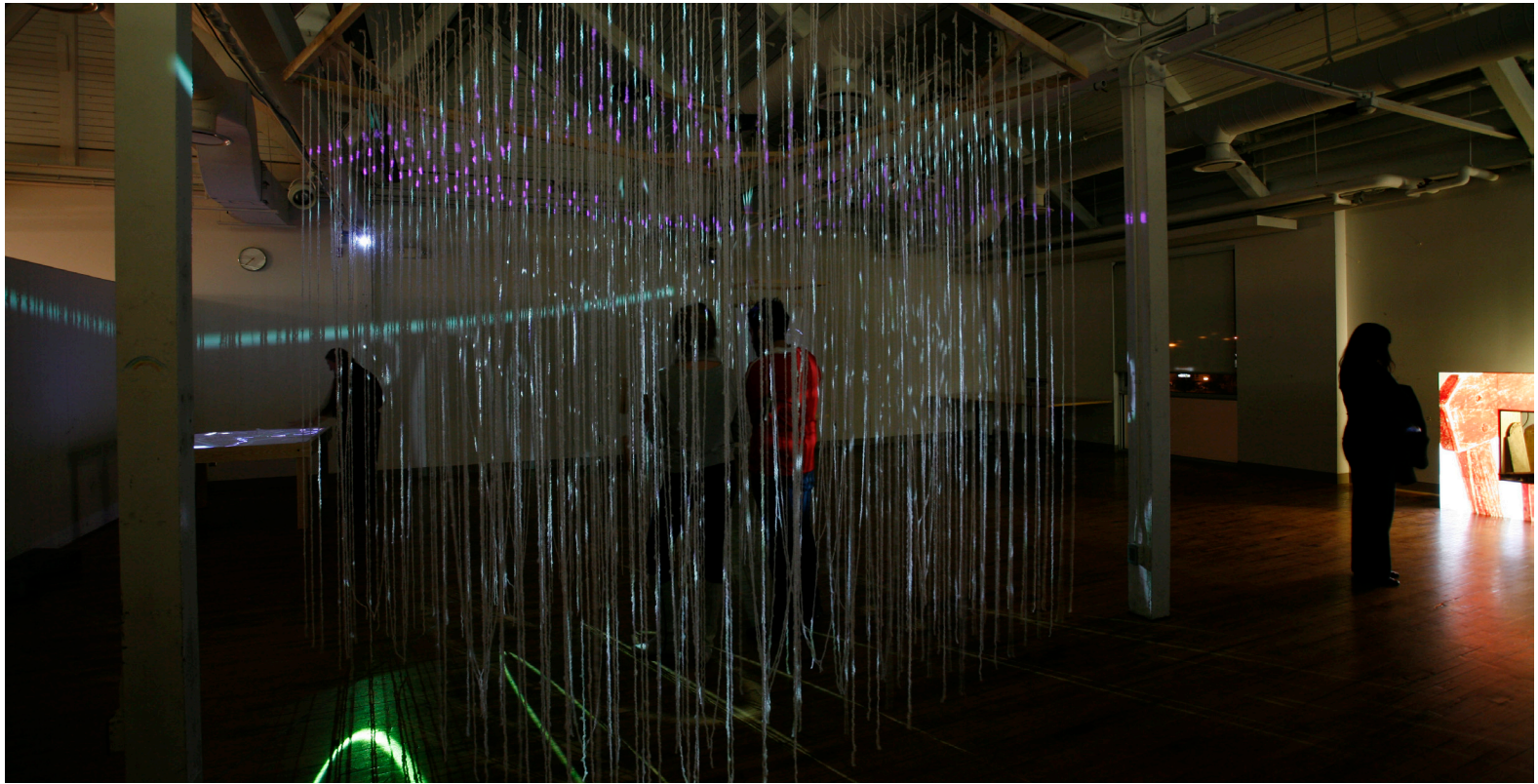




*fig. 8.10 Force-sensing handles.
Hand-crafted & finished maple with felt linings.*



*fig. 8.11 'Lightroom' exhibition view I.
Photograph by Johnathan Wong.*



*fig. 8.12 'Lightroom' exhibition view II.
Photograph by Johnathan Wong.*

(following page)
*fig. 8.13 'Lightroom' exhibition view III.
Photograph by Johnathan Wong.*





Screen #3: TOUCH

A polyester gauze tensioned in a plywood frame; bands of light behind.

'TouchScreen' is an interface designed to bring the hands and screen into direct and playful contact. The work is comprised of a framed and stretched fabric screen, resembling a painting which is completely blank. The viewer is invited to manipulate this blank canvas with their hands; enjoying an open interaction between material and the experience of 'drawing with light.'

(overleaf)

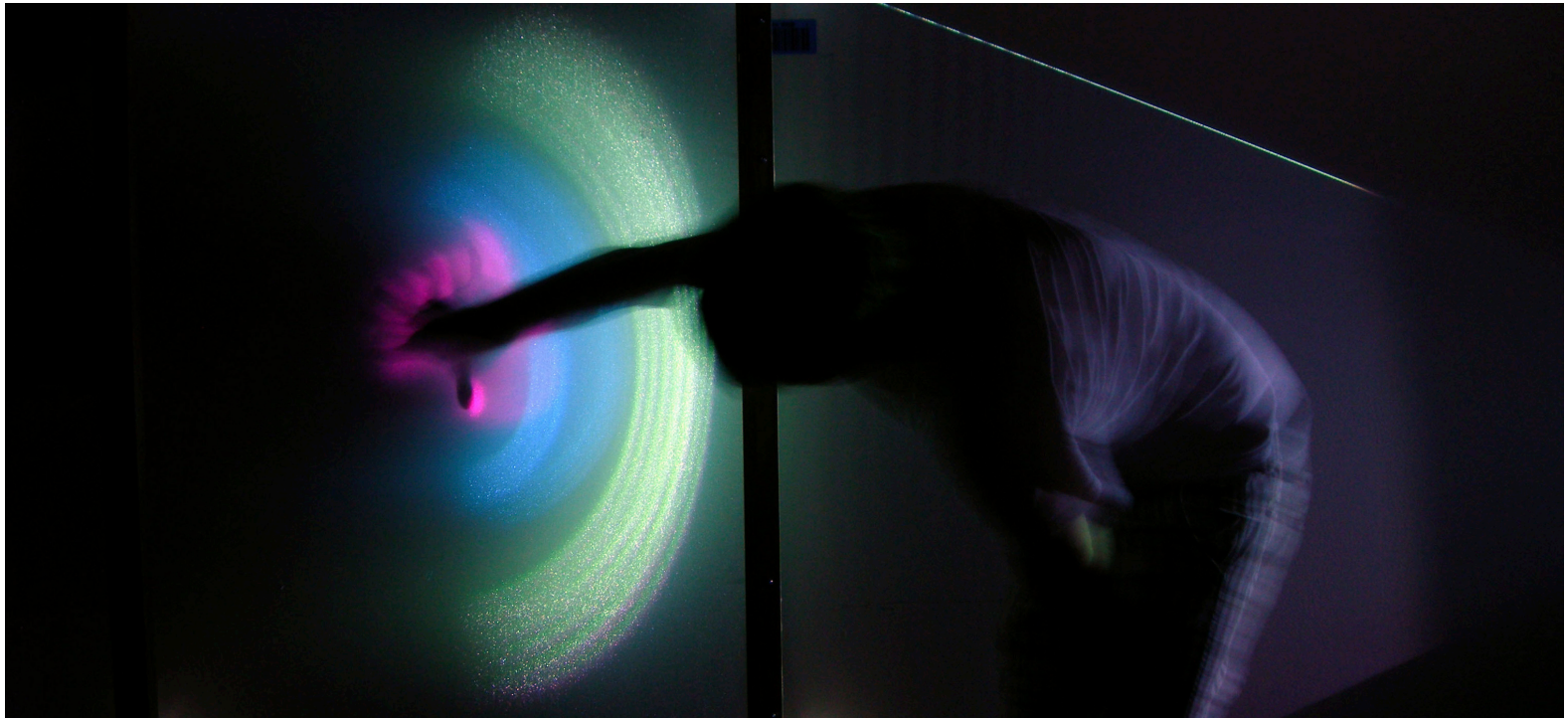
*fig. 8.14 Digitally projected bands of colour.
Bands of light slip behind a blank canvas.*

(underlayer & following page)

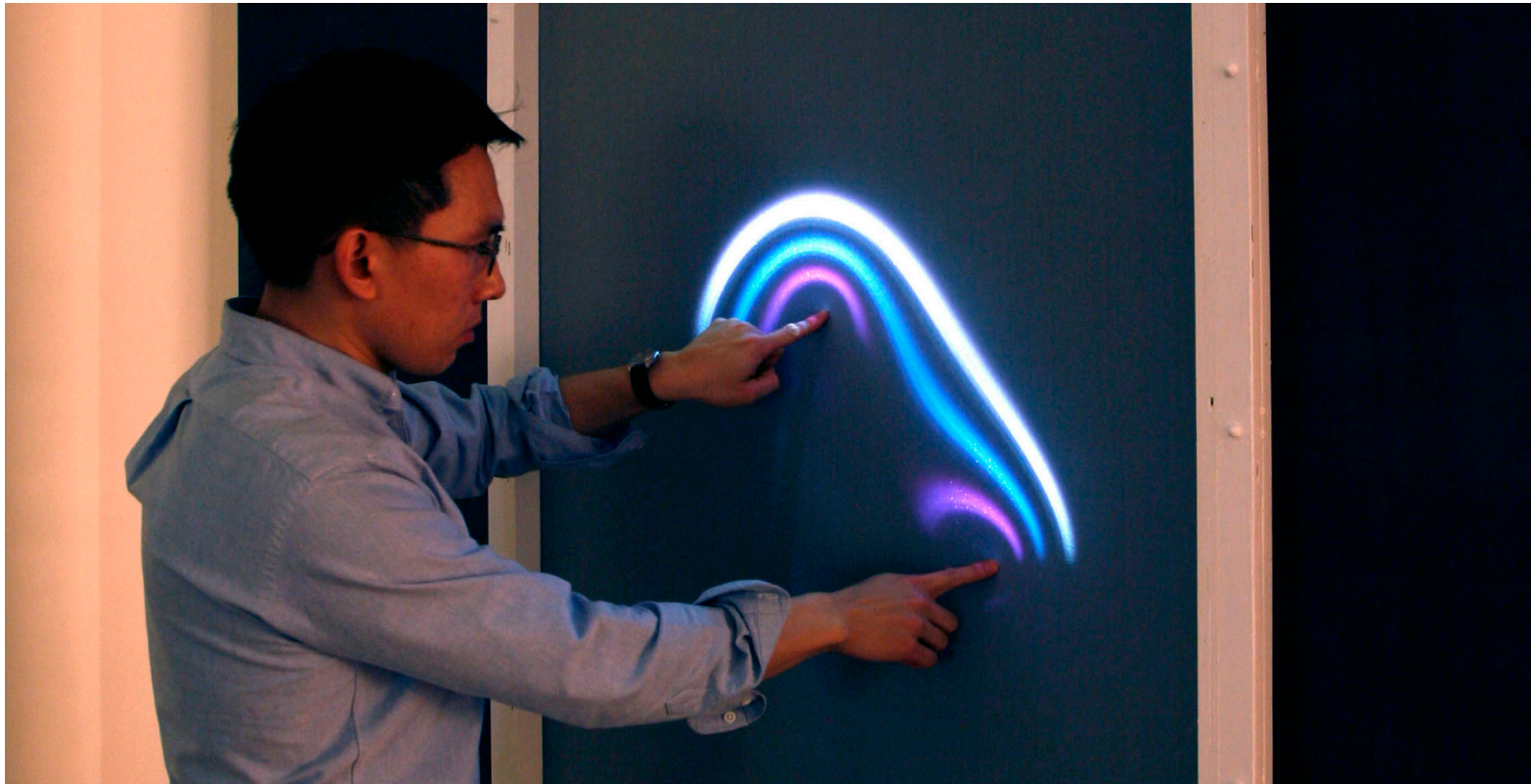
*fig. 8.15 Blank Canvas.
Elastic fabric tensioned within a plywood frame.*



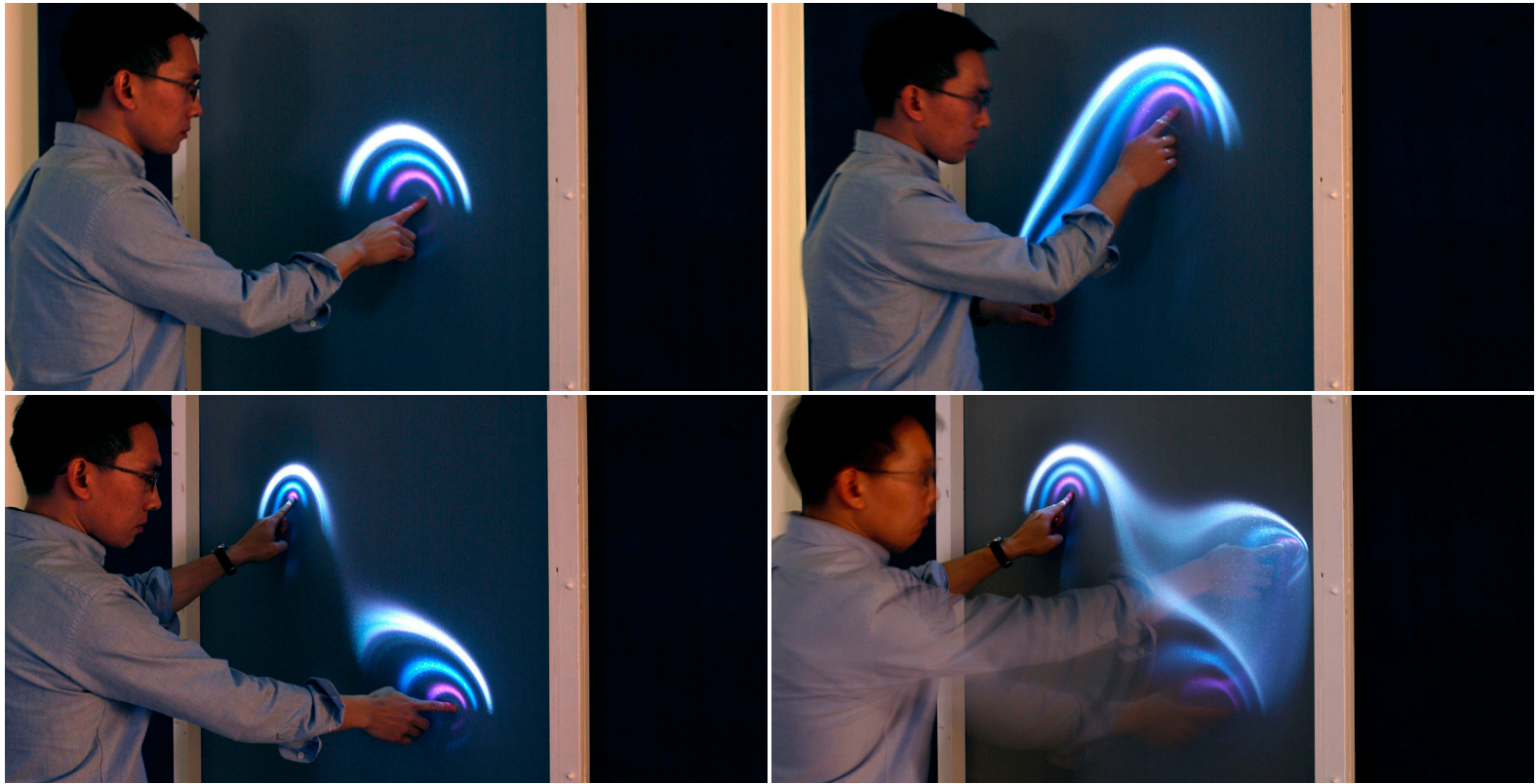




*fig. 8.16 'Touchscreen' preliminary documentation.
Colourful patterns are revealed as fabric intersects light.*



*fig. 8.17 'Touchscreen' exhibition view I.
Photograph by Jobnathan Wong.*



*figs. 8.18 - 8.21 'Touchscreen' exhibition views II, III, IV, V.
Photographs by Johnathan Wong.*

Screen #4: DEPTH

Seven veils suspended from a finished ash rack.

*'Circle Collision with Swapping Velocities' by Ira Greenberg
'Mandorla Rings' by Abraham Galway*

Seven hanging veils interact with simple digital code, creating intersections between material and a digital light that permeates, reflects and transmits throughout the depth of the screen. With this work, I am attempting to cultivate a reflective, contemplative state of mind using the same digital technologies that distract us all day. This work is a direct extension and reaction to the phenomenon of contemporary distraction and employs permutational strategies in order to approach the issue of digital boredom - where despite being always different, nothing new ever happens. Through use of the devices of temporal extension and multiple view points, the work is impossible to comprehend in its entirety.

(overleaf)

*fig. 8.22 Permutational coding.
Simple graphics coding create a sense of duration.*

(underlayer & following page)

*fig. 8.23 Seven hanging veils.
Gauze, netting & reflective mylar film.*

```
float theta;
float theta2;
float fade;
float r;
import fullscreen.*;
FullScreen fs;

void setup() {
  size(400, 400);
  frameRate(30);
  smooth();
  background(0);
  fs = new FullScreen(this);
  fs.enter();
  r = 100;
  theta = 0;
  theta2 = 0;
}
```

```
void draw() {
  translate(width/2, height/2);
  float a = r * cos(theta)-PI;
  float b = r * sin(theta)-PI;
  float c = r * cos(theta2);
  float d = r * sin(theta2);
  ellipseMode(CENTER);
  noStroke();
  fill(255);
  ellipse(a, b-75, 2, 2);
  rotate(PI);
  ellipse(c, d-75, 2, 2);
  if (theta < 2*PI) {
    theta = theta + 0.01;
  }
  if (theta2 < 2*PI) {
    theta2 = theta2 - 0.01;
  }
  if (theta >= 2*PI){
    delay(2000);
    background(0);
    theta = 0;
  }
  println("theta = " + theta);
  delay(1000);
}
```

0 min

5 min

10 min

15 min

20 min

```
import fullscreen.*;
FullScreen fs;
Ball[] balls = {
  new Ball(100, 400, 20),
  new Ball(700, 400, 80)
};
PVector[] vels = {
  new PVector(2.15, -1),
  new PVector(-5, 6)
};

void setup() {
  size(450, 720);
  smooth();
  noStroke();
  frameRate(60);
  fs = new FullScreen(this);
  fs.enter();
}

void draw() {
  background(0);
  noFill();
  stroke(255);
  for (int i=0; i < 2; i++){
    balls[i].x += vels[i].x;
    balls[i].y += vels[i].y;
    ellipse(balls[i].x, balls[i].y, balls[i].r*2,
    balls[i].r*2);
    checkBoundaryCollision(balls[i], vels[i]);
  }
  checkObjectCollision(balls, vels);
}
```

```
void checkObjectCollision(Ball[] b,
PVector[] v){
  PVector bVect = new PVector();
  bVect.x = b[1].x - b[0].x;
  bVect.y = b[1].y - b[0].y;
  float bVectMag = sqrt(bVect.x * bVect.x +
  bVect.y * bVect.y);
  if (bVectMag < b[0].r + b[1].r){
    float theta = atan2(bVect.y, bVect.x);
    float sine = sin(theta);
    float cosine = cos(theta);
```

```
Ball[] bTemp = {
  new Ball(), new Ball()
};
bTemp[1].x = cosine * bVect.x + sine
* bVect.y;
bTemp[1].y = cosine * bVect.y - sine
* bVect.x;
PVector[] vTemp = {
  new PVector(), new PVector()
};
vTemp[0].x = cosine * v[0].x + sine
* v[0].y;
vTemp[0].y = cosine * v[0].y - sine
* v[0].x;
vTemp[1].x = cosine * v[1].x + sine
* v[1].y;
vTemp[1].y = cosine * v[1].y - sine
* v[1].x;
PVector[] vFinal = {
  new PVector(), new PVector()
};
vFinal[0].x = ((b[0].m - b[1].m) *
vTemp[0].x + 2 * b[1].m *
vTemp[1].x) / (b[0].m + b[1].m);
vFinal[0].y = vTemp[0].y;
vFinal[1].x = ((b[1].m - b[0].m) *
vTemp[1].x + 2 * b[0].m *
vTemp[0].x) / (b[0].m + b[1].m);
vFinal[1].y = vTemp[1].y;
bTemp[0].x += vFinal[0].x;
bTemp[1].x += vFinal[1].x;
Ball[] bFinal = {
  new Ball(), new Ball()
};
bFinal[0].x = cosine * bTemp[0].x - sine
* bTemp[0].y;
bFinal[0].y = cosine * bTemp[0].y + sine
* bTemp[0].x;
bFinal[1].x = cosine * bTemp[1].x - sine
* bTemp[1].y;
bFinal[1].y = cosine * bTemp[1].y + sine
* bTemp[1].x;
b[1].x = b[0].x + bFinal[1].x;
b[1].y = b[0].y + bFinal[1].y;
b[0].x = b[0].x + bFinal[0].x;
b[0].y = b[0].y + bFinal[0].y;
v[0].x = cosine * vFinal[0].x - sine *
vFinal[0].y;
v[0].y = cosine * vFinal[0].y + sine *
vFinal[0].x;
v[1].x = cosine * vFinal[1].x - sine *
vFinal[1].y;
v[1].y = cosine * vFinal[1].y + sine *
vFinal[1].x;
}

void checkBoundaryCollision(Ball ball,
PVector vel) {
  if (ball.x > width-ball.r) {
    ball.x = width-ball.r;
    vel.x *= -1;
  }
  else if (ball.x < ball.r) {
    ball.x = ball.r;
    vel.x *= -1;
  }
  else if (ball.y > height-ball.r) {
    ball.y = height-ball.r;
    vel.y *= -1;
  }
  else if (ball.y < ball.r) {
    ball.y = ball.r;
    vel.y *= -1;
  }
}

class Ball{
  float x, y, r, m;
  Ball() {
  }
  Ball(float x, float y, float r) {
    this.x = x;
    this.y = y;
    this.r = r;
    m = r*.1;
  }
}
```

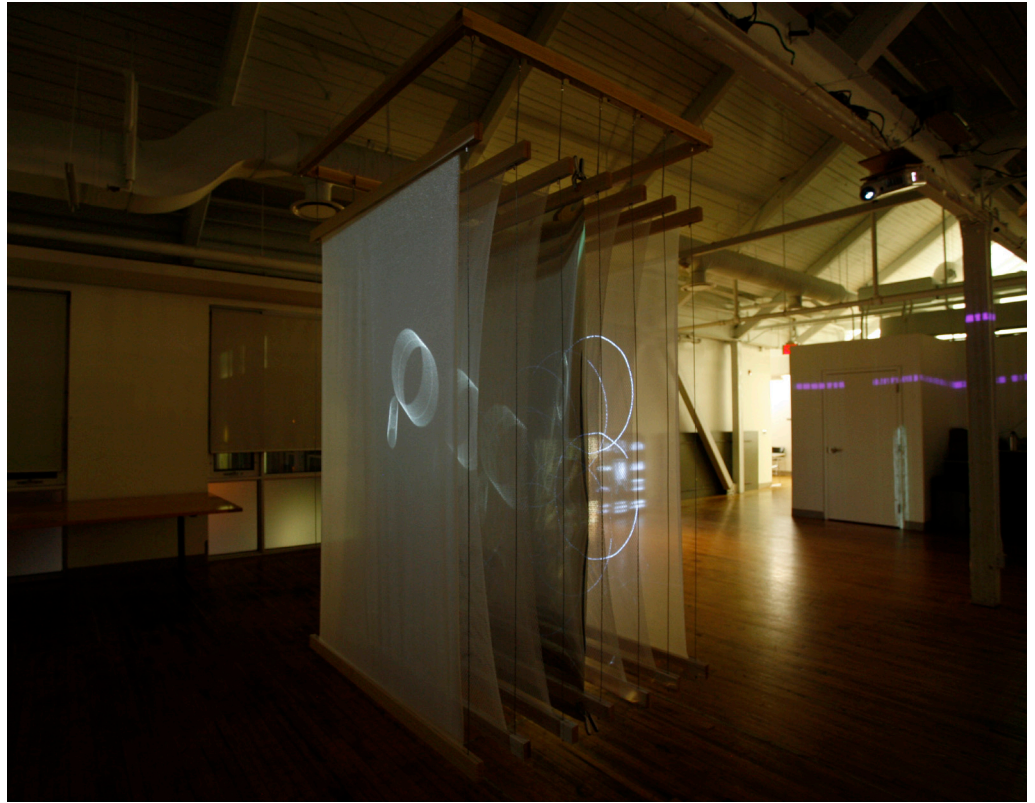




*fig. 8.24 'Depthscreen' cross-section.
Six interstitial spaces catalyze complexity within the screen.*



*fig. 8.25 'Depthscreen' difference over time.
Sequential photographs by Johnathan Wong.*



*figs. 8.26 & 8.27 'Depthscreen' exhibition views I & II.
Photographs by Johnathan Wong.*

Screen #5: TABLE

*Milled foam panels supported by an ash stand; detailed with digital light.
In collaboration with bobmLAB for David Johnston's thank-you celebrations.*

A fabricated model of the University of Waterloo campus, CNC milled from high density foam with dimensions approximately 1400x1800mm. The physical surface of the model describes simplified building forms, is painted entirely in white and installed in a handcrafted ash stand. An additional layer of information is projected onto this base in light, via a digital projector mounted above. This strategy of digital augmentation eludes the material limitations of milling foam at this scale by allowing the inclusion of much greater detail, colour, and animation. A provocative visual display results.

(overleaf)

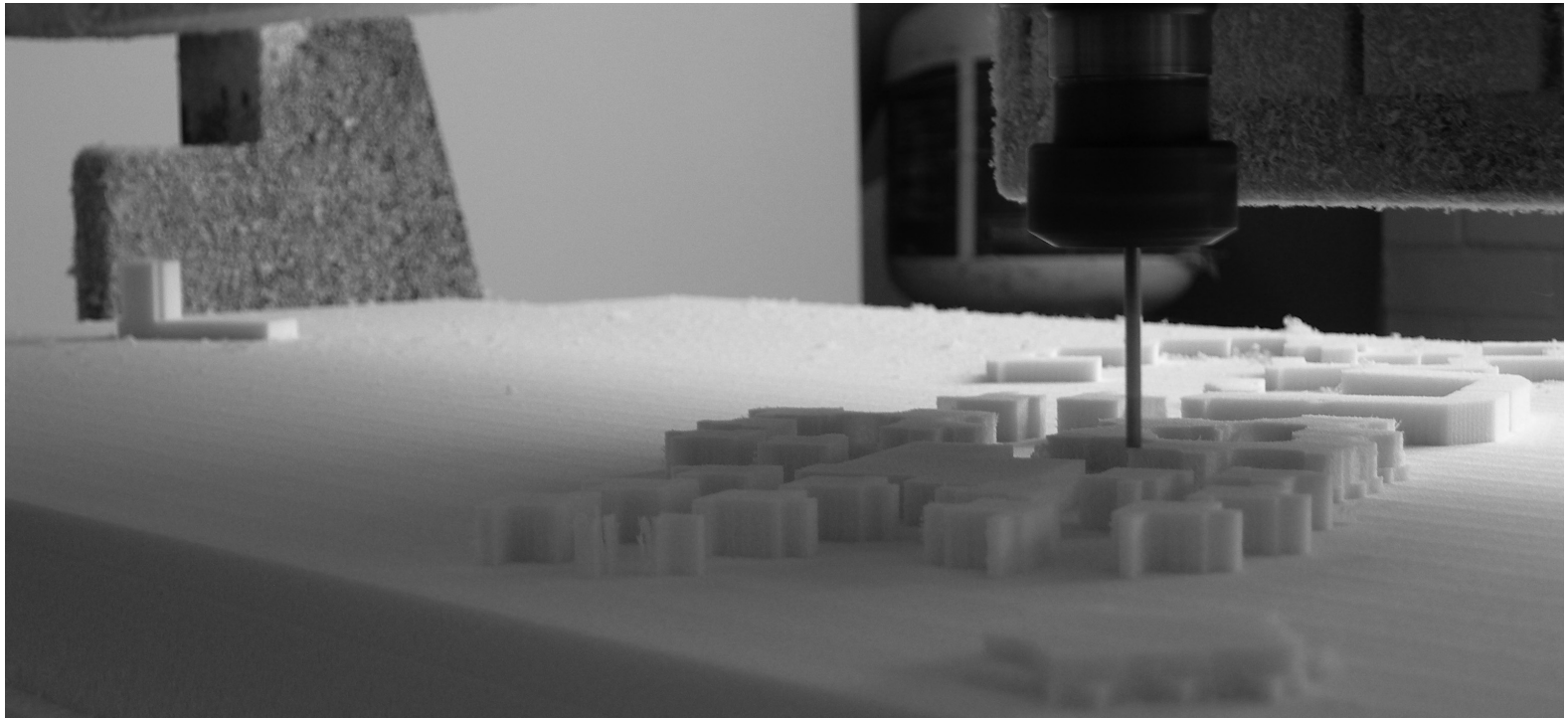
*fig. 8.28 UWaterloo Campus geometries.
Wireframe view of Rhino 3 dimensional model.*

(underlayer & following page)

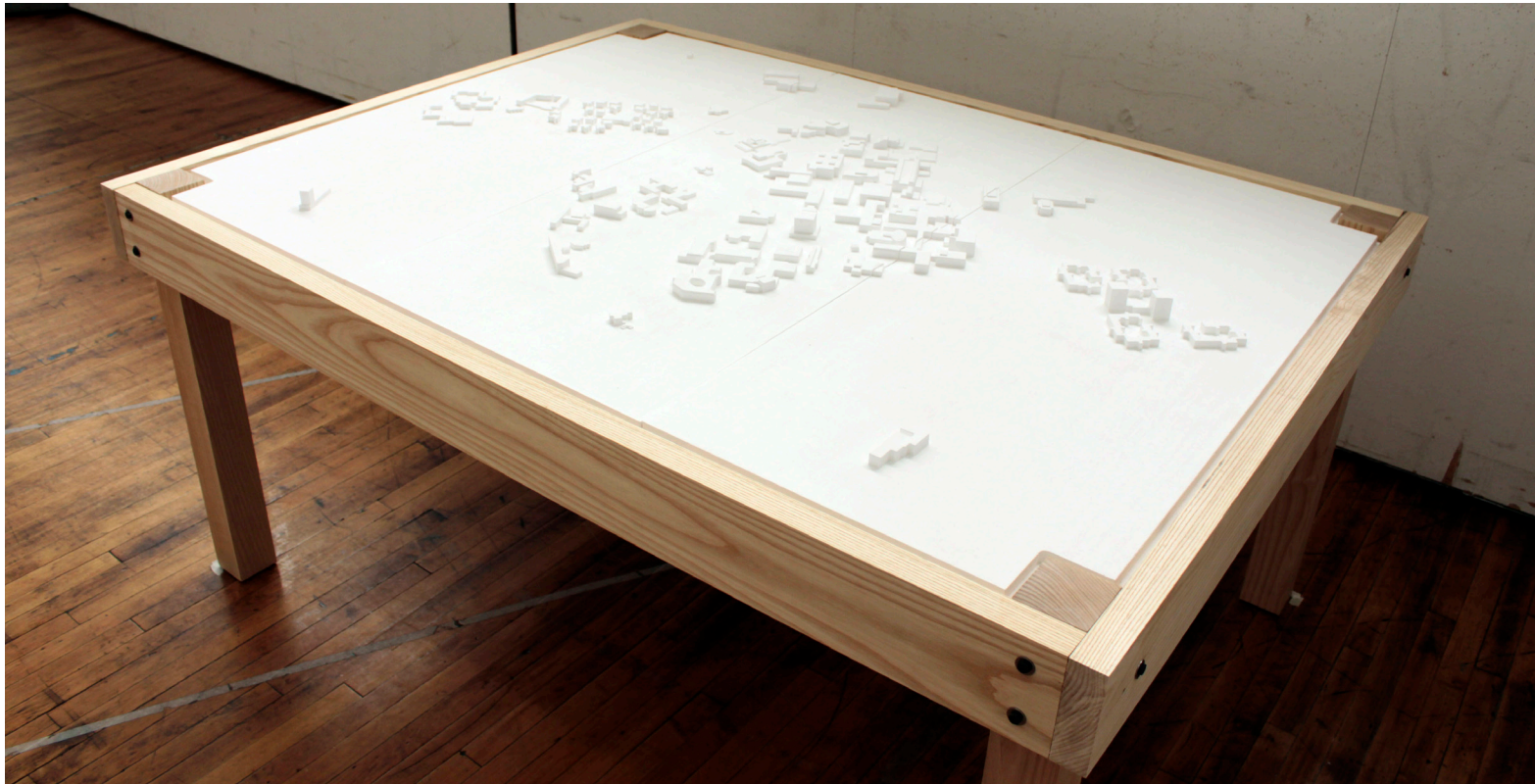
*fig. 8.29 CNC milled foam base panels.
Material substrate without digital augmentation.*



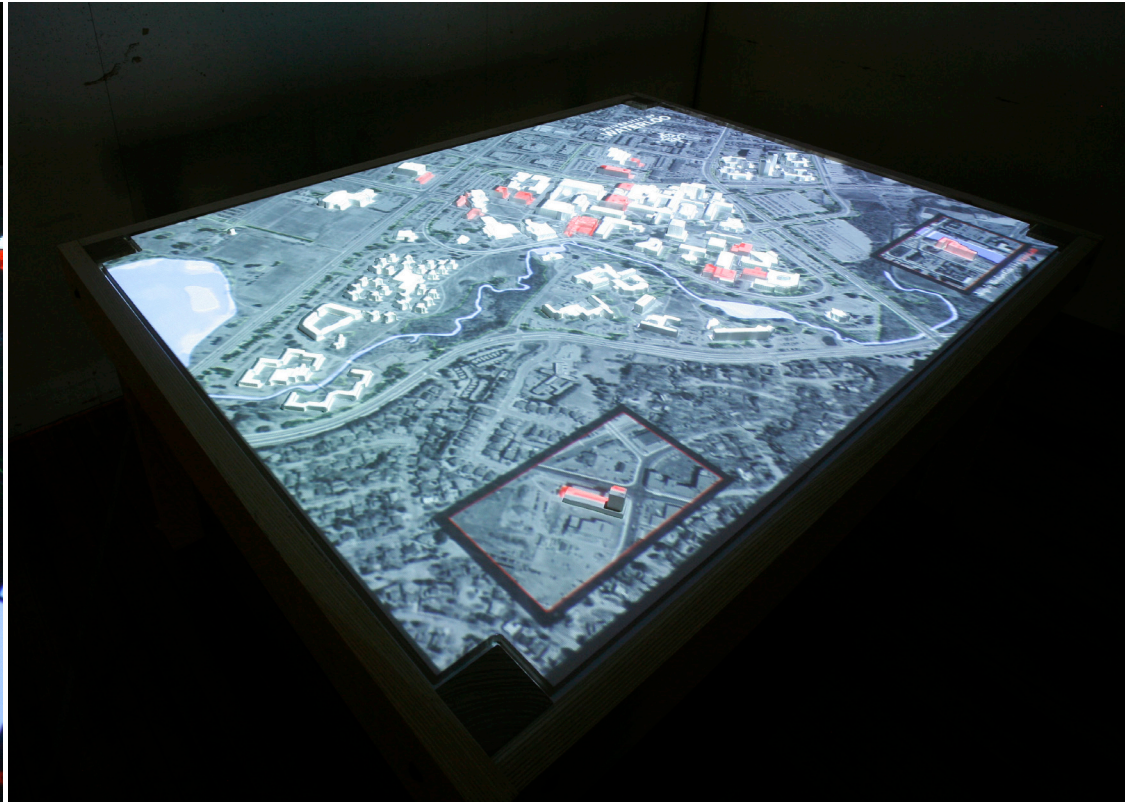




*fig. 8.30 CNC finishing with a 1/8" bit.
Completing a finishing pass on a foam panel.*



*fig. 8.31 'Tablescreen' complete with ash stand.
Hand-crafted, painted & assembled.*



*figs. 8.32 & 8.33 'Tablescreen' exhibition views I & II.
Photographs by Johnathan Wong.*

Screen #6: HAND

The digitally transcribed human voice produces custom spirographics.

This project is an exercise in working back and forth between hand and screen, and an exploration of the gaps and potentials that exist within cycles of transcription. Human speech is 'sublimated;' the embodied human voice is transcribed into data using digital voice recording technology. By cycling through a variety of digital languages, formats and softwares, I am able to transcribe voice data into intensity information, calibrate this with simple mathematics, graph it radially, combine this drawing with a gearing pattern and lasercut acrylic 'spirograph' discs. These are then drawing tools which can be practiced in the space between our hands to create spirographic drawings: material representations of the embodied voice.

(overleaf)

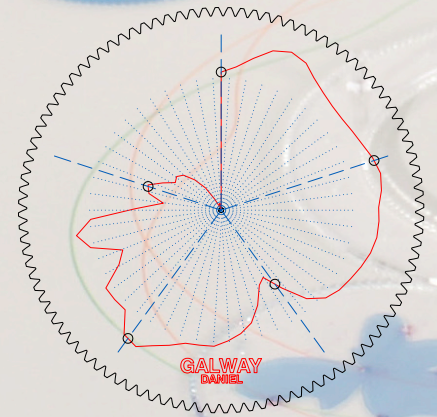
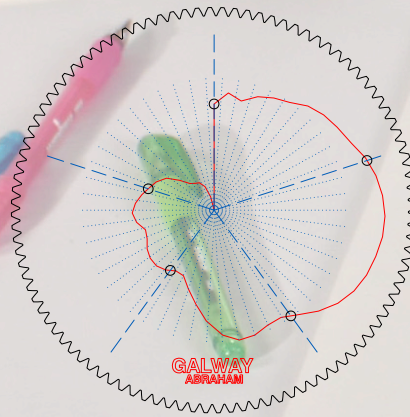
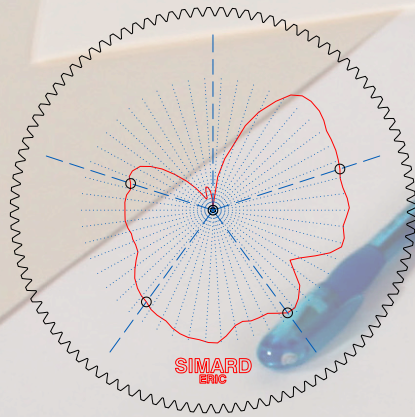
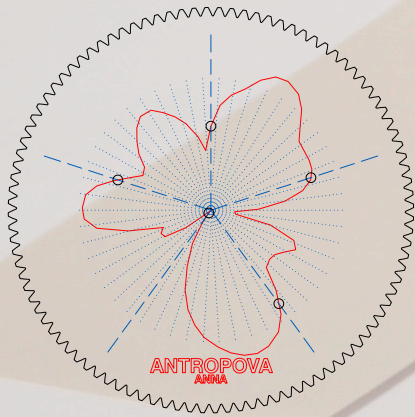
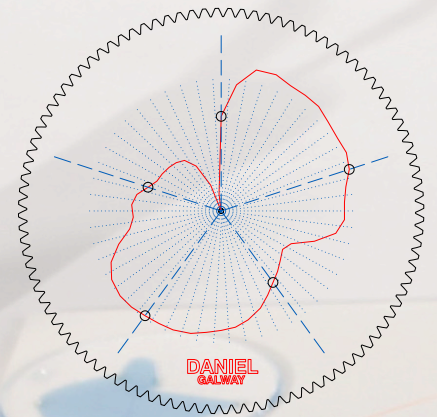
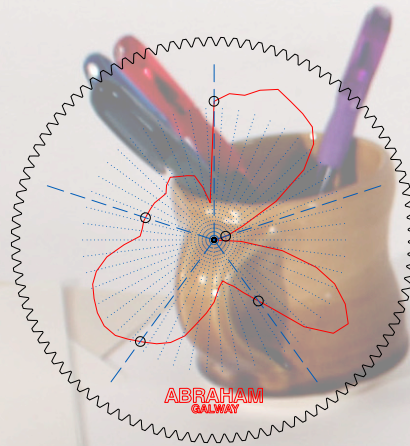
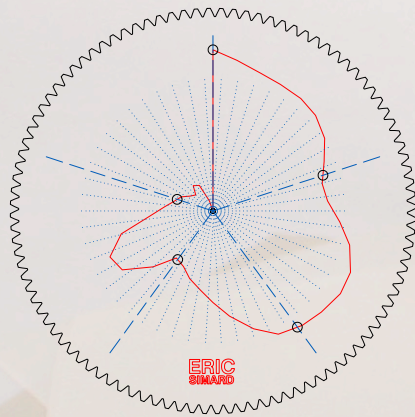
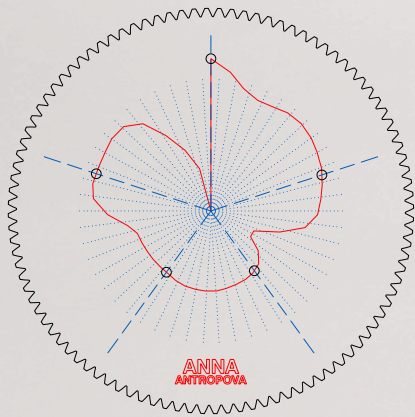
fig. 8.34 Digitally transcribed speech.

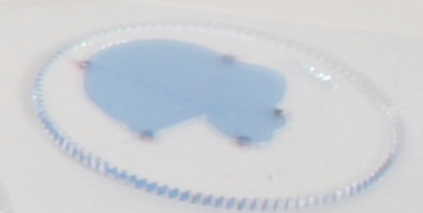
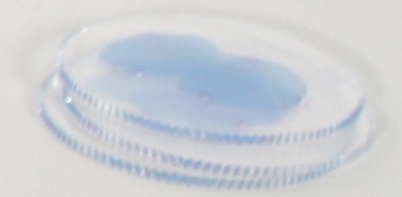
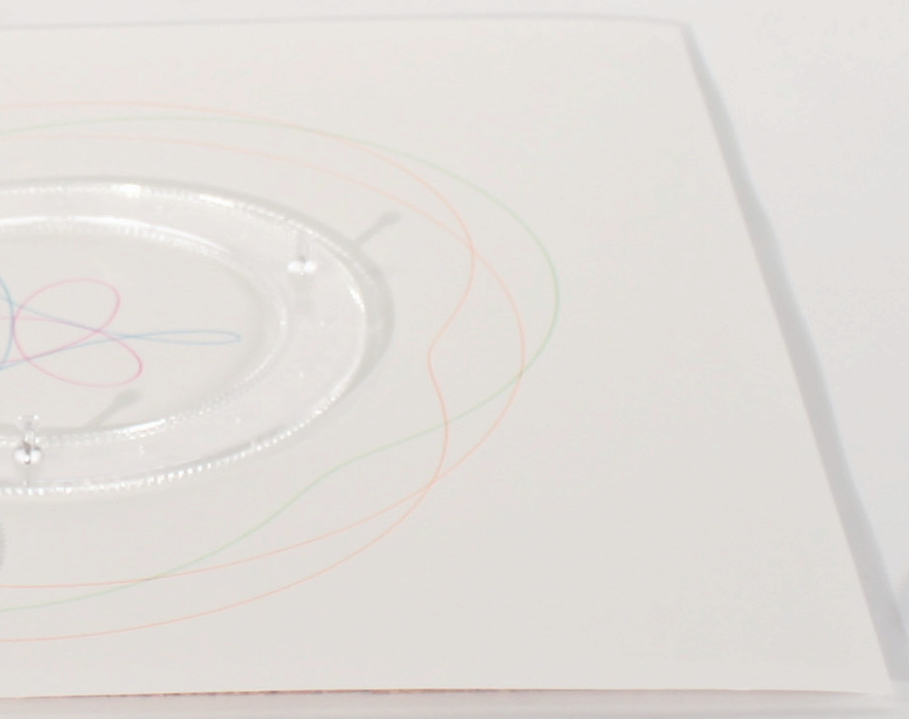
A series of 'spirograph' discs developed from the embodied voice.

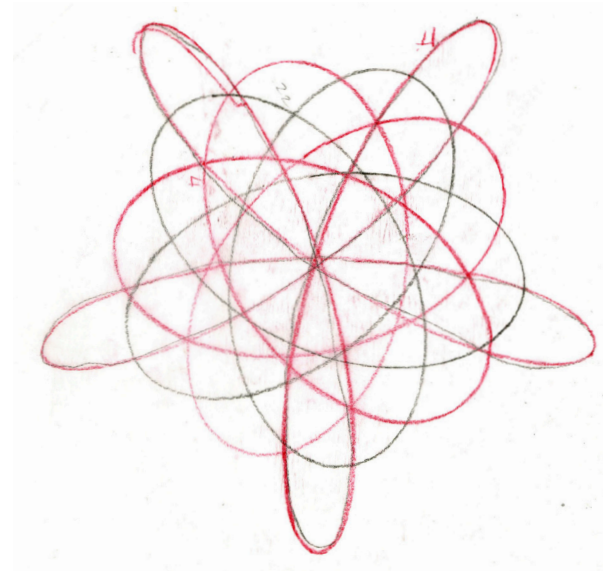
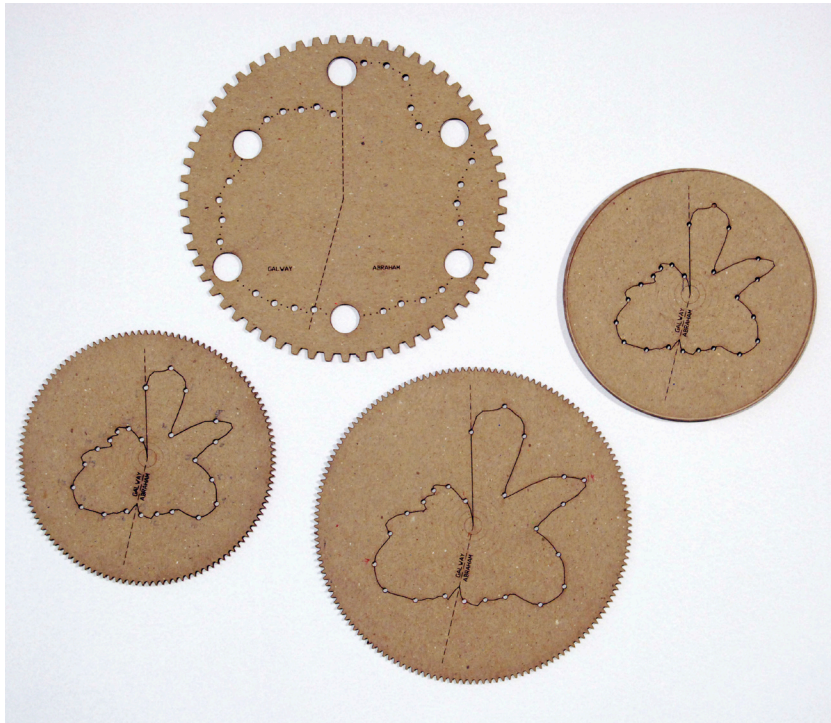
(underlayer & following page)

fig. 8.35 Drawing with the 'Spirovox.'

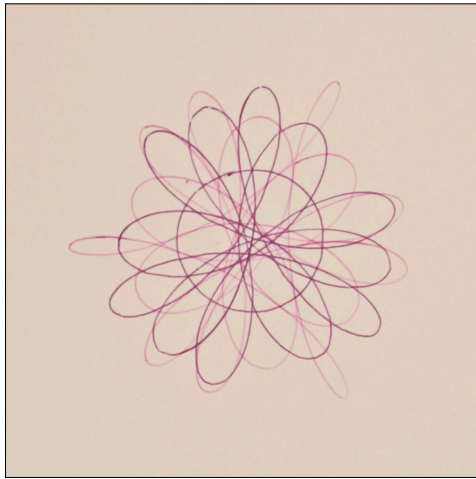
Returning digital transcription to the space between the hands.



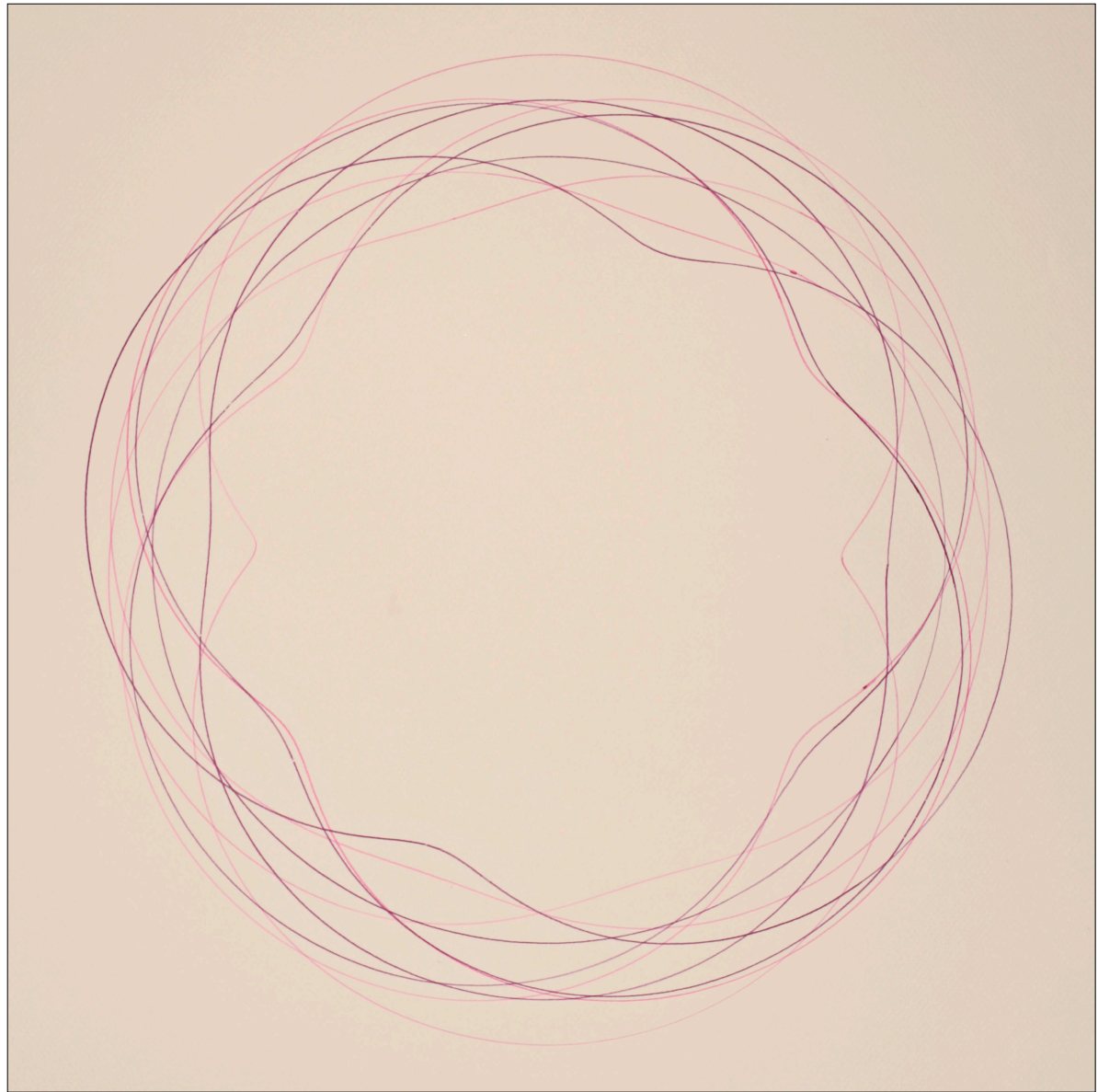


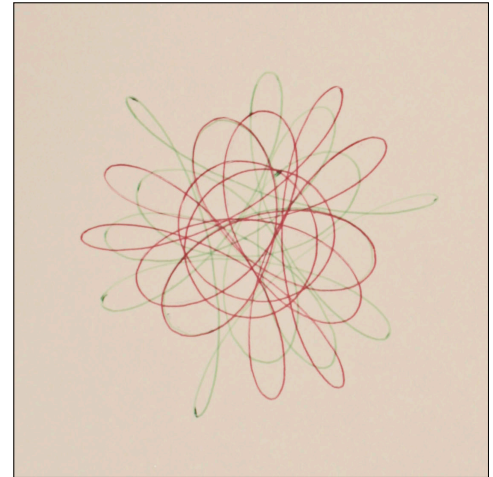
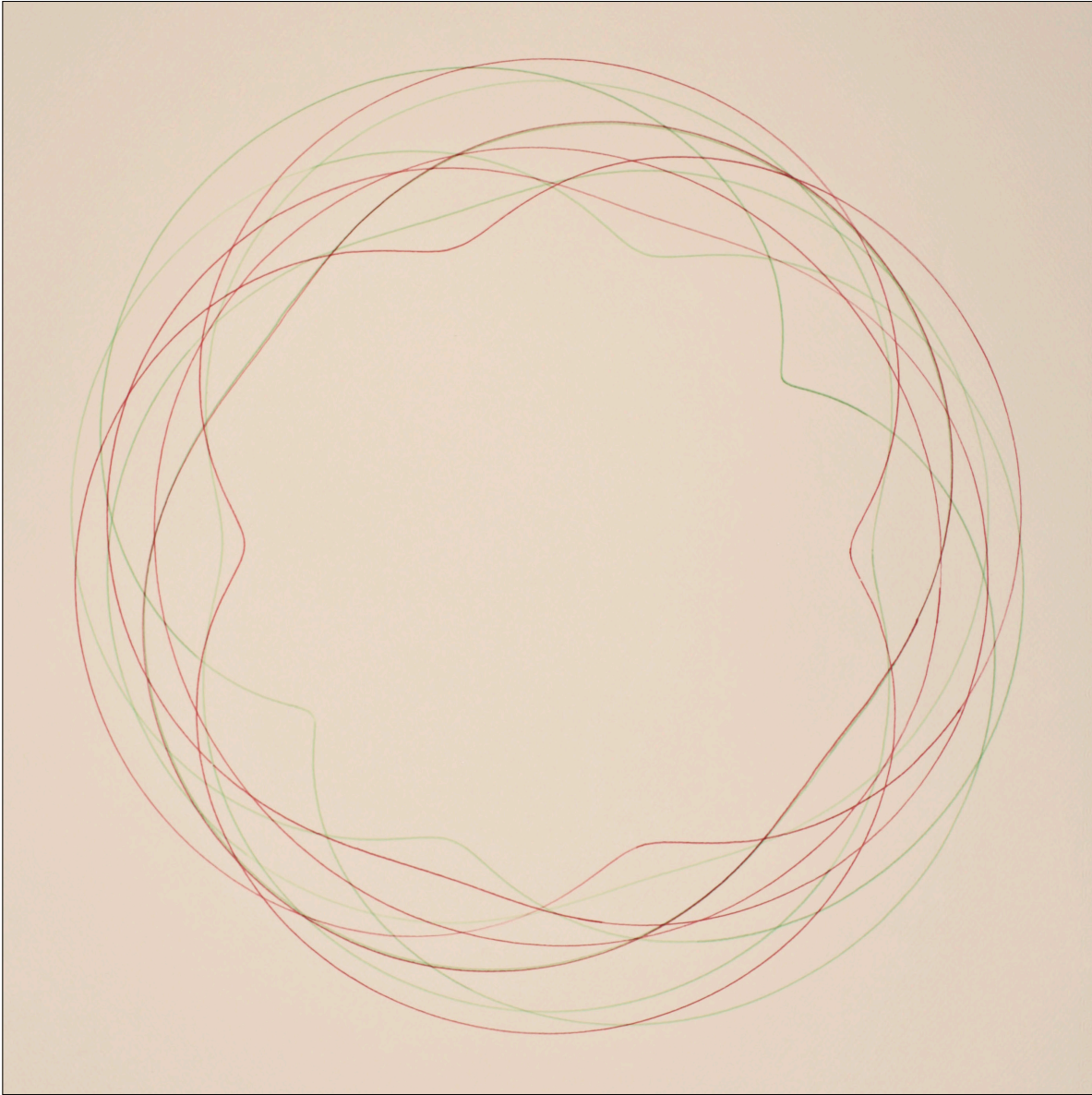


*figs. 8.36 & 8.37 Versioning. Prototypes I, II, III, IV? (left) 'Abraham Galway spirographic.' (right)
Several iterations of a process-based working method.*

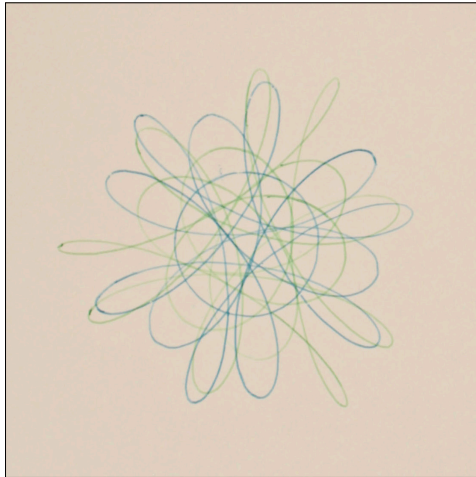


*figs. 8.38 & 8.39 'Anna Antropova' spirographics.
Hand drawn with a 1.6mm ballpoint pen.*

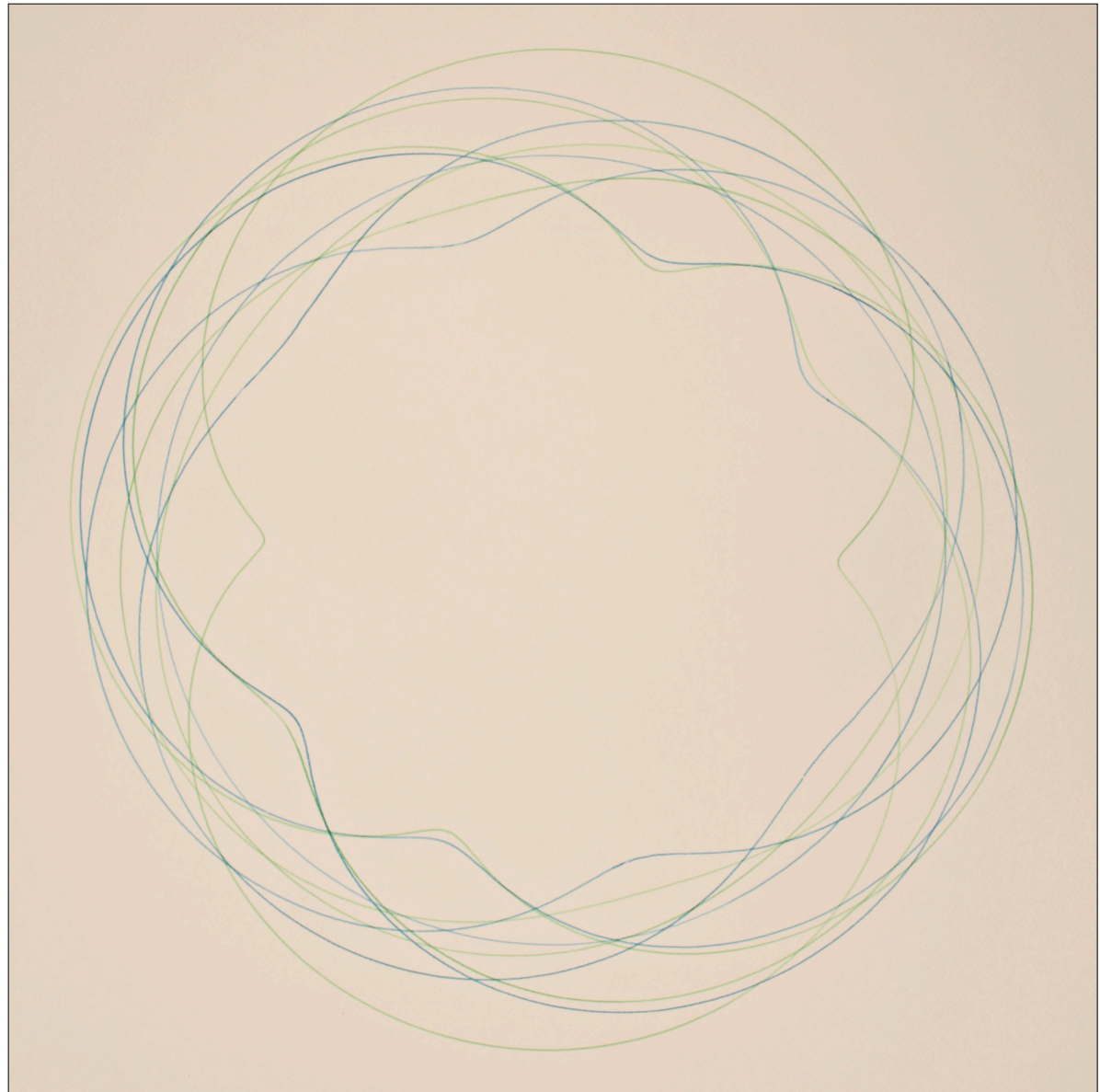


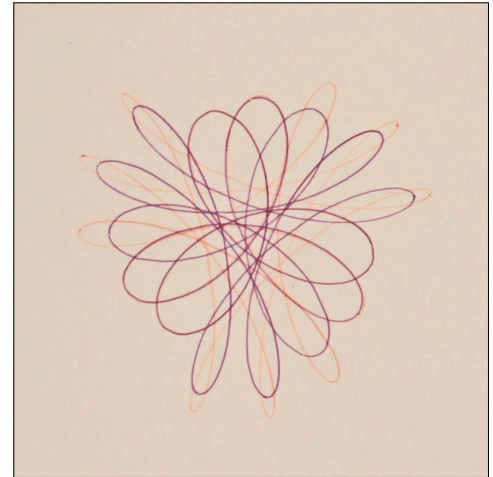
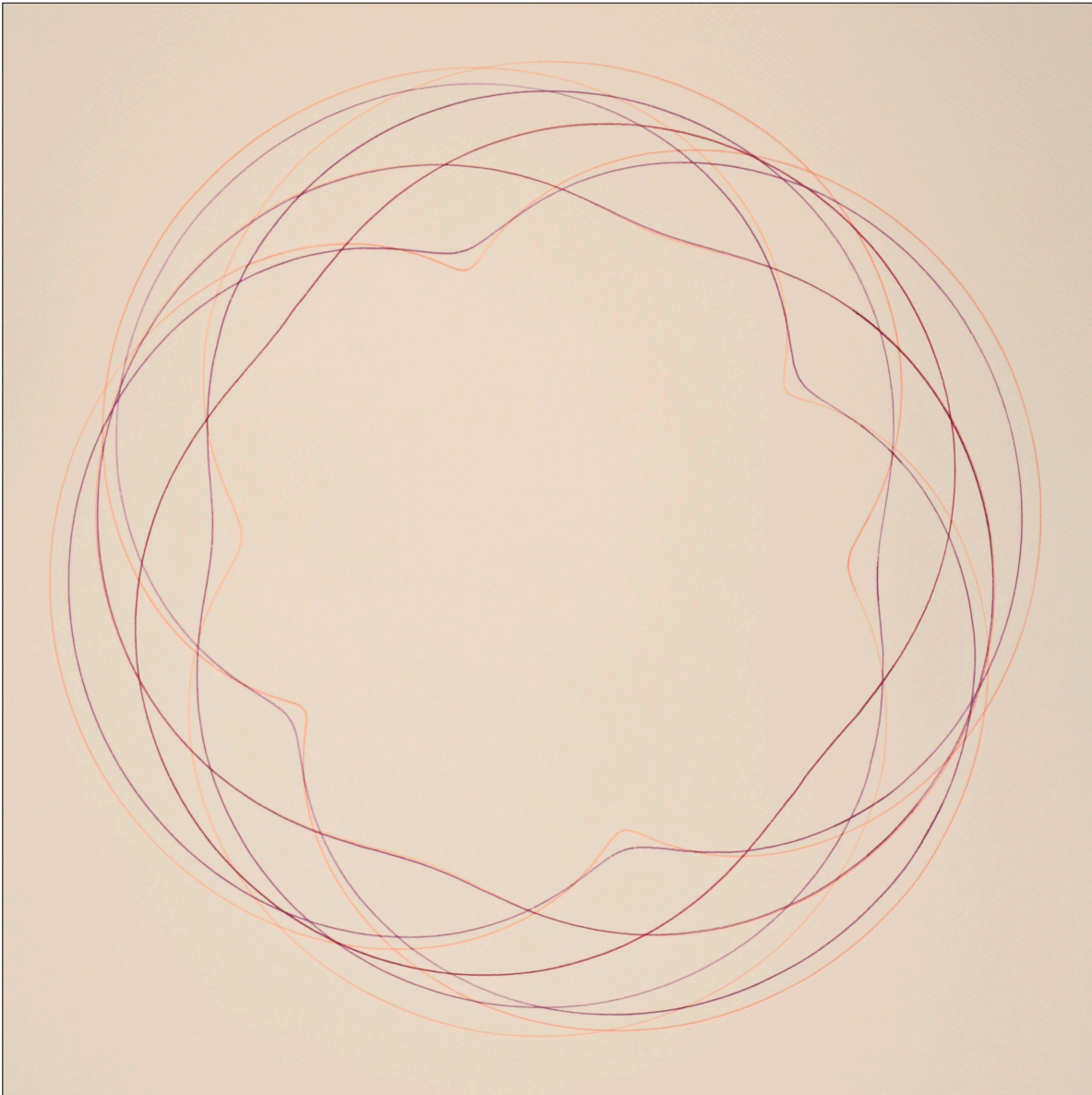


*figs. 8.40 & 8.41 'Abraham Galway' spirographics.
Hand drawn with a 1.6mm ballpoint pen.*



*figs. 8.42 & 8.43 'Eric Simard' spirographics.
Hand drawn with a 1.6mm ballpoint pen.*





*figs. 8.44 & 8.45 'Daniel Galway' spirographics.
Hand drawn with a 1.6mm ballpoint pen.*

Screen #7: DECOMPOSITION

An old wooden chair; dismantled and digitally resurrected.

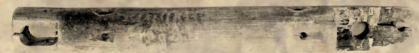
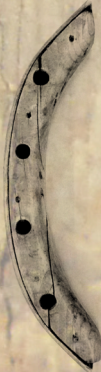
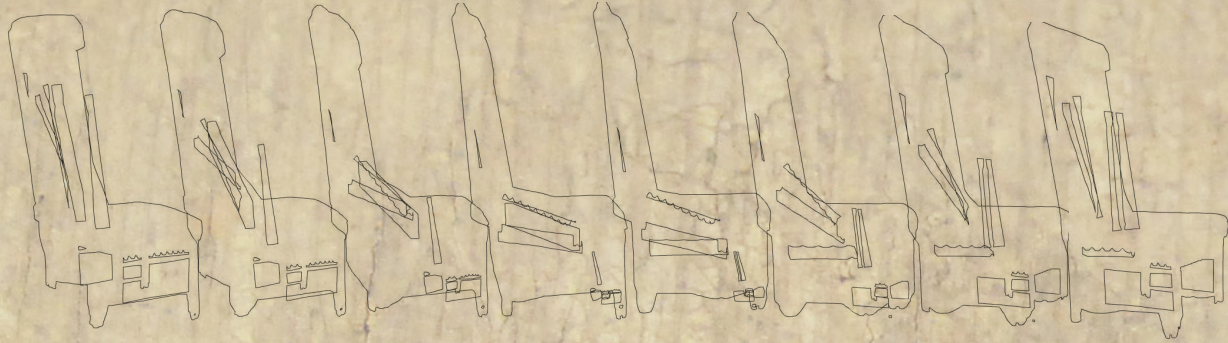
'The Chair' is an old, deteriorated piece of wooden furniture. Completely hand-built - most likely dating back to mid-19th century southwestern Ontario - this chair may originally have been a 'nursing rocker,' but has since been neglected for so long that its lower legs have rotted away, its joints are weakened, and its wood degraded. This artifact has seen many years. The material decline of the chair is continued via a careful process of disassembly, yet the ghost of the artifact is preserved: a resurrection through digital sublimation.

(overleaf)

*fig. 8.46 Digital sublimations of the chair.
Photographed, 'live traced,' and shape-tweened into digital life.*

(underlayer & following page)

*fig. 8.47 The chair.
19th century era with wood dowelled joints.*



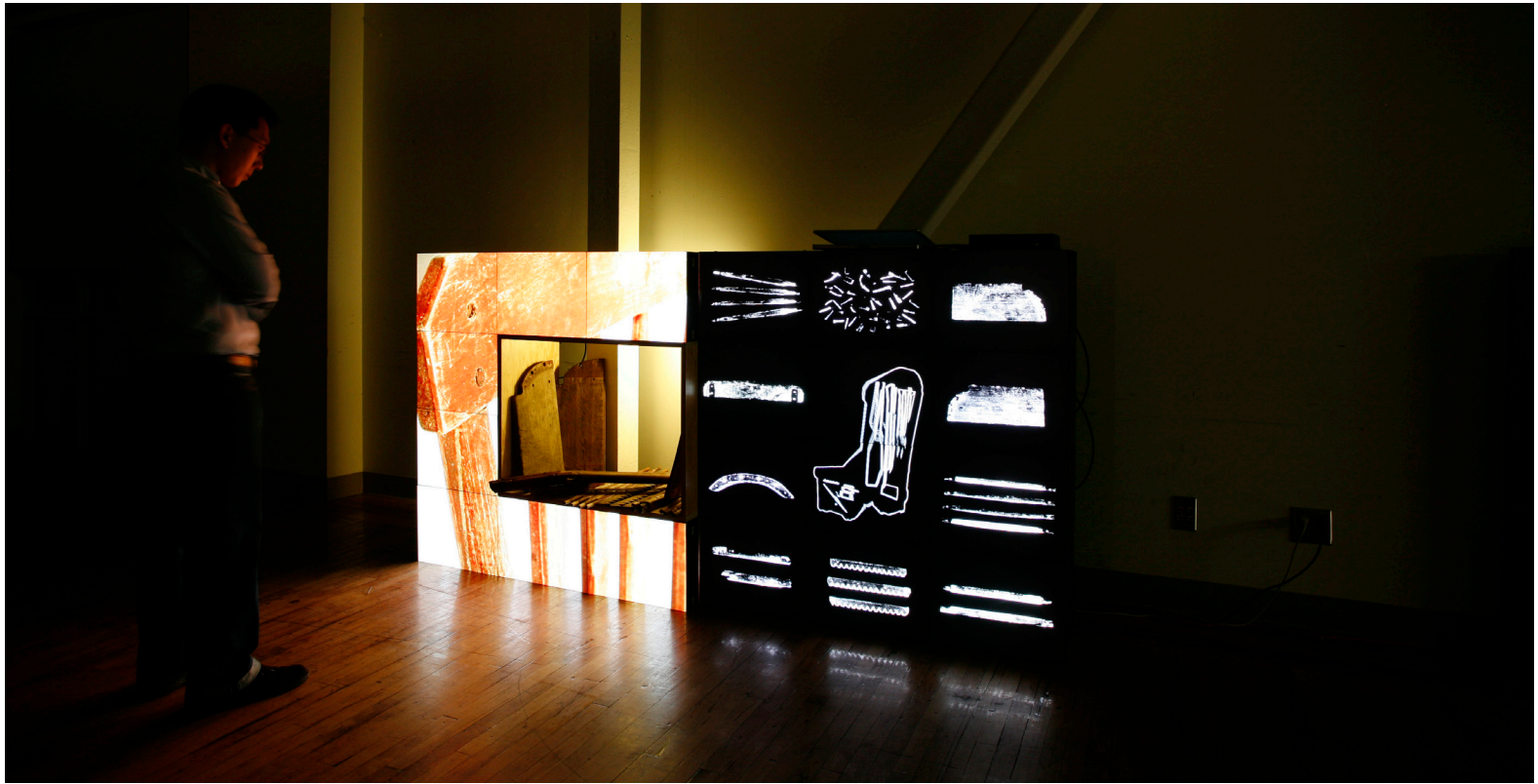
Barlow front



*figs. 8.48 & 8.49 'Decomposition' exhibition views I & II.
Photographs by Johnathan Wong.*



*fig. 8.50 'Decomposition' exhibition view III.
Photograph by Jobnathan Wong.*



*fig. 8.51 'Decomposition' exhibition view IV.
Photograph by Jobnathan Wong.*

Screen #8: RECOMPOSITION

Paper mâchéed in beeswax with LEC technology from innolite®

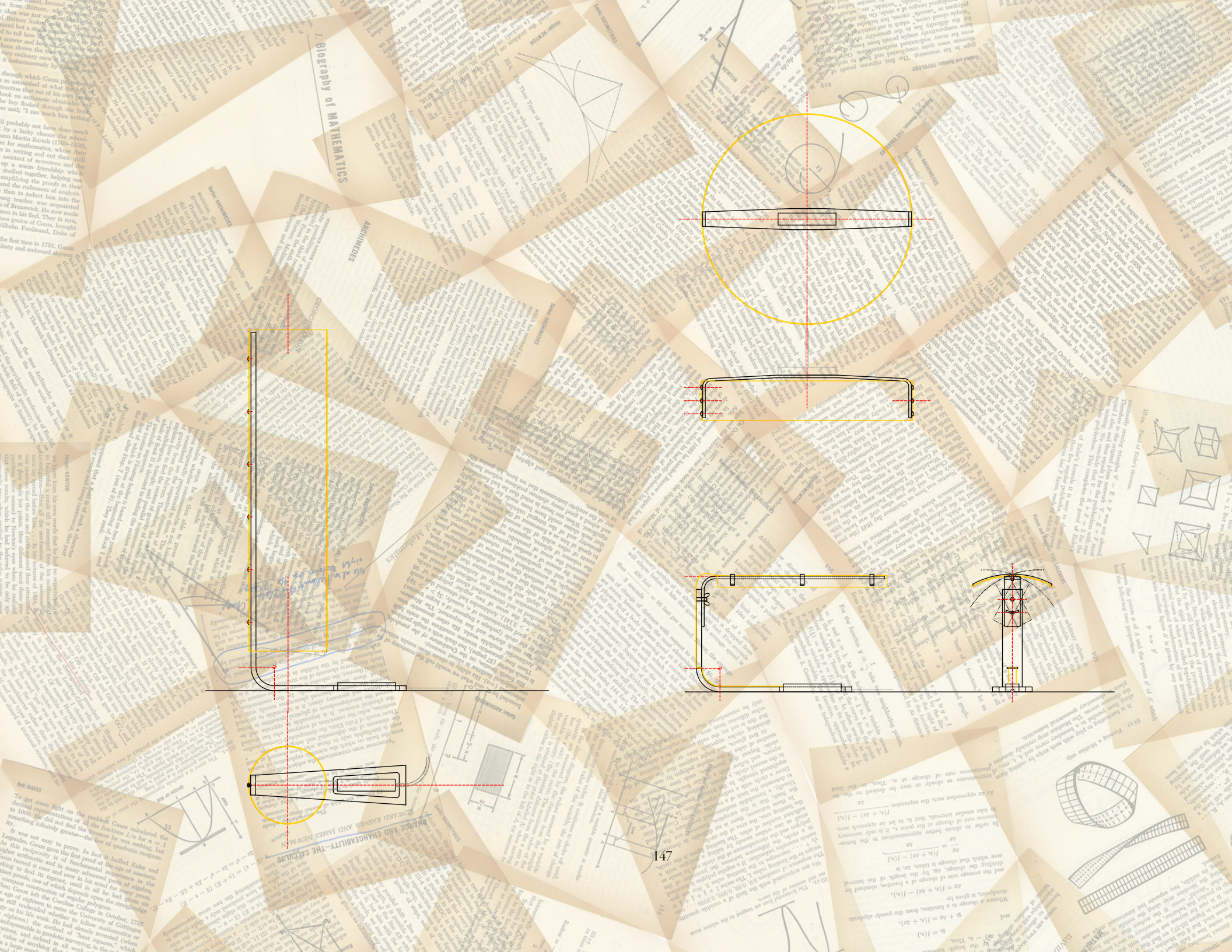
'Lights for Reading' are a collection of lamps to accompany reading off of your digital device. As books become software, the 'hardware' of old books is repurposed; formed into mâchéed screens bonded together with beeswax. The light source is a new, flexible light emitting capacitor (LEC) panel technology which is only 1mm thick, emits no heat, and has an extremely long life. The lamps will provide low ambient light, textured by the look, feel, and smell of vintage books.

(overleaf)

*fig. 8.52 CAD concept sketches.
Floor lamp, Ceiling lamp & Desk lamp.*

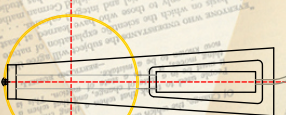
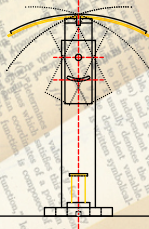
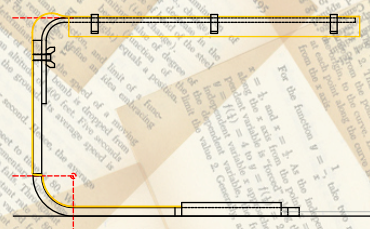
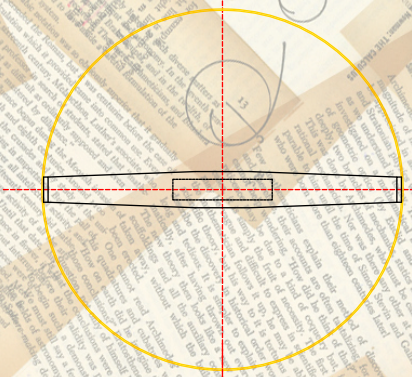
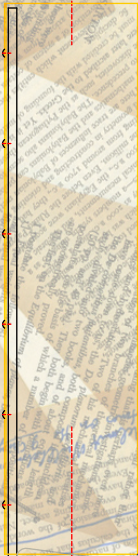
(underlayer & following page)

*fig. 8.53 'The Biography of Mathematics.'
Second-hand book reconstituted as paper screen.*



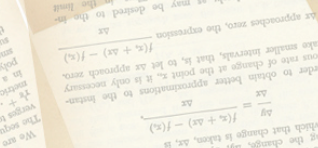
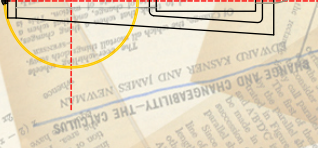
Biography of MATHEMATICS

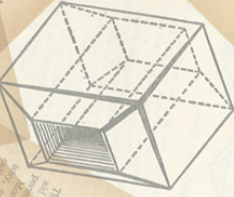
ARCHIMEDES



CHANGE AND CHANGEABILITY—THE CALCULUS

To get some light on the problem, Gauss calculated the decimal representations of all the fractions $1/n$ for $n = 1$ to 1000. He did not find the fraction he was seeking, but something infinitely greater—the law of quadratic reciprocity.





THE GEOMETRY OF THE EPISTEMIC WEB

J. HEINZ FALDRE

epistemic web... a subject which is not... certain knowledge of geometry... I am not addressing geometers... logical coherence... mathematical coherence... to study the social structure...



FROM CYCLOPS TO NEPTUNE

ENIGMA

ENIGMA

ENIGMA

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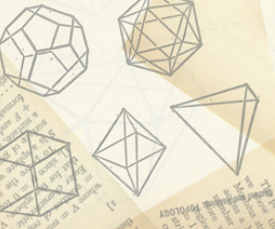
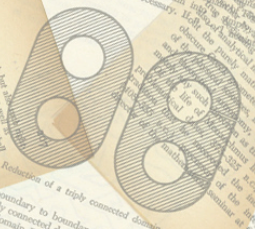
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*fig. 8.54 'Floor Lamp' for reading.
Visualization by Terry Sin.*



*fig. 8.55 'Ceiling Lamp' for reading.
Visualization by Terry Sin.*



*fig. 8.56 'Desk Lamp' for reading.
Visualization by Terry Sin.*

*(following page)
fig. 8.57 'Lamps for Reading' collection.
Visualization by Terry Sin.*





Digital Innocence: EXHIBITION

School of Architecture Loft gallery, Thursday December 2nd 2010.

Seven works on public exhibit:

The Exploded Frame.

Spirovox.

Touchscreen.

Tablescreen.

Lightroom.

Depthscreen.

Decomposition.

(overleaf)

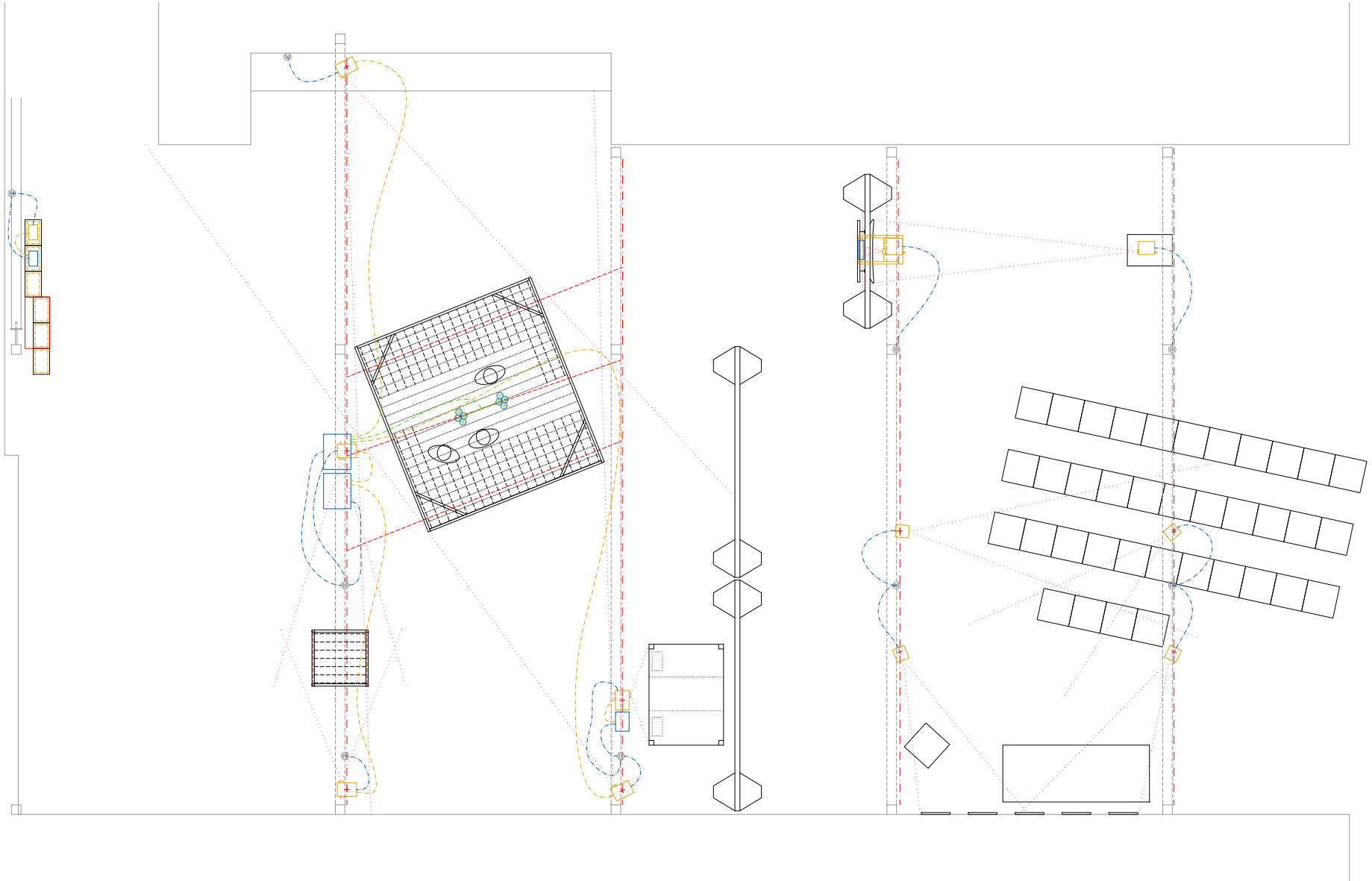
fig. 8.58 Digital technology layout.

Projectors, computers, cables and cords never interrupt human space.

(underlayer)

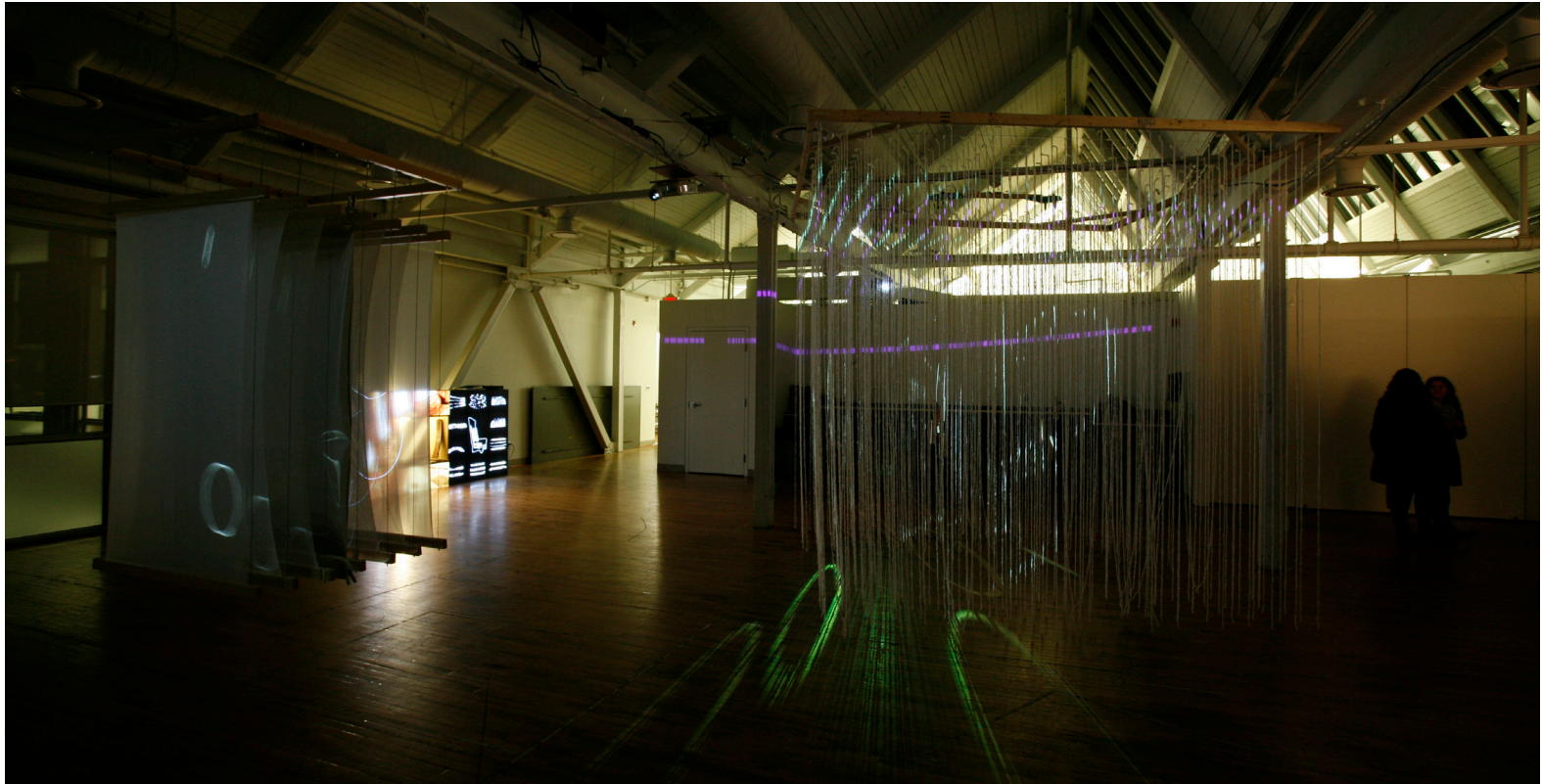
fig. 8.59 Material installation layout.

A smooth movement between 'light' and 'dark' zones.





*fig. 8.60 'Digital Innocence' exhibition - light zone.
Space for a verbal introduction to the thesis.*



*fig. 8.61 'Digital Innocence' exhibition - dark zone.
Space for the exhibition of 'screens.'*

(following page)
*fig. 8.62 'Digital Innocence' on show.
Thursday evening, December 2nd 2010.*





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Enframing

1 Langer: "Everything has an aspect of appearance as well as of causal importance. Even so non-sensuous a thing as a fact or a possibility appears this way to one person and that way to another. That is its 'semblance', whereby it may 'resemble' other things..." *Feeling and Form* 49

2 Langer: "But the true power of the image lies in the fact that it is an abstraction, a symbol, the bearer of an idea." *ibid.* 47

3 *ibid.* 50

4 Hansen: "Shaw's work – and his development as a media artist – bears witness to one of the most crucial theoretical tenets of this study, namely, that the virtual is a quality of human (and, more generally, organic) life and can only erroneously be equated with technology. Far from being a synonym of the digital, the virtual must be understood as that capacity, so fundamental to human existence, to be in excess of one's actual state." *New Philosophy for New Media* 50

5 Brian Massumi: "Digital technologies...have a remarkably weak connection to the virtual, by virtue of the enormous power of their systemization of the possible... Equating the digital with the virtual reduces the apparitional to the artificial,

with the 'simulacrum' taking the place of the phantasm...This forgets intensity, brackets potential, and in that same sweeping gesture bypasses sensation, the actual envelopment of potential...Digital technologies have a connection to the potential and the virtual only through the analog." *ibid.* 309

6 Terium non datur – "The reconciling 'third,' not logically foreseeable, characteristic of a resolution in a conflict situation when the tension between opposites has been held in consciousness...As a rule it occurs when the analysis has constellated the opposites so powerfully that a union or synthesis of the personality becomes an imperative necessity...[This situation] requires a real solution and necessitates a third thing in which the opposites can unite. Here the logic of the intellect usually fails, for in a logical antithesis there is no third. The 'solvent' can only be of an irrational nature. In nature the resolution of opposites is always an energetic process: she acts symbolically in the truest sense of the word, doing something that expresses both sides, just as a waterfall visibly mediates between above and below. Jung CW14 par. 705

7 Brian Massumi: "An analog process is the continuous transformation of an impulse from one qualitatively different medium into another...Its substance is topological deformation." *The Virtual Dimension* 307

8 Brian Massumi: "The digital is a numerically based form of codification (zeros and ones). As such, it is a close cousin to quantification. Digitality is a numeric way of arraying alternative states so they can be sequenced into a set of alternative routines. Step after ploddingly programmed step. Machinic habit...The medium of the digital

is possibility, not virtuality, and not even potential. Digital coding is possibilistic to the limit." *ibid.* 308-309

9 McCullough: "Electronic reproduction and transmission now confer legitimacy – they make reality...Conversely, forms not onscreen tend to fade from consideration. For example, in a research library, those books cited in the computer database enjoy much more circulation than those listed in only the old card catalogue. Visual media determine what gets noticed, what gets demanded, what gets admired...To be viable, then, is to be visible." *Abstracting Craft* 43

10 McLuhan: "There is a basic principle that distinguishes a hot medium like radio from a cool one like the telephone, or a hot medium like the movie from a cool one like TV. A hot medium is one that extends one single sense in 'high definition.' High definition is the state of being well filled with data. A photograph is, visually, 'high definition.' A cartoon is 'low definition,' simply because very little visual information is provided. Telephone is a cool medium, or one of low definition, because the ear is given a meager amount of information. And speech is low definition, because so little is given and so much has to be filled in by the listener. On the other hand, hot media do not leave so much to be filled in or completed by the audience. Hot media are, therefore, low in participation, and cool media are high in participation or completion by the audience." *Understanding Media* 24-25

11 Lanier: "The antihuman approach to computation is one of the most baseless ideas in human history. A computer isn't even there unless a person experiences it. There will be a warm mass of patterned silicon with electricity coursing through it,

but the bits don't mean anything without a cultured person to interpret them." You Are Not a Gadget 26

Sublimated Realities

1 OED online 'Sublimate'

2 "Within the space created by the media of mass production and reproduction, everything comes to be transformed into an immaterial image...so, today more than ever, people can claim to know things – paintings, buildings, objects, events – that they have never actually encountered outside of their reproduction and representation." Beyond Form 10

3 http://en.wikipedia.org/wiki/State_of_matter

4 Simon Penny addresses this condition in a discussion about virtual reality space: "VR technology, far from including the body in a virtual environment, actively excludes the physical body, replacing it with a body image. One does not take one's body into VR, one leaves it at the door while the mind goes wandering, unhindered by a physical body, inhabiting an ethereal virtual body in pristine virtual space, itself a 'pure' Platonic space, free of farts, dirt, and untidy bodily fluids...As such, it is a clear continuation of the rationalist dream of a disembodied mind, part of the long Western tradition of denial of the body. This re-affirms the Cartesian duality, reifying it in code and hardware." New Philosophy for New Media 165

5 Hansen: "The reality encoded in a digital database can just as easily be rendered as a sound file, a static image, a video clip, or an immersive, interactive world, not to mention any number of forms that do not correlate so neatly with our sensory capacities. Viewed in this way, the digital era and the phenomenon of digitization itself can be understood as demarcating a shift in the correlation of two crucial terms: media and body. Simply put, as media lose their material specificity, the body takes on a more prominent function as a selective processor of information." *ibid.* 22

6 Tell: "This has important consequences for Memory, for the images placed therein are derived from both seen object and seeing subject. Because the image-in-memory is the result of an essential composite it follows that we cannot 'distinguish the form of the body which we see and the form which arises from it in the sense of the one who sees.' Augustine is here recognizing that although human sensation cannot distinguish the object-in-the-world from its image-in-memory, the image does not correspond to the object-in-the-world." Beyond Mnemotechnics 239

7 MacDonald Pantheon: Design, meaning, and progeny. 11

8 Mitchell: "Take text, for example. When it was inscribed in stone and clay, it didn't move very much; to gain access, you traveled to it. Then, when it shifted to lightweight sheet materials – papyrus, parchment, and paper – it began to circulate. Medieval monasteries became nodes in manuscript production, distribution, and consumption networks. With cheaper and more plentiful paper, printing, more efficient and reliable transportation, and mass literacy came large-scale, high-volume mail networks. Next, the telegraph network eliminated the paper substrate (over the

long-distance legs of communication systems, at least), and demonstrated that short, electronically encoded strings of characters could move far faster than the swiftest messenger. Finally, digital storage and processing, ASCII coding, packet switching, and high-bandwidth electronic channels enabled the high-speed transmission of very large quantities of text. Today, through email, instant messaging, and the Web, text mostly comes to you in completely dematerialized form.” Mc++ 84

9 Kozel Closer, 81

10 Hansen: “The capacity to store information ‘sheltered from entropy’ has, in short, rendered time an independent variable: no longer intrinsically bound to materials subject to decay, time in some sense ‘exists’ outside or beyond the thermodynamically irreversible universe governed by the laws of physics. In the wake of this shift in the being of time, human mediation of digital information becomes necessary as a means to reintroduce temporality into information. By performing a role formerly carried out through the entropic decline of information’s material support, the supplementary human mediation (or framing) of information has now become central to the givenness of time itself.” *New Philosophy for New Media* 193

The Digital Supplement

1 McLuhan: “That our human senses, of which all media are extensions, are also fixed charges on our personal energies, and that they also configure the awareness and experience of each one of us...” *Understanding Media* 23

2 Kozel: “The use of the word saturation in conjunction with the virtual works on many levels: it is an evocative sensory term that draws the body into the experience of virtuality. Saturation makes us think of a liquid that permeates our pores, seeps into our skin; it transforms the properties of materials and can’t help but transform the affective state of a person. Being saturated by anything (rain, polemics, visual data) can be pleasurable, or it can be deeply annoying. It is a sister term to immersion, also an aquatic metaphor: effective immersion involves saturation.” Closer 78

3 Stereoscopic viewing technologies utilize glasses with alternately polarized lenses in conjunction with film projected at a much higher frame rate. The polarization causes only every second frame of video to reach each eye, thus distorting perception and creating the illusion of three dimensional depth.

4 Hansen: *New Philosophy for New Media* 162

5 Simon Penny: “VR technology, far from including the body in a virtual environment, actively excludes the physical body, replacing it with a body image. One does not take one’s body into VR, one leaves it at the door while the mind goes wandering, unhindered by a physical body, inhabiting an ethereal virtual body in pristine virtual space, itself a ‘pure’ Platonic space, free of farts, dirt, and untidy bodily fluids. In VR the body is broken into sensor and effector components, a panoptical eye and a slave body which ‘works’ the representation but is invisible within it. As such, it is a clear continuation of the rationalist dream of a disembodied mind, part of the long Western tradition of denial of the body. This re-affirms the Cartesian duality, reifying it in code and hardware.” *ibid.* 165

6 “Cameron’s special effects masterpiece is very lifelike, and the 3D performance capture and CGI effects essentially allow the viewer to enter the alien world of Pandora for the movie’s 2.5 hour running time, which only leads to the separation anxiety some individuals experience when they depart the movie theater.” *Avatar Blues*

7 “Working in air-conditioned trailers, Predator pilots observe the field of battle through a bank of video screens and kill enemy fighters with a few computer keystrokes. Then, after their shifts are over, they get to drive home and sleep in their own beds...But that whiplash transition is taking a toll on some of them mentally, and so is the way the unmanned aircraft’s cameras enable them to see people getting killed in high-resolution detail, some officers say.” *UAV War Stress*

8 Hansen: “VR can be seen to lend concrete support to neuroscientist Humberto Maturana’s generalization of simulation: “whenever we have an illusion,” suggests Maturana, “we really have it. In our experience we cannot differentiate between what we call a perception and what we call an illusion. Whenever we have an illusion, we experience it always in the same way as we experience what we are used to calling a perception.” This is so, moreover, precisely because the experience of illusion and of perception are affectively identical: from the standpoint of the experiencing, feeling body, simulation and perception are, quite simply, indiscernible.” *New Philosophy for New Media* 168

9 Hansen: “Neither a figure for visual function nor a functional instrument co-

constitutive (with the eye) of vision, VR demarcates the technical infiltration of human perception or, more exactly, the technical supplementation of the human capacity for simulation (the absolute survey). With VR, that is, the machinic component no longer serves as a frame for perception, but becomes entirely integrated into the process of simulation that lies beneath and encompasses perception.” *ibid.* 170

10 Adamson: “A supplement is that which provides something necessary to another, ‘original’ entity, but which is nonetheless considered to be extraneous to that original. Derrida describes the supplement as pointing to a ‘lack,’ which might be present in a single work or in an entire field of discourse.” *Thinking Through Craft* 11

11 McLuhan *Understanding Media* 24-25 (see also *Enframing* note 10)

12 McLuhan: “On the other hand, in experiments in which all outer sensation is withdrawn, the subject begins a furious fill-in or completion of senses that is sheer hallucination. So the hotting-up of one sense tends to effect hypnosis, and the cooling of all senses tends to result in hallucination.” *ibid.* 35

13 Hansen: “As a kind of test case for Manovich’s concept of simulation, the example of telepresence underscores the limitation of his general distinction between representation and simulation and suggests the necessity of triangulating this binary with a third term, namely, hallucination (by which I mean, following recent research in perception, the fact that the embodied mind actually creates what it sees). For...there necessarily takes place, within the body of the participant, an

embodied experience: a bodily processing of the action that has the effect of 'making it real' for the participant." *New Philosophy for New Media* 41

14 Manovich: "Whereas the representational tradition (from Renaissance painting to cinema) splits the viewer's identity between the physical space and the space of the representation, simulation (from the mosaic to the fresco to VR) places the spectator in a single coherent space encompassing the physical space and the virtual space that continues it." *ibid.* 40

15 *ibid.* 41 (see above)

16 OED online - 'Hallucination' and 'Illusion'

17 Grynstejn: "Enter the work of Eliasson, which at its core makes a case for the proactive subject, for the individual's return to a heightened sense of him – or herself in the act of perceiving and acting, and by extension for the conscious ownership of all manner of processes of cognition that tend to be standardized, automated, and otherwise impoverished by a mediating world...With his many titles using the possessive pronoun your...Eliasson openly calls for an actively engaged spectator, casting the viewer in a principal role in the aesthetic production of the artwork. This is the central tactic in his arsenal of strategies for encouraging individual awareness, reflection, and ultimately a greater consciousness of the workings of large economic and political frameworks." *Take Your Time* 14

18 *ibid.*

19 Grynstejn: "Nearly all of his art deflects its own imaginative power by divulging the functional machinations that drive its effects...the smooth surface of illusion and its technical construction then form two poles between which the visitor can move." *ibid.* 22

20 Duchamp: "All in all, the creative act is not performed by the artist alone; the spectator brings the work in contact with the external world by deciphering and interpreting its inner qualifications and thus adds his contribution to the creative act. This becomes even more obvious when posterity gives its final verdict and sometimes rehabilitates forgotten artists." Marcel Duchamp 43

21 "And perhaps, in occupying that space, the individual may come to see that the kind of engagement offered by consumer culture is by comparison less one of heightened activity than simply a 'more developed form of sedentarization,' less interactive than 'interpassive,' a field on which we do not truly act so much as receive a limited opportunity to manipulate its givenness (however refined and multifarious)." *ibid.* 22

22 Kozel: "Performance can be very subtle. The key is that we are aware of what we are doing as we are doing it..." *Closer* 69

23 L'Artisan Electronique - www.unfold.be

24 Grosz: "...the relationship between the virtual and the actual is one of surprise, for

the virtual promises something different to the actual than it produces, and always contains in it the potential for something other than the actual.” Closer 82

Distracted by Design

1 Crary: “For it is in the late nineteenth century, within the human sciences and particularly the nascent field of scientific psychology, that the problem of attention becomes a fundamental issue. It was a problem whose centrality was directly related to the emergence of a social, urban, psychic, and industrial field increasingly saturated with sensory input. Inattention, especially within the context of new forms of large-scale industrialized production, began to be treated as a danger and a serious problem, even though it was often the very modernized arrangements of labour that produced inattention.” *Suspensions of Perception* 13

2 James Cappie: “It is unnecessary to enlarge on the psychological importance of this function. It may be said to underlie every other mental faculty. It is the bringing of the consciousness to a focus in some special direction...without it meaningless reverie will take the place of coherent thought.” *ibid.* 17

3 Crary: “But scientific psychology never was to assemble knowledge that would compel the efficient functioning of an attentive subject, or that would guarantee a full co-presence of the world and an attentive observer. Instead, the more one investigated, the more attention was shown to contain within itself the conditions

for its own undoing – attentiveness was in fact continuous with states of distraction, reverie, dissociation, and trance.” *ibid.* 45

4 Helmholtz: “It is natural for the attention to be distracted from one thing to another. As soon as the interest in one object has been exhausted, and there is no longer anything new in it to be perceived, it is transferred to something else, even against our will. When we wish to rivet it on an object, we must constantly seek to find something novel about it, and this is especially true when other powerful impressions of the senses are tugging at it and trying to distract it.” *ibid.* 30

5 NY Times: “Scientists say juggling email, phone calls and other incoming information can change how people think and behave. They say our ability to focus is being undermined by bursts of information. These play to a primitive impulse to respond to immediate opportunities and threats. The stimulation provokes excitement – a dopamine squirt – that researchers say can be addictive. In its absence, people feel bored.” *Your Brain on Computers*

6 Crary: “Information and telematic systems simulate the possibility of meanderings and drift, but in fact they constitute modes of sedentarization, of separation in which the reception of stimuli and the standardization of response produce an unprecedented mixture of diffuse attentiveness and quasi-automatism, which can be maintained for remarkably long periods of time.” *Suspensions of Perception* 78

7 Oppenheimer: “Just because it’s on a monitor, kids pay more attention. There’s this magic to the screen.” *The Computer Delusion* 50

8 Conversations: Walter Murch and the Art of Editing Film 49.

9 NY Times: Your Brain on Computers.

10 Crary Suspensions of Perception 53

11 NY Times: "Heavy multitaskers actually have more trouble focusing and shutting out irrelevant information, scientists say, and they experience more stress. And scientists are discovering that even after the multitasking ends, fractured thinking and lack of focus persist." NY Times: Your Brain on Computers

12 *ibid.*

13 Lehrer: In a study "...patient children were better at using reason to control their impulses. They were the kids who covered their eyes, or looked in the other direction, or managed to shift their attention to something other than the delicious marshmallow sitting right there...It turned out that the same cognitive skills that allowed these kids to thwart temptation also allowed them to spend more time on their homework. In both situations, the prefrontal cortex was forced to exercise its cortical authority and inhibit the impulses that got in the way of the goal." *How We Decide* 112

14 Vance Packard outlines modes of obsolescence in "The Waste Makers":
Obsolescence of function: In this situation an existing product becomes outmoded

when a product is introduced that performs the function better. Obsolescence of quality: Here, when it is planned, a product breaks down or wears out at a given time, usually not too distant. Obsolescence of desire: In this situation a product that is still sound in terms of quality or performance becomes 'worn out' in our minds because a styling or other change makes it seem less desirable. cited in Baudrillard *The System of Objects* 156

15 Crary *Suspensions of Perception* 29

16 Fukasawa: "Encouraged by glossy lifestyle magazines, and marketing departments, [design has] become a competition to make things as noticeable as possible by means of colour, shape and surprise...Design makes things seem special, and who wants normal if they can have special? And that's the problem...Not that old things shouldn't be replaced or that new things are bad, just that things which are designed to attract attention are usually unsatisfactory. There are better ways to design than putting a big effort into making something look special. Special is generally less useful than normal, and less rewarding in the long term." *Supernormal* 29

17 McLuhan: "Any new service environment, such as those created by the alphabet or railways or motor cars or telegraph or radio, deeply modifies the very nature and image of people who use it." *Laws of Media* 97

18 Carr: "A recently published study of online research habits, conducted by scholars from University College London, suggests that we may well be in the midst of a sea change in the way we read and think. They found that people exhibited

“a form of skimming activity,” hopping from one source to another and rarely returning to any source they’d already visited. They typically read no more than one or two pages of an article or book before they would “bounce” out to another site. Sometimes they’d save a long article, but there’s no evidence that they ever went back and actually read it.” *Is Google Making Us Stupid*

19 McLuhan: “For the ‘content’ of a medium is like the juicy piece of meat carried by the burglar to distract the watchdog of the mind.” *Understanding Media* 19

20 Crary: “It is in this sense that the management of attention, whether through early mass-cultural forms in the late nineteenth century or later through the television set or the computer monitor (at least in their overwhelmingly pervasive forms), has little to do with the visual contents of these screens and far more with a larger strategy of the individual. Spectacle is not primarily concerned with a looking at images but rather with the construction of conditions that individuate, immobilize, and separate subjects, even within a world in which mobility and circulation are ubiquitous.” *Suspensions of Perception* 74

21 Crary: “What once might have been called reverie now most often takes place aligned with preset rhythms, images, speeds, and circuits that reinforce the irrelevance and dereliction of whatever is not compatible with their formats. Beyond the limits of the present study is the question of how and whether creative modes of trance, inattention, daydream, and fixation can flourish within the interstices of these circuits. It is particularly important now to determine what creative possibilities can be generated amid new technological forms of boredom.” *ibid.* 78

22 Crary: “Because so many forms of a disciplinary attentiveness, especially since the early twentieth century, have entailed cognitively “processing” a stream of heterogeneous stimuli (whether film, radio, television, or cyberspace), the kind of swerves into inattentiveness increasingly have produced alternate experiences of disassociation, of temporalities that are not only dissimilar to but also fundamentally incompatible with capitalist patterns of flow and obsolescence.” *ibid.* 77

23 Petro: “In contrast to the passive and pathos-laden term ennui, boredom is defined more actively; indeed, its primary definition takes the form of a verb: to weary by dullness, tedious repetition, unwelcome attentions; a cause of ennui or petty annoyance.” *Fugitive Images* 272

24 Petro: “Although Simmel never uses the term distraction in this essay, the violent sense impressions he describes are clearly the equivalent of distraction – an experience of sensory stimulation as sensory overload that leads to boredom, exhaustion, and indifference – the perception of a universal equality of things.” *ibid.* 273

25 *ibid.* 275

26 Petro: “Boredom and distraction, in other words, are complimentary rather than opposing terms, whose relationship might be stated as follows: reception in a state of distraction reveals cultural disorder and increasing abstraction; the cultivation of boredom, however, discloses the logic of distraction, in newness becomes a fetish, and shock itself a manifestation of the commodity form.” *ibid.* 274

27 *ibid.* 274

Interface Friction

1 Adamson *Thinking Through Craft* 11

2 This family of objects which ‘possess screens’ includes many digital technology interfaces such as televisions, phones, and computers. The screen is an essential characteristic for inclusion in this group since it is through the screen that our relationship with digital space is cultivated. As such, I would extend this definition to include those peripheral objects which depend entirely upon another screened device; such things as CDs, DVDs, memory sticks, keyboards, mice, and many others.

3 Baudrillard: “To become an object of consumption, an object must first become a sign. That is to say: it must become external, in a sense, to a relationship that it now merely signifies. It is thus arbitrary – and not inconsistent with that concrete relationship: it derives its consistency, and hence its meaning, from an abstract and systematic relationship to all other sign-objects. Only in this context can it be ‘personalized’, can it become part of a series, and so on; only thus can it be consumed, never in its materiality, but in its difference.” *The System of Objects* 218

4 Adamson: “The customization of the frame to the work is crucial – a great

painting must not be besmirched with a cheap mass-produced frame – but the craft of the framer is not undertaken for its own sake. In a sense, it is not even meant to be noticed. The craft of the framer must not ‘upstage’ the art of the painter. As Derrida says, the *parergon* has ‘as its traditional determination not that it stands out but that it disappears, buries itself, effaces itself, melts away at the moment when it deploys its greatest energy. To say that craft is supplemental, then, is to say that it is always essential to the end in view, but in the process of achieving that end, it disappears.’ *Thinking Through Craft* 13

5 Baudrillard *The System of Objects* 51

6 Baudrillard: “Indeed, a genuine revolution has taken place on the everyday plane: objects have now become more complex than human behaviour relative to them. Objects are more and more highly differentiated – our gestures less and less so. To put it another way: objects are no longer surrounded by the theatre of gesture in which they used to be simply the various roles; instead their emphatic goal-directedness has very nearly turned them into the actors in a global process in which man is merely the role, or the spectator.” *ibid.* 59

7 Baudrillard: “Where once man imposed his rhythm upon objects, now objects impose their disjointed rhythm – their unpredictable and sudden manner of being present, of breaking down or replacing one another without aging – upon human beings.” *ibid.* 172

8 Connerton: “Today, we are surrounded everywhere by the conspicuousness

of consumption through the multiplication of objects and material garb...the contemporary indoctrination into systematic, organized consumption is the extension, in the present, of the earlier indoctrination of rural populations into industrial labour which occurred in the nineteenth century. From the standpoint of cultural memory, it is not simply the fecundity of consumable objects, it is rather their lifespan, that is significant. The norms of social standing impose a time-scheduling, a metabolism, of increasingly rapid cycles." *How Modernity Forgets* 122

9 Crawford *Shopclass as Soulcraft* 16

10 Terry O'Reilly: *The Age of Persuasion*, CBC Radio

11 Crawford: "Early motorcycles were not very convenient. More than today's machines, they made an issue of certain intellectual and moral qualities of the rider. One was drawn out of oneself and into a struggle, by turns both hateful and loving, with another thing that, like a mule, was emphatically not just an extension of one's will...Old bikes don't flatter you, they educate you." *Shopclass as Soulcraft* 59

12 Lanier: "It's the people who make the forum, not the software. Without the software, the experience would not exist at all, so I celebrate that software, flawed as it is. But it's not as if the forum would really get much better if the software improved. Focusing too much on the software might even make things worse by shifting the focus from the people...There is huge room for improvement in digital technologies overall. I would love to have telepresence sessions with distant oudists, for instance. But once you have the basics of a given technological leap in place, it's important to

step back and focus on the people for a while." *You Are Not a Gadget* 72

13 Sennett *The Craftsman* 44

14 Sennett: "Getting better at using tools comes to us, in part, when the tools challenge us, and this challenge often occurs just because the tools are not fit-for-purpose. They may not be good enough, or it's hard to figure out how to use them. The challenge becomes greater when we are obliged to use these tools to repair or undo mistakes. In both creation and repair, the challenge can be met by adapting the form of a tool, or improvising with it as it is, using it in ways it was not meant for. However we come to use it, the very incompleteness of the tool has taught us something." *ibid.* 194

15 *ibid.* 248

16 Bill Viola: "One of the things that clouds this issue is that to be truly useful, any technology has to be unconscious. We are in a period where all these new technologies are still very conscious. It's not a world that we should ever stop questioning, but we need to know that we are using these things to go somewhere, to achieve something, to deepen ourselves and our knowledge. We don't pick up a hammer to have a 'hammer and nail experience,' we use it to build a house or a table." *Bill Viola* 152

The Knowing Hand

1 The Globe and Mail: Information Rich and Attention Poor

2 *ibid.*

3 “What is apparently being eroded is the deep, integrative mode of knowledge generation that can only come from the ‘10 000 hours’ of individual intellectual focus – a process that mysteriously gives rise to the insights that occur, often quite suddenly, to the well-prepared mind.” *ibid.*

4 E.F. Schumacher *Small is Beautiful* 17

5 See Apple iPhone and Google Swype; as well Microsoft surface and emerging technologies from MIT MediaLab utilizing projected graphics and camera feedback.

6 As Crawford points out, the value of work could be divided between services which are deliverable through wire, and those which are not. Architects can be outsourced, plumbers cannot. Crawford *Shopclass as Soulcraft* 35

7 McCullough: “If manual ability has a way of defying explanation, that is because it is based not in language but action. Skill is participatory. This same basis makes it durable: any teacher knows that active participation is the way to retainable knowledge. In this regard skill has intrinsic, personal worth. It is an achievement.

Almost any practiced person values her skill above and beyond what it is good for producing, as though there were psychological benefits to mastery itself.” *Abstracting Craft* 7

8 *ibid.* 248

9 Sennett: “Craftsmen take pride in skills that mature. This is why simple imitation is not a sustaining satisfaction; the skill has to evolve. The slowness of craft time serves as a source of satisfaction; practice beds in, making the skill one’s own. Slow craft time also enables the work of reflection and imagination – which the push for quick results cannot. Mature means long; one takes lasting ownership of the skill.” *The Craftsman* 295

10 Wilson *The Hand* 93

11 Lehrer: “Although we tend to think of experts as being weighed down by information, their intelligence dependent on a vast amount of explicit knowledge, experts are actually profoundly intuitive. When an expert evaluates a situation, he doesn’t systematically compare all the available options or consciously analyze the relevant information. He doesn’t rely on elaborate spreadsheets or long lists of pros and cons. Instead, the expert naturally depends on the emotions generated by his dopamine neurons. His prediction errors have been translated into useful knowledge, which allows him to tap into a set of accurate feelings he can’t begin to explain.” *How We Decide* 54

12 McCullough: "Above all, you develop a contextual awareness. Like a good pianist you improve your ability to push what you have learned into a subconscious background, so that you don't have to keep so much in mind at any one time. Instead of thinking the actions, you feel the actions – and actions stir your memory, and give you a better sense of inhabiting your work. As an expert you sense what to try when; how far a medium can be pushed; when to check up on a process; which tool to use for what job." *Abstracting Craft* 27

13 Sennett *The Craftsman* 174

14 Polanyi *Knowing and Being* 14

15 cited in Wilson *The Hand* 62

16 Crawford: "...the degradation of work is ultimately a cognitive matter; rooted in the separation of thinking from doing." *Shopclass as Soulcraft* 38

17 Wilson *The Hand* 111

18 Hansen: "For if we now regularly experience a 'pathology of immediate perception' in which the credibility of visual images has been destroyed, isn't the reason simply that image-processing has been disassociated from the body? And if so, what better way can there be to resist the industrialization of perception than by reinvesting the bodily basis of perception? Faced with the all-too-frequent contemporary predicament of 'not being able to believe your eyes,' are we not

indeed impelled to find other ways to ground belief, ways that reactivate the bodily modalities – tactility, affectivity, proprioception – from which images acquire their force and their 'reality' in the first place?" *New Philosophy for New Media* 105

19 Sennett *The Craftsman* 160

20 Sennett: "Technique develops, then, by a dialectic between the correct way to do something and the willingness to experiment through error. The two sides cannot be separated. If the young musician is simply given the correct way, he or she will suffer from a false sense of security. If the budding musician luxuriates in curiosity, simply going with the flow of the transitional object, she or he will never improve." *ibid.* 160

21 cited in Oppenheimer *The Computer Delusion* 55

22 Oppenheimer: "This is not just the future versus the past, uncertainty versus nostalgia; it is about encouraging a fundamental shift in personal priorities – a minimizing of the real, physical world in favor of an unreal 'virtual' world. It is about teaching youngsters that exploring what's on a two-dimensional screen is more important than playing with real objects, or sitting down to an attentive conversation with a friend, a parent, or a teacher. By extension, it means downplaying the importance of conversation, of careful listening, and of expressing oneself in person with acuity and individuality. In the process, it may also limit the development of children's imaginations." *ibid.* 62

23 Crawford *Shopclass as Soulcraft* 51

24 *ibid.* 51

25 Kozel: "What *techne* and *episteme* mean, Heidegger writes, is 'to be entirely at home in something, to understand and be expert in it. Such knowing provides an opening up. As an opening up it is a revealing...' This sense of 'being at home' is achieved through spending protracted periods of time in a particular physical state, or, I have come to realize, within a particular computer-mediated responsive system. Paradoxically, it is familiarity, or being at home, that provides scope for the unexpected." *Closer* 76

26 Frank Levy: *Education and Inequality in the Creative Age*

27 Crawford: "But when things get really hairy, you want an experienced human being in control." *Shopclass as Soulcraft* 168

28 Hubert & Stuart Dreyfus: "If we fail to put logic machines in their place, as aids to human beings with expert intuition, then we shall end up as servants supplying data to our competent machines. Should calculative rationality triumph, no one will notice that something is missing, but now, while we still know what expert judgment is, let us use that expert judgment to preserve it." *Abstracting Craft* 259

29 Mann *Cyborg* 30

30 McCullough: "Increasingly computing shows promise of becoming the medium that could reunite visual thinking with manual dexterity and practiced knowledge.

This reunion lies at the heart of any proposition for a digital craft. New approaches to the likes of continuous process, refined artifact, workability, and the application of individual talent all relate to traditional notions of craft. This is the point. Reuniting hand, eye, tools, and mind, the level of visual (and otherwise sensory) abstraction, may be the way toward more satisfying and incisive work." *Abstracting Craft* 51

Eliasson, Viola & McCall

1 Ross: "In the traditional manner of great art, Viola provokes the heart by leading the mind to avenues of contemplation and self-discovery. In so doing, the art provides the basis for an experience best described as transcendent – a curious word to use at the end of the age of mechanical reproduction, yet the only word that applies." *Bill Viola* 27

2 Grynstejn: "The philosophy posited by *Notion motion* stands at the heart of Eliasson's entire enterprise, which at its core coheres clearly and powerfully as a serious argument for an imbedded and exhilarating being-in-the-world." *Eliasson Take Your Time* 18

3 Viola & Hyde: "In other words, it's in Being where that knowledge is located. That's where it's going to come across. It's not head knowledge, not intellectual knowledge...I think that the person who is able to...to embody something rather than just repeat it...and to say it persuasively, is somebody who is operating on all

levels – body, speech, and mind. And so it's felt, and it's expressed in a language that is captivating and inspiring." Bill Viola 159

4 Townsend: "Yet Viola's mode of engagement is effected with precisely that technology that promises the most authentic simulacrum of reality and, therefore, perhaps the least attentiveness from its audience. His media are the most sophisticated products of that technological impulse to arrest and replicate the world, which first manifests itself in the camera obscura, and which evolves through photography, sound recording and film." Art of Bill Viola 13

5 Viola: "One of the things that clouds this issue is that to be truly useful, any technology has to be unconscious. We are in a period where all these new technologies are still very conscious. It's not a world that we should ever stop questioning, but we need to know that we are using these things to go somewhere, to achieve something, to deepen ourselves and our knowledge. We don't pick up a hammer to have a 'hammer and nail experience,' we use it to build a house or a table." Bill Viola 152

6 Grynstejn: "Nearly all of his art deflects its own imaginative power by divulging the functional machinations that drive its effects...the smooth surface of illusion and its technical construction then form two poles between which the visitor can move." Eliasson Take Your Time 22

7 Joseph: "Habituated by the media, it is precisely the spectacular, dramatic incident that audiences crave from performance as well. McCall was determined not to give

the audience what they wanted, least of all in an aesthetic situation. Fire Cycles III was as far as possible from what photographer Henri Cartier-Bresson termed 'the decisive moment.'" Eamon Solid Light Films 109

8 Joseph: "Instead, he embraced 'the perception that nothing will change' in the sense of producing any great 'variety,' and began to expand the homeostatic permutational strategies that had already informed certain aspects of his performances to encompass the entirety of what were now multi-hour works. It was a means, as he would later describe Long Film for Four Projectors (where such permutations, as we have seen, were developed most thoroughly), of producing a result that was 'constantly different but with no real development.'" *ibid.* 108

9 Grynstejn: "A touchstone work in his oeuvre, Model room is crucial in pointing to a mode of thinking that opens out into risky and inconclusive territory – a field of trial and error, false starts, ongoing puzzlings, and delightful discoveries. In the passage from reverie to resolution, Eliasson emphasizes the former. His fundamental approach to art making is not declarative but speculative; rather than striking a stance, he follows his curiosity in a process of attentive inquiry that lets intellectual and emotional sparks fly." Eliasson Take Your Time 26

10 Ross: "The work functions as an extension of direct personal observation of the everyday, presented as poetic intimations of the sublime in everyday life. Viola's notebooks reveal the ways in which his wide-ranging curiosity has powered a deep personal search for the sublime in both written and visual form." Bill Viola 24

11 Townsend: "Viola's is an art for 'everyman', rather than for cognoscenti; an art of affect rather than distanced appraisal, but not an art of pathos; an art of duration and absorption rather than of immediate satisfactions and revelation; an art that refuses the spectacular control over the image, but which embeds its audience within its structures – an art, then, that refuses transcendence to the spectator, but which attracts us by its own inquiry into transcendence." *Art of Bill Viola* 10

12 Joseph: "Long Film thus amplifies the manner in which the very apprehension of the world is inherently tied to the body, forcefully undermining any identification with an abstract or transcendent point of view." *Eamon Solid Light Films* 49

13 John Berger: "Time appears to pass at different rates because our experience of its passing involves not a single but two dynamic processes which are opposed to each other: as accumulation and dissipation. The deeper the experience of a moment, the greater the accumulation of experience. This is why the moment is lived as longer. The dissipation of the time-flow is checked. The lived *durée* is not a question of length but of depth and intensity." *Art of Bill Viola* 122

14 Ross: *Bill Viola* 28-29

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