Realising The Unreal

Swedenborg, Photography and Vision(s)

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Royal College of Art
Doctor of Philosophy
(by project)

ABSTRACT

In this practice-led PhD I ask how might an allegorical reading of the eighteenth-century scientific and visionary cosmologies of Emanuel Swedenborg elucidate new readings around the invention, practice and reception of photography in the 1830s to 1850s? How might these readings 'speak' and act as an agent to impact a different, secular knowledge and understanding of contemporary photographic practices and theory?

My connection to Swedenborg comes through the archive at Swedenborg House, London, and my role there as artist in residence (2015-19). Swedenborg lived during the height of the Enlightenment, a prominent natural scientist fascinated by instruments of vision, turned seer and visionary. This latter occupation placed his thinking in the undercurrents of his time, as he dispassionately recorded things heard and seen up above the earth's atmosphere. He formulated his theory of correspondences, whereby the knowledge (visibility) of an immaterial world corresponds with and affects the physical world, in a dynamic, interactive dialogue. My research project is an experimental visualisation of how Swedenborg's scientific and visionary theories might correspond with contemporary photographic practice.

I find and trace Swedenborg's connection to photography (as medium, apparatus and process) through looking back to its origins and associated theories: Walter Benjamin's 'Little History of Photography' (1931), Rosalind Krauss's 'Tracing Nadar' (1978) and Kaja Silverman's *The Miracle of Analogy* (2015), as well as her earlier *Flesh of My Flesh* (2009). Benjamin's seminal essay on the intelligibility of photography seen through the 'fog' that surrounded its 'beginnings' is the touchstone for Krauss and Silverman. Krauss identifies Swedenborg's influence in an atmosphere of science and spiritualism. Silverman in her reevaluation asserts that photography is not index but analogy, the world's predominant way of revealing itself to us, and that the atmosphere surrounding its origins has reappeared due to photography's recent obsolescence as an industrial medium. If we accept Silverman's theory then it follows, I assert, that Swedenborg's theory of correspondences and analogy is brought to the fore, and might usefully propose a model for contemporary photographic practice.

Through knowledge of the archive and Swedenborg's methods and methodologies that can be seen as analogous with photographic practices, I assert my concept of Swedenborg as camera. A dynamic, associative, 'virtual' tool that I pick up and add to my existing toolkit: a past/present/future instrument of vision that prompts a diffraction methodology, as identified by Karen Barad, whereby, the apparatus, what is seen through it and the images it generates are inevitably entangled.

The PhD encompasses three research outcomes in photography's expanded field: 'The Eye Needs a Horizon', Frith Street Gallery, London (2016); 'Thinking Light', Beecroft Building, University of Oxford (2018); and 'Let Us Record The Atoms As They Fall', Swedenborg House, London (2019).

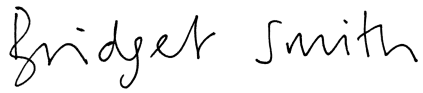
Photography's obstructive 'fog' becomes an enabling atmosphere. Its expanded field becomes relational. Camera obscuras are deconstructed, reimagined and spatially reconfigured. Throughout it all a single beam of light evolves and reforms as it moves through the research project.

DECLARATION

This thesis represents partial submission for the degree of Doctor of Philosophy at the Royal College of Art. I confirm that the work presented here is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

During the period of registered study in which this thesis was prepared the author has not been registered for any other academic award or qualification. The material included in this thesis has not been submitted wholly or in part for any academic award or qualification other than that for which it is now submitted.

Bridget Smith



November 2021

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Preface

It is spring 2015 and I am newly arrived in a part of the field of fine art photography that seems both familiar and unfamiliar to me,[1] an area that has already been termed 'photography's expanded field' by the art historian George Baker in 2005.[2] Baker did not see photography's expansion as the result of an increase in the number of practitioners; rather he identified both a temporal and spatial expansion of photography through its interaction with other fields of art-making, specifically the fields of cinema and sculpture. In his essay he invites the reader to 'map its possibilities'.[3] I felt that I was in the right place for my art practice but the ground didn't appear to be that stable, it was constantly shifting. Not only that but the whole notion of just what photography *is* in the twenty-first century had also shifted, evolved and become radically different from what it was in the twentieth century. In light of these circumstances and the endless talk of the pervasive effect of photography in all its multiple forms on all aspects of our lives, as well as the speculation about just where photography was headed – at speed, due to the technological advances fuelling that future trajectory (or rather trajectories) – I felt the weight of the situation. You might say that it was as if a fog hovered just above my head, and low over the landscape. And much like Italo Calvino in his *Six Memos for the Next Millennium*, written in 1985 where he looked ahead fifteen years to the new century in order to offer his literary values to carry into the future, I realised that my position fifteen years in to that now established century also required a certain lightness of approach.

> When the human realm seems doomed to heaviness, I feel the need to fly like Perseus into some other space. I am not talking about escaping into dreams or into the irrational. I mean that I feel the need to change my approach, to look at the world from a different angle, with different logic, different methods of knowing and proving. The images of lightness I'm looking for shouldn't let themselves dissolve as dreams do in the reality of the present and future...[4]

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[1] This repositioning had occurred through my exhibition, 'If You Want To Talk About Light You Have To Talk About Waves', Focal Point Gallery, Southend, 2015. It was the first time that I had exhibited photographs *with* objects to create a sculptural installation.

[2] See George Baker, 'Photography's Expanded Field', *October*, 114 (Fall, 2005), 120-40. Baker's essay takes its cue from Rosalind Krauss's, 'Sculpture in the Expanded Field', *October,* 8 (Spring, 1979), 30-44.

[3] Baker, p. 138.

[4] Italo Calvino, *Six Memos for the Next Millennium*, trans. by Geoffrey Brock (UK: Penguin, 2016), p. 8.

I felt a kinship with Calvino's paradoxical approach but found myself looking back to where I had come from, and down at the ground that I was standing on, rather than ahead towards the horizon. At that moment in time (as well as currently) an artist interested in photographic practices was able to work (with some difficulty) with the earliest photographic processes and technologies invented in the nineteenth century, the further developed analogue processes of the twentieth century, as well as the digital and computational technologies of the twenty-first century. I had already made the move into photography's expanded field because I felt my photographs had become too 'fixed' and I wished to 'unfix' them. If I were to truly understand my current position and confidently create a new space for my practice I would need to utilise my look back (in order to move forwards), not just to my earlier practice, but also to the origins of photography itself. I had witnessed the increasing disappearance of analogue processes that I had previously taken for granted. Before they were to disappear entirely I was keen to make use of those processes, working now in concert with digital processes, in order to find new forms of expression within my photographic art practice and to address how might the stillness inherent in an image point to the movement inherent in the medium? I required a full spectrum of photographic methods and methodologies if I wished to change my perspective and see that still photograph anew: as a site of potential, of reimagining and reconfiguring as much as a place of realisation. Rather than shed some of my photographic baggage so that I could achieve this new light way of being as an artist I, therefore, had to add new tools and processes to my load.

At the same time – and sensing an opportunity to progress further my interest in photography's expanded field – I applied to become artist in residence at Swedenborg House, London; a Society dedicated to the preservation of the writings, theories and artefacts of the Swedish eighteenth-century scientist and visionary, Emanuel Swedenborg held in the archive. I had, some years earlier, photographed the hall for a book of my photographs, *Society*.[5] At the time of applying for the residency I had, therefore, some prior knowledge of his life and theories. A natural scientist who was fascinated by instruments of vision, who became a seer and a visionary; both grounded and elsewhere, up above the earth's atmosphere where space begins, dispassionately recording things heard and seen. It was the volume of these activities that interested me (both in terms of sheer amounts, as well as the verticality of territory covered), that for now existed in outline only. I knew that like the earlier Calvino quote he looked at the world from a different angle, with different logic, with different methods of knowing, and that visions were images of light.

[5] Bridget Smith, *Society* (Germany: SteidlMack and General Public Agency, 2007).

London was where Swedenborg came, at the age of twenty-one, to study the latest developments in physics (in particular astronomy), mechanics and philosophy in his quest to become a natural philosopher. It was in London at the age of fifty-seven that he experienced his first full vision that set him on a different path, to his then roles, of natural philosopher and an Assessor for the Royal Board of Mines. It was in London that he anonymously published his visionary experiences and theories; as to publish such material in Sweden would run the risk of being declared a heretic. It was in London that he died in 1772 at the age of eighty-four and was laid to rest here until his remains were repatriated to his homeland with a state ceremony in 1908. The Swedenborg Society was established in 1810 by his followers. Swedenborg House, Bloomsbury was acquired in 1924: home to the Society, now with an ever expanding archive, an office, a small bookshop, two reading rooms and a large hall. It is the opportunity of this interior space, in particular the large hall with the vaulted ceiling – another site of potential – that creates the additional aim of the Society: to encourage a connection between the archive and Swedenborg's theories, and present-day artistic and cultural preoccupations.

Once appointed as artist in residence (and a few months later, when I began this research project) I stood in the hall with the vaulted ceiling once again – isn't the Latin origin of 'camera' an arched or vaulted room I wondered? – I absorbed the atmosphere. The fog was lifting. Deploying intuition and speculation as a methodology and combining it with the already existing paradoxical approach I decided that my remit was to find a way to connect the scientist-seer-visionary with contemporary photographic art practice. In doing so I leapt further back, to the eighteenth century, a time before photography's invention, expanding the scope of enquiry to outside its chronology.

Introduction

In this practice-led PhD I ask how might an allegorical reading of the eighteenth-century scientific and visionary cosmologies of Emanuel Swedenborg elucidate new readings around the invention, practice and reception of photography in the 1830s to 1850s? How might these readings 'speak' and act as an agent to impact a different, secular knowledge and understanding of contemporary photographic practices and theory?

Swedenborg formulated his theory of correspondences whereby the knowledge (visibility) of the spirit world corresponds with and affects the physical world, in a dynamic and interactive dialogue – light being the conduit. His theory is vertical, moving in levels from the natural world, to higher worlds. Charles Baudelaire responded to Swedenborg in the nineteenth century with 'Correspondences',[6] a symbolic poem on the exchange of senses between humans and nature, turning the theory horizontal.[7]

Swedenborg is a guide for many people through his esoteric mysticism and his theology. I too wish to use him as a guide and, whilst absorbing some of that mysticism, my questions seek to engage with his ability 'to picture' unseen worlds: as a scientist, seer and visionary. As a natural philosopher he used instruments of vision and where they reached their limits, speculation. To access knowledge of higher worlds he induced a hypnagogic state ('a waking dream'); an altered state of consciousness induced through an act of breathing meditation. This 'portal' enabled Swedenborg to engage with the unseen (but present spirit worlds) as an eyewitness to 'things heard and seen', as well as to actively participate through dialogue, which took on more than one form. How the immateriality of a vision (also theory) is conveyed, and the point at which it emerges in correspondence with the material world to create new understandings, or ways of seeing, is where my interest lies, as my title points towards: 'Realising the Unreal: Swedenborg, Photography and Vision(s)'. The timeframe of 1830s to 1850s means that whilst spiritualism was in the air, it is before the existence of spirit photography. Whilst I might enact my own communing with spirits, the photography here corresponds, not with the dead, but with the living universe, and the ubiquitous double exposure is rather an invitation to 'see double'.

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[6] The poem, published in 1857, as part of *Flowers of Evil* (*Les Fleurs du mal*), is widely credited as the start of the Symbolist movement.

[7] See Gary Lachman, *Introducing Swedenborg: Correspondences* (London: The Swedenborg Society, 2021), pp. 47-55.

My research project is both a meditation on photography as a continuum, and an experimental visualisation of how Swedenborg's theories might correspond with contemporary photographic practice. The resulting artworks come together to create photographic installations that reveal multi-directional correspondences: between the artworks, our earthly landscape, the wider universe and what we might call home.

The artworks are situated within photography's expanded field, a term first used by George Baker in 2005 to identify a temporal, as well as spatial, expansion of photography through its interaction with other fields of art-making, specifically cinema and sculpture. Baker's essay centred primarily on a number of artists who demonstrate photography's temporal expansion: Nancy Davenport, Sharon Lockhart, Joachim Koestler, Tacita Dean and Douglas Gordon; also mentioned are artists whose practice creates a spatial expansion of photography: Louise Lawlor, Zoe Leonard, Gabriel Orozco and James Welling.

Baker identifies photography's expanded field as emerging out of a specific period of time for the medium, driven by a climate of new digital technologies, that has since been termed 'post-photography' or the 'post-photographic condition'. In 2013 Baker extends his thoughts on photography's expanded field, that sees his previously structuralist model pivot towards that of 'relationality' through a specific consideration of Zoe Leonard's exhibition of a camera obscura, 2012; an approach that expands photography both spatially *and* temporally.[8]

In 2016, Lucy Soutter adds the fields of painting, installation, architecture and action in her essay 'Expanded Photography: Persistence of the Photographic'.[9] She notes such key exhibitions as 'What is a Photograph?', ICP, New York, 2014, curated by Carol Squiers, including artists such as Liz Deschenes, Gerhard Richter and Mariah Robertson. Soutter also refers to Charlotte Cotton's 2015 book *Photography Is Magic*, a survey of eighty artists who deploy both analogue and digital techniques, alongside a broad spectrum of photographic materials and mixed media: Walead Beshty, Batia Suter and Sara VanDerBeek adopt such practices within photography's expanded field. Soutter's definition takes its cue less from Baker's (originally) structuralist formula, and more from Gene Youngblood's 1970 definition of expanded cinema; that regarded cinema as an aesthetic medium with a rich history that remains both integral, and relevant to, the newly-evolved art form, video.

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[8] Murray Guy, 'Zoe Leonard', <https://murrayguy.com/exhibitions/zoe-leonard/> [accessed 25 October 2021].

[9] Lucy Soutter, 'Expanded Photography: Persistence of the Photographic', *PhotoResearcher*, 26 (2016), 36-43.

In my own use of the term expanded photography I include Baker's original examples of the fields of cinema and sculpture, and in alignment with the Baker of 2013, propose a model that is relational. I add Soutter's definition that includes painting, installation, architecture and action. And, like Soutter, my definition of expanded photography treats photography's histories and earliest processes as relevant to, and in dialogue with, its current post-photographic condition. By choosing Swedenborg as a guide to creating a relational model, the definition necessarily expands further to include a pre-photographic condition.

I take as my starting point Zoe Leonard's exhibition-as-camera-obscura, that repositions photography's historic room (before images were fixed) into the heart of a contemporary enquiry: just what is photography? It is from this premise that I deconstruct and reconfigure my own (imagined) camera obscuras.

I consider my overall approach to be in conversation with Liz Deschenes's practice, based on the notion of change, that is not bound to a single technology, method or process but that focuses on the materials and properties of photography, light and perception. I identify with Deschenes's use of the elements of photography, as well as film and photo devices, as frequent subjects of her artworks, to create photo-sculptures that respond to their architectural environments, specifically calibrating the works to the site.

My move into photography's expanded field asks the viewer to assume a more active participation within installations that set up to explore multiple, dynamic relationships between the artworks themselves, and their architectural contexts. The photographic artworks are seen in relation to props that adopt various roles: held alongside, above, below or as support to the photograph, as well as the photograph becoming a conceptual prop. Images of interior furniture and furnishings, co-exist with actual furniture and furnishings, within interior spaces, creating an altered play of perception between these elements. I see something akin to this spatial and visual double-play in the work of artist-photographer Thomas Demand; source material from mass-media photographs of newsworthy interiors, generate a cardboard/paper model, whose only existence is realised as a photograph. Demand's concept of models and modelling, has in the last ten years or so, extended out from his photographs, to include architecturally modelled environments for the viewing of his photographs, creating another conceptual, as well as literal, dimension to the 2D artworks.

My interest in exploring a photographic vocabulary, through photography's histories that intertwine with those of science and spiritualism - in the form of sculptural experiments - finds a counterpart in Clare Strand's photographs of fictional, scientific and paranormal experiments, that have their roots in historical facts and artefacts. Her embrace of photography in multiple forms, as well as an engagement with its role outside of art, specifically in science, is a point of contact between our practices. But where Strand's photographs adopt a playful humour that subtly undercuts a carefully constructed scientific staging, to hint at more magical, pseudo-scientific and homely underpinnings, I adopt a poetic approach that seeks to find their correspondences through the playful use of analogy.

My engagement with science through this research project, with its resulting artworks, is manifested most directly in my public art commission 'Thinking Light', for the University of Oxford's new physics building. Here I looked to the science photographs constructed by Berenice Abbott during her time at MIT between 1958-60, that sought to demonstrate a visualisation of the laws of physics. Using a collaborative process to enact a series of scientific experiments, that were technically complex to document, Abbott created photographs that successfully translated the laws of physics into clear and compelling visual forms. Her 'photodiagrams'[10] are an exemplary realisation of the 'confluences and interdependences of photography and science'; making explicit that photography is not a passive recording device for science, but an active, experimental and equal collaborator with science.[11] An approach that I adopt throughout this research project, that had a direct bearing on 'Thinking Light', an artwork that could be said to be a 'photodiagram-sculpture'.

The research project as a whole, however, using as it does Swedenborg as a lens, takes in a broader span of the history of science: the transition from the seventeenth century to the eighteenth century period of Enlightenment - a time of natural philosophy - with its lack of formally defined fields of study and laboratories that were domestic in nature, before a move towards scientific institutions and the demarcation of fields; the origins of photography, a crowded field of nineteenth century scientific experiments that sought to fix an image; the thought experiments of the twentieth century; the experimental and technological scientific

[10] A term proposed by Terri Weissman, 2011.

[11] See KelleyWilder, 'Photography and Science', blog post, Fotomuseum Winterthur, 31 October 2012, <https://www.fotomuseum.ch/en/series/photography-and-science/> [accessed 1 November 2021].

capabilities of the twenty-first century, that can now realise certain thought experiments in state-of-the-art laboratories. This twenty-first century fine art research project is also a thought experiment that results in a concrete visualisation of how Swedenborg's eighteenth century scientific and visionary theories might correspond with contemporary photographic practices.

Existing Swedenborg research either resides firmly in the realm of the history of science *or* in the realm of the arts, predominantly in nineteenth century painting and literature. My research project looks to both Swedenborg's scientific *and* visionary cosmologies. I reveal a hidden connection between Swedenborg and the origins of photography, and establish my own assertion of his connection and relevance to contemporary photographic theory. I propose his theory of correspondences as a useful model for this current post-photographic condition, the application of which results in my artworks. By this means I make an original contribution to the field of expanded photography, as well as to the field of Swedenborg and the arts, that acknowledges within its underlying basis, his scientific theories.

The research project originated, through intuition and speculation, as a thought experiment. In order to find concrete answers to my research question (in two parts) I adopt a layered, multi-faceted use of Swedenborg as a method. Using Swedenborg's theories as a touchstone I am able to plot an original and idiosyncratic path through photographic theory. Swedenborg House, home to the archive, becomes an active part of my methodology, the different functions of the rooms generating different information gathering: browsing, reading, conversation, listening to knowledge dissemination, as well as an archaeological approach. I collate the differing registers of information, building a picture of Swedenborg's methods and methodologies for formulating his theories and visions. I find them to be analogous with photographic practices and from this I am able to assert my concept of Swedenborg as camera. A dynamic, associative tool that I pick up and add to my photographic toolkit. In addition, I pay attention to details from his everyday eighteenth-century life: the scientific instruments of vision he used, the dwellings he resided in, the travels he undertook, the letters that he wrote (earthly correspondences). This noting and gathering gives rise to correspondences, becoming my jumping off points, creating themes and motifs that recur and are tracked as they move through the thesis and the practice. A Swedenborgian approach continues with regards to specific, creative and aesthetic decisions; the processes and materials used to create the artworks, the form they adopt, their display and calibration according to the sites they occupy. The 'voice' of the thesis developed out of the research and the attention I paid to the dialogue between Swedenborg's private voice (from his diaries and letters) and that of his public voice (his published writings). The voice

here is that of a narrator taking the reader on a journey through space(s) and time, charting otherwise unseen narratives and working processes, that lead a path to the public artworks.

I begin by finding and tracing Swedenborg's connection to photography (as medium and apparatus) through the act of looking back to its origins and associated theories: Walter Benjamin's 'Little History of Photography' (1931), Rosalind Krauss's 'Tracing Nadar' (1978) and Kaja Silverman's *The Miracle of Analogy* (2015), as well as her earlier *Flesh of My Flesh* (2009). Benjamin's seminal essay on the intelligibility of photography seen through the 'fog' that surrounded its 'beginnings' is the touchstone for Krauss and Silverman. Silverman in her reevaluation asserts that photography is not index but analogy, the world's predominant way of revealing itself to us, and that the atmosphere surrounding its origins has reappeared due to photography's recent obsolescence as an industrial medium. If we accept Silverman's theory, then it follows, I assert, that Swedenborg's theory of correspondences and analogy is brought to the fore, and might usefully propose a model for contemporary photographic practice.

The artworks act as prompts for the form and content of each chapter of the thesis, the text being comprised of both fact and speculation. I describe my methods and methodologies for each artwork in order to make transparent their role in addressing my research questions. The artworks and the thesis are in dialogue, and through this exchange form a 'textual apparatus' – a camera obscura of sorts – whereby otherwise hidden correspondences emerge through the use of narrative, metaphor and closely observed detail. Images of the artworks are embedded within the thesis revealing a visual path through the body of text. The 'textual camera obscura' lightly holds these images within the form of the thesis. After all, they have a life of their own.

'Objects' are generated by the research project, through multiple acts of looking back. I trace their changing forms and qualities as they evolve through space and time, becoming motifs that repeat and evolve as they move through the thesis. The objects frequently pivot, perform lateral reversals and upturn whilst remaining on an essentially forward trajectory. I am concerned in this research project with photography's spatial expansion, as such matters of height, depth, volume and weight (of numerous objects) are all considered as a valid part of my investigation.

Each chapter of the thesis has two parts: theory and narrative; exhibition and artworks. Each chapter begins with an actual correspondence in the form of a letter. In the course of the thesis, several recorded conversations appear and invitations are issued. Each chapter has a

predominant instrument of vision: telescope, camera obscura, prism and microscope. The first three chapters address specific periods in Swedenborg's life in reverse chronological order: visionary; pivot from natural philosopher to seer and mystic; natural philosopher. The final fourth chapter brings us to his afterlife and the present day where it becomes possible for all aspects of his life to come together in correspondence with photography.

In chapter 1 (part 1) there are no artworks as I begin by finding and tracing Swedenborg's connection to the medium of photography, through the act of looking back to its origins and the associated theories of Benjamin, Krauss and Silverman, leading to Swedenborg's theory of correspondences coming to the fore. In part 2, I find my key Swedenborg 'picture guidebooks': *The Worlds In Space* and *The Principia*. We end with Swedenborg's lifelong quest to formulate a means to calculate longitude.

In chapter 2 (part 1) I am looking to connect Swedenborg to the apparatus of photography. The main instrument of vision, therefore, is the camera obscura. I detail its development through history and select three models: two by Robert Hooke: a DIY assembly kit, and a camera/man hybrid model. The third example is Alexander Pope's grotto/camera obscura located in the basement of his house in Twickenham. The camera obscura is shown to be the pivotal instrument of vision that enables Swedenborg's own pivot from man of science to seer and visionary. I assert my concept of Swedenborg *as* camera obscura: a 'virtual' past/present/future instrument of vision that sees and records in more ways than one. In part 2, I detail my exhibition 'The Eye Needs A Horizon', Frith Street Gallery, 2016. In my own act of looking back, I disassemble an analogue photograph from 1995 to create a new reimagined, reconfigured cinematic camera obscura. We end on the magic of transmission in space.

In chapter 3 (part 1) I consider the art of the scientific experiment and take a look inside light. I expose the hidden underside of two seminal scientific experiments through tracing their accompanying visual artefacts: one real experiment by Isaac Newton from the seventeenth century, of his light/prism experiment; one imaginary experiment (a *gedanken* experiment) debated by Einstein and Bohr in the twentieth century involving a box of light that emits a single photon. In part 2, I detail my public art commission *Thinking Light*, Beecroft Building, University of Oxford, 2018. A façade for a new physics building that, for the first time brings together theoretical and experimental research physicists under one roof. We end with the building seemingly afloat, held up by imagined light quanta.

In chapter 4 (part 1) I am fully in the archive at Swedenborg House. I consider Swedenborg's summerhouse in Stockholm, Sweden, and its original plot, as well as his 'afterlife' home, Swedenborg House. I consider disparate, 'accidental' artefacts within the archive for their imaginative potential: tables, blotting paper, bark, and ear bones that activate tremulations. I find a thumbnail drawing of a vision in Swedenborg's *Spiritual Diary*, a dwelling/camera obscura with prophetic ways of operating. In part 2, I detail my exhibition at Swedenborg House 'Let Us Record The Atoms As They Fall', 2019 – a reconfigured domestic camera obscura. We encounter Benjamin's first account of the 'aura' once again and photographic props leave the picture plane and are brought into the room. The artworks are in correspondence with photography as a continuum, held in a loosely interwoven open structure. We end on two photographic studies and a plan.

The overriding emphasis of the thesis is one of perpetual motion and change, emphasised through tracking the evolution of different theories and objects through time. The thesis, in line with photography's histories, has more than one beginning: preface *and* introduction. It also has more than one ending - afterword *and* appendix – implying that the photographic trajectory documented here will continue beyond the thesis, as part of its unstoppable development. The structure of more than one way into, and out of, the thesis is also Swedenborgian in nature.

The afterword provides a summing up of my overall approach to answering my research question as well as a final realisation about its outcomes. It concludes with an invitation for others to pick up the model I have described and open out the dialogue established here. The appendix documents a group exhibition at Swedenborg House, involving fifty-eight artists, that I co-curated with Stephen McNeilly, Director of the Swedenborg Society, in 2016. This account resides outside of the body of the thesis not due to its subsidiary nature; it was a crucial first step in establishing a method of working in the archive. Ultimately, however, it is an exploration of text rather than image, and as such is outside of my main enquiry. The premise for the exhibition continues to evolve, and be reconfigured, through different locations over time.

Photography's obstructive 'fog' becomes an enabling atmosphere. Its expanded field becomes relational. Two camera obscuras are deconstructed, reimagined and spatially reconfigured: one cinematic, one domestic. Throughout it all a single beam of light evolves and reforms as it moves through the research project. Two other 'camera obscuras' are constructed: one the textual apparatus of the thesis, and one an eighteenth-century vision, realised in the twenty-first century.

*

'What is photography?' has been the cry ever since photography's beginnings and it is a question that is asked and answered several times throughout this thesis. It was a question that Zoe Leonard, a key figure in photography's expanded field, asked in the 'textual apparatus' that accompanied her solo exhibition at Murray Guy, New York, 2012:

> Is it a print or an object, is it a jpeg on your screen or does it only exist if you print it out? Is it a snapshot on your phone, a slide projection, or the image you see in your mind before you click the shutter? In short, is photography a thing, or a picture, or is it a way of seeing?[12]

Leonard had turned one of the gallery spaces into a camera obscura, in order to create an 'embodied experience of viewing'[13] for her audience to participate in. She recognised that despite being considered a relic, the camera obscura still had something to say. George Baker, in his appraisal of the exhibition, noted it as 'an *archeological* move'.

> Hunting back photography to its origins took photography beyond photography, it would seem, to some complex form of medium sharing, or intermedia as it was once called. A spatial expansion of photography, from which, nonetheless, the photograph had once set out or begun. An expansion and a return.[14]

It is here, in 2013, that Baker tests out a new term – photography's 'afterlife' – and adds 'relational' to photography's already expanded field. I am receptive to the premise, but in my own unearthing of more than one camera obscura, my intention is that they do not remain intact, but rather open up in multiple (relational) ways to the light.

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[12] Murray Guy, 'Zoe Leonard', <https://murrayguy.com/exhibitions/zoe-leonard/> [accessed 25 October 2021]. Between 2011-14 Leonard created six camera obscura installations in locations across the USA and Europe.

[13] Ibid.

[14] George Baker, 'The Relational Field of Photography', <https://www.fotomuseum.ch/en/2013/05/31/the-relational-field-of-photography/> [accessed 3 September 2018].

CHAPTER 1

Part 1

Locating Swedenborg In The Fog That Surrounds The Beginnings Of Photography

> I am very desirous of getting my telescope and my thermometers down here, which perhaps could be enclosed in a wooden case stuffed with hay; if this would not be too much trouble, I would ask for these.
>
> Emanuel Swedenborg, 8 December 1718[15]

I am seeking to locate the eighteenth-century scientist, seer and mystic visionary, Emanuel Swedenborg, in the nineteenth century 'fog that surrounds the beginnings of photography'.[16] In doing this I am wishing to bring two things together that are not usually considered as connected. Through my research project I wish to make Swedenborg 'speak' to, or rather, *with* contemporary photographic art practice.

Swedenborg lived during the height of the Enlightenment, a Swedish nobleman who, as a natural philosopher, contributed greatly to his country's scientific life.[17] He held the important position of Assessor for the Royal Board of Mines[18] for thirty-one years until, at the age of fifty-five, he embarked upon 'one of the most significant eighteenth century spiritual projects in illumination and theosophy'.[19] He moves from his scientific cosmology to his visionary cosmology, from his careful observation of night skies, geological terrains and underground mines, to up close observations of heaven, hell and the spirit world in

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[15] Swedenborg to Erik Benzelius, Brunsbo, 8 December 1718, in *Letters and Memorials of Emanuel Swedenborg,* 1, ed. and trans. by Alfred Acton (Bryn Athyn: Swedenborg Scientific Association, 1948), p. 203.

[16] Walter Benjamin, 'Little History of Photography', in *Selected Writings, Volume 2, Part 2, 1931 – 1934*, ed. by Michael W. Jennings, Howard Eiland and Gary Smith, trans. by Rodney Livingstone and Others (Cambridge, MA; London: Harvard University Press, 2005), pp. 507-530 (p. 507).

[17] Working with Christopher Polhem, Sweden's foremost mechanical thinker, he published Sweden's first scientific journal, *Daedalus Hyperboreus* (1716-18). He produced the first modern geological description of Scandinavia in his *Height of the Waters* (1719). He also wrote the first Swedish book on algebra.

[18] This was a Civil Service position but one that actively involved the dangerous task of physically inspecting the conditions of the mines.

[19] Simon Schaffer, 'Swedenborg's Lunars', *Annals of Science*, 71 (2013), 2-26 (p. 3). <https://doi.org/10.1080/00033790.2013.791226>.

between. He moves through space and time in a way that is considered both real (his life and work on earth) and unreal (his travels in other dimensions). Through these activities he formulates his theory of correspondences.

On the surface then he starts off in alignment with the characteristics of his age and its devotion to scientific rationalism before moving against such a tide of reason. Yet as historians of the eighteenth century have pointed out, rationalist imperatives can paradoxically, produce irrational side effects; in the eighteenth century these included magic lantern shows, automata and optical illusions, 'strange retinal "ghosts" that seem to float up in space'[20] creating a challenge to what was considered real and what was unreal. Perhaps then this change of direction part-way though his life might be considered more as a matter of depth, moving from the surface to occupy the undercurrent of his times, and that of height gaining an aerial perspective on Enlightenment activities below.

He was considered by his contemporaries to be a seer, to the nineteenth-century spiritualists he was the 'first great medium'. His influence on such significant nineteenth-century figures as William Blake, Honoré de Balzac, Charles Baudelaire, and Ralph Waldo Emerson and the subsequent movements of Romanticism, Symbolism and Transcendentalism are well documented. His life and works touch on the overlapping histories of science, optics, religion and visionary experience. He remains, however, a marginal figure with little by way of a visual response to his writings. 'A colossal soul, he lies vast abroad on his times, uncomprehended by them, and requires a long focal distance to be seen'.[21]

My photographic art practice up to this point had explored the relationship between the real and the imagined, predominantly through the structure and contents of the architectural interior spaces that we occupy. The artworks often addressed our conflicted desire to feel both connected and transported: within society, the landscape and the wider universe. I see in Swedenborg the potential to approach these themes by another means and from another angle; to use him as a guide (prism) through which his theories, methods and methodologies can test the form of photography as medium, and apparatus – in order that I might 'unfix' my (interior) photography to see it anew.

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[20] Terry Castle, *The Female Thermometer: Eighteenth-Century Culture and the Invention of the Uncanny* (New York, Oxford: Oxford University Press, 1995), p. 3.

[21] Ralph Waldo Emerson, *Representative Men: Seven Lectures* (Cambridge, MA; London: Harvard University Press, 1996), p. 58.

First though, I must locate his presence in that nineteenth-century fog. 'The fog that surrounds the beginnings of photography is not quite as thick as that which shrouds the early days of printing'[22] is the evocative, opening sentence to Walter Benjamin's, 'Little History of Photography' (1931), which both lays out the issue whilst simultaneously offering the reader some hope of a resolution. He continues, in narrative form, to immediately refer to two distinct ideas in relation to this fog: firstly that numerous people were engaged with trying to fix and capture images made from the camera obscura, and that more than one of them succeeded at about the same time;[23] secondly, that photography's 'rapid ongoing development' had not allowed for a 'backward glance' to address historical and philosophical questions raised by its invention. The fog then was a perpetually evolving mass that moved at speed, but more importantly for Benjamin it acted as an obstruction to his ability to see clearly, in this instance the legibility of photography. His seminal essay is the first significant act of looking back from a distance, in order to understand (to see) the nature of photography through its history. Benjamin's 'look' has evolved over time into a wide, densely populated field, with numerous offshoots. In my specific quest to connect Swedenborg with the medium of photography I will consider three examples from this wide field: Benjamin's 'Little History of Photography' (1931); Krauss's 'Tracing Nadar' (1978); and Silverman's *The Miracle of Analogy* (2015). I also consider Silverman's preceding book *Flesh of My Flesh* (2009).

Looking furthest back in time to Benjamin's essay – 'his most extended statement specifically on photography'[24] – I find no presence of Swedenborg, but it is the ground from which I look and the place from which Krauss and Silverman evolve their own theories. It was here in this variously translated small-short-brief-little history of photography that Benjamin identified photography's 'flowering' to have occurred in its first decade, before its industrialisation stunted its growth. It was here that he described his concept of the optical unconscious, the existence of which we are only able to discover through photography, 'just as we discover the instinctual unconscious through psychoanalysis'.[25] Photography through its technological means is able to reveal 'image worlds' that are otherwise latent to the eye. It was here that he also first mentioned his notion of the aura starting with an example from nature and moving to the image, the copy '——What is aura, actually? A strange weave of

[22] Benjamin, 'Little History', p. 507.

[23] Benjamin is referring here to Nicéphore Niépce and Louis Daguerre.

[24] Walter Benjamin, *On Photography*, ed. and trans. by Esther Leslie (London: Reaktion Books, 2015), p. 53.

[25] Benjamin, 'Little History', p. 512.

space and time: the unique appearance or semblance of distance, no matter how close it may be'.[26] It was a concept that he went on to develop further in his most popular essay 'The Work of Art in the Age of Its Technological Reproducibility: Second Version' (1936). For Esther Leslie:

> Benjamin's history of photography is as much about the changing contours of experience, and its intermeshing with technology, as it is about a visual appearance produced by photography.[27]
>
> Benjamin repeatedly evoked photography. He was its critic, in a profound sense, because he tracked it as something changing, adapting, developing in history.[28]

And it was here also that he wrote '"the illiteracy of the future," someone has said, "will be ignorance not of reading or writing, but of photography"'.[29] That someone was László Moholy-Nagy and Benjamin's essay remains a brilliant testament to his ability to read a photograph.

> The beholder feels an irresistible urge to search such a picture for the tiny spark of contingency, of the here and now, with which reality has (so to speak) seared the subject, to find the inconspicuous spot where in the immediacy of that long-forgotten moment the future nests so eloquently that we, looking back, may rediscover it.[30]

The essay was initially published in German in 1931, in three parts in a weekly literary magazine. It generated little interest at the time. It was first published in English in the film journal *Screen* in 1972, translated by Stanley Mitchell. It was published again in the American art journal *Artforum* in February 1977, this time translated by Phil Patton. It is around this period that it found its audience and gained in influence giving theoretical backing to, as well as influencing the materiality of photography and film in the art making of that time.[31]

In the spring and autumn of 1977 Rosalind Krauss published her influential two-part essay 'Notes on the Index: Seventies Art In America' in *October* journal, volumes 3 and 4, arguing that much of modern art, but specifically photography, was indexical in nature. For Krauss the photograph was fundamentally connected to the world as a trace, a copy. Krauss's

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[26] Benjamin, 'Little History', p. 518.

[27] Benjamin, *On Photography*, p. 55.

[28] Ibid. p. 45.

[29] Benjamin, 'Little History', p. 527.

[30] Ibid. p. 510.

[31] See Benjamin, *On Photography*, pp. 53-58.

following contribution to *October* was her essay 'Tracing Nadar' and it is here that I find Swedenborg. It is for this reason that I wish to take a close look at Krauss's essay.

In the 'special photography edition' of *October* that summer, 1978, Krauss wished to look back to a nineteenth-century view of photography prompted by 'a growing sense of critical frustration about just what photography *is*'.

> It repays our attention, especially now. For at this point, in our turn, we are realizing the immense impact of photography, the way it has shaped our sensibilities without our quite knowing it, the way, for example, the whole of the visual arts is now engaged in strategies that are deeply structured by the photographic.[32]

For Krauss in the late 1970s, photography operated as an all-pervasive atmosphere that she wished to further understand, like Benjamin before her, through tracing back to its origins. In seeking to understand the conditions, influences and concerns around the birth of photography in 1839 Krauss turns to Nadar's obscure memoir *My Life as a Photographer*.[33] Nadar (a pseudonym for Gaspard-Félix Tournachon) was one of the most famous portrait photographers of the nineteenth century, as well as the first person to take an aerial photograph in 1858, and the first person to photograph underground in the catacombs of Paris, pioneering the use of artificial light.[34] His celebrated career as a photographer also included that of caricaturist, novelist, journalist, inventor and balloonist. His memoir (or rather collection of memoirs) was published at the beginning of the twentieth century, looking back to the '1830s and thereabouts'.[35]

Krauss finds Nadar to be an idiosyncratic narrator; there is no chronology to his historical overview, accounts are anecdotal, full of asides, and frequently dwell on irrelevant, excessive details all the time moving between past and present tense. He remains, however, an eyewitness to that extraordinary time and one who desires above all else 'to conjure for his *listener* the full intensity—emotional, physical, psychological—of that experience'.[36]

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[32] Rosalind Krauss, 'Tracing Nadar', *October*, 5 (Summer, 1978), 29-47 (p. 30).

[33] Krauss uses the translation by Thomas Repensek, 1978. The memoir was originally published in French as *Quand j'étais photographe* (Paris: E. Flammarion, 1900), and more recently republished as *When I Was a Photographer*, trans. by Eduardo Cadava and Liana Theodoratou, (Cambridge, Massachusetts; London, England: The MIT Press, 2015).

[34] Nadar is name checked by Benjamin in 'Little History' as an exemplar of its early flowering, as well as citing his memoirs in his writings on Baudelaire and the unfinished *The Arcades Project.*

[35] In his 2015 introduction to *When I Was a Photographer* Cadava refers to the book as a collection of memoirs, 'fourteen vignettes', '1830 and Thereabouts' being the final one.

[36] Krauss, p. 29. Italics are my own emphasis. By using the word 'listener' as opposed to 'reader' Krauss shifts Nadar's accounts from that of written text to the spoken word and the conversational.

At the time of his writing, at the start of the twentieth century, photography had already transformed from a thing of mystery to an accepted part of everyday life. He sought to remind his readers just how seismic the invention of photography was. As Cadaver writes in his introduction to the memoirs, for Nadar, 'nothing is more extraordinary than photography, because it extends the limits of the possible'.[37] 'It appeared as it remains, the most brilliant star in the constellation of inventions that have already made our still unfinished century a Golden Age of Science'.[38] For their part, the editors of *October*, Rosalind Krauss and Annette Michelson, also wished to conjure for their readers the precise tone and nuance of nineteenth-century concerns in order to lay a ground for their readers. The first item in the journal, therefore, is a reprint of Nadar's first three chapters: 'Balzac and the Daguerreotype', 'Gazebon Revenged' and 'The Blind Princess'.

'Balzac and the Daguerreotype' tells of the superstition and shock that accompanied the invention of photography and uses Balzac and his theory on photography as an exemplar of this superstition. 'Gazebon Revenged' is a tale of a con trick played on Nadar (who knew he was being played) about 'remote-photography', the act of photographing someone without the photographer being present. 'The Blind Princess' is a tale of a group royal visit to Nadar's studio for a portrait-sitting of the said blind princess. A secret, kept from her by the other family members, is almost exposed by an unwitting remark made by Nadar, the potential emotional distress averted solely through the subject's 'deafness' in not hearing the blunder.

The links between Nadar's opening three chapters are initially unclear to Krauss. All are told in the manner of gossip. All are infused with ideas of superstition, duplicity and disbelief, and a concern for who is able to 'see' or 'not see' the full 'picture', as well as an unease about how photography actually happens. At their core, however, they each address a different aspect of photography: invention; process (what was possible at the time and what might be possible in the future); and photography as a performative, closely enacted exchange within the studio.

'Peculiarity' is a recurring word in Krauss' essay, yet crucially, for the semiologist, she requires a witness, an 'I was there' account, however unreliable the witness appears to be

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[37] Félix Nadar, *When I Was A Photographer,* trans. by Eduardo Cadava and Liana Theodoratou (Cambridge, Massachusetts; London, England: The MIT Press, 2015), p. xvi.

[38] Félix Nadar, *My Life As A Photographer*, trans. by Thomas Repensek, *October*, 5 (Summer, 1978), 6-28 (p. 6).

and however circular and nebulous the account. Krauss comes to understand that part of 'Nadar's point is that among other things photography is a historical phenomenon, and therefore what it *is* is inseparable from what it *was* at specific points in time, from a succession of responses which were not uniform'.[39] From where she is standing in 1978 Krauss unsurprisingly sees the underlying message behind Nadar's rambling tales as ultimately reaffirming 'an account of the photographic sign as an index'. However, she acknowledges that 'Nadar was not a semiologist'[40] and the inferences that he drew were particular to his time: 'Standing rather peculiarly at the crossroads between science and spiritualism, the trace seemed to share equally in the positivist's absolutism of matter and the metaphysician's order of pure intelligibility, itself resistant to a materialist analysis'.[41]

In order for Krauss to understand more fully the seriousness with which superstition and spiritualism surrounded photography, she turns to the first chapter, 'Balzac and the Daguerreotype'. Nadar sets the scene with the opening sentence to his first chapter: 'People were stunned when they heard that two inventors had perfected a process that could capture an image on a silver plate'.[42] He goes on to speak of 'universal confusion' yet undeniable excitement in response to photography: 'Exploding suddenly into existence, it surpassed all possible expectations, undermining beliefs, sweeping theories away'.[43] Yet accompanying such admiration was also fear and bewilderment amongst all strata of society, 'the uneducated and the ignorant were not the only ones to hesitate before this peril'.[44] Nadar chooses Balzac to illustrate just how high up in intellectual circles this superstition and unease could go. Despite the fact that, as Krauss reminds us, it was Balzac who boasted that it was he who prefigured the invention of the daguerreotype, through his extensive use of detail that brought his characters 'to life' for the reader. Yet he remained profoundly uneasy about this new image creating invention. So much so that he came up with his theory of spectres as a way to comprehend it. According to this theory people and their physical bodies are made up of multiple layers of ghostlike images. In his belief that it was impossible to 'create something from nothing'[45] he asserted that a photographic portrait was the result of a spectral layer being removed from a person's physical body and transferred to the

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[39] Krauss, p. 30.

[40] Ibid. p. 34.

[41] Ibid. p. 35.

[42] Nadar, *My Life as a Photographer*, p. 6. Nadar is also referring to Niépce and Daguerre.

[43] Ibid. p. 6.

[44] Ibid. p. 9.

[45] Ibid. p. 9.

photographic plate. The superstition becomes dressed up as a scientific theory. For Nadar this is an opportunity to mock, portraying Balzac as both laughable and tiresome in his superstitions and pretensions.

> I do recall very clearly, however, that he used an exceedingly large number of words to explain it to me on several occasions—he seemed to be quite obsessed with the idea, there in his little violet apartment in the rue de Richelieu.[46]

For Nadar, who was from a later generation to Balzac and Daguerre (being nineteen years old in 1839), this opening chapter serves to portray him as the all-knowing, all-seeing master of this brilliant new invention, at one remove from the 'primitives of photography'. Krauss, in turn, writing from her twentieth-century perspective, views the nineteenth century preoccupations with bemusement and is able to see what Nadar is unable to; that his own practice is also deeply affected by superstition and spiritualism.

Krauss takes a closer look at Balzac and finds him to personify the twin influences of science and spiritualism that pervaded the age. Balzac's love of descriptive surface detail to illustrate a person's inner being found its 'scientific' home in the now discredited theory of physiognomy, Johann Caspar Lavater's *The Art of Knowing Man by Means of Physiognomy* (1781-1803). Lavater's 'science' required multiple graphic representations of a person in order to best discern their inner character: profile, silhouette, and profile in outline. The silhouettes were made through the use of a semi-automated instrument, the physionotrace: an instrument that will later be cited in histories of photography, as 'a forerunner of the aspirations […] that made the photograph inevitable'.[47] Balzac would frequently use Lavater's theories and imagery as source material for his fiction.

Krauss goes on to cite another influential figure for Balzac – this time fulfilling the spiritualist aspect of the age – that of Swedenborg. It is through Swedenborg that she finds the key to understanding how Balzac, with one foot in the positivist field, had come to formulate his metaphysical theory of spectres as a way to make photography intelligible. The 'missing ingredient' that turns Lavater's system of physiognomic traces into one of 'spectral images' is for Krauss, light.

> Light was the means by which the seemingly magic transfer of the photograph was effected; the way in which one could, in Nadar's words, "create *something* from

[46] Nadar, p. 9.

[47] Krauss, p. 36.

> *nothing*." And light, the keystone in the Swedenborgian system, was the conduit between the world of sense impression and the world of spirit.[48]

For Krauss, Swedenborg's influence, his fame, and respect for his ideas, is yet another example of the peculiarities of the age: 'it is hard to understand as anything more than a piety of literary history the incredible, contemporaneous eminence of Swedenborg'.[49] By way of an answer she points to the fact that a young Immanuel Kant felt compelled to critique the elderly Swedenborg's ideas in *Dreams of a Spirit Seer* (1766). Kant adopts an unusual tone of irony in this early work, which on the surface is a damning, damaging critique of the man and his theories. However, the interesting point for Krauss is the underlying connections between the two.

> No matter how preposterous the outcome of his endeavors, the question that animates them in the first place was utterly serious for the founder of analytic philosophy: how to find data by which to prove the existence of an intelligible (as distinct from a merely material or sensible) world.
>
> Swedenborg's labors as scientist-turned-mystic compose an incredible cadenza on the theme of intelligibility. They turn, as I have said, on the issue of light.[50]

Swedenborg's *Arcana Celestia* (*Heaven's Secrets*) demonstrates how the legibility of the world is transformed through its correspondence with the spiritual world. As Krauss writes, 'it is the visibility of the noumenal world which thus concerns Swedenborg, and the demonstration of the way this is possible by light's acting on phenomena to produce an image'.[51] As a footnote to this she quotes Swedenborg as cited by Ralph Waldo Emerson in *Representative Men*, '"Man is a kind of very minute heaven corresponding to the world of spirits and to heaven. Every particular idea of man, and every affection, yea, every smallest part of his affection is an image and effigy of him"'.[52]

So ends Krauss's direct consideration of Swedenborg who occupies only a minor part within her essay but where she has crucially brought into view an idea of his spiritual, visionary influence amidst the conditions and interests that led to the birth of photography, as well as the identification of his theories informing an understanding of just what photography might be.

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[48] Krauss, p. 37.

[49] Ibid. p. 38.

[50] Ibid. p. 39.

[51] Ibid. p. 39.

[52] Ibid. p. 39. See footnote 16.

As a post-script (and an aside) I would like to add that Lavater and Swedenborg, here depicted as the two sides to Balzac's equation, were in actual fact engaged in their own correspondence. Lavater, a newly ordained pastor, was greatly interested in Swedenborg's spiritual experiences and as such wrote him two letters. The first letter of 1768 included a request that Swedenborg teach him how to converse with spirits. Swedenborg, being away on his travels at that time, did not receive this letter before a second letter of 1769 arrived, that included 'cipher writing', to be decoded by Swedenborg so that Lavater 'may see what I am believing upon the testimony of others'.[53] Both Lavater letters are now lost (surviving in translated form only), and whilst there are intimations of a response from Swedenborg (by others), there are no documents to prove those intimations as fact.

Krauss goes on to note that Balzac's theory of spectres is quickly subsumed by the themes of spiritualism that became embedded into the initial responses to photography.[54] It was the spiritualists who cited Swedenborg as the first great medium due to his accounts of communicating with the spirit world in his most popular work, *Heaven and Hell*. She also makes reference to William Henry Fox Talbot (inventor of photography's negative-positive paper process, also declared in 1839) at his most metaphysical in *The Pencil of Nature.*

Krauss is selecting her evidence to build a picture of that particular time. Through the analysis of Nadar's highly personal account Krauss shows the age to be a marriage of science and spiritualism. Such a marriage resulted in many nineteenth-century 'offspring' and Krauss's key assertion is 'that the initial conception of the photograph, as such, was one'.[55] The overall emphasis of the essay, however, is weighted much more towards the spiritualist side of the marriage partnership. The science that is mentioned is either pseudo-science, or seen through the eyes of the layperson, who could not help but view it as a form of magic. Krauss could be said to take her cue from Nadar in this respect. For despite being an accomplished chemist and acknowledged master of the technicalities of the photographic process, he pays that scant attention here. Instead his memoir brings to the fore one of his many personas, that of novelist.

Nadar looks back and tries to conjure for his readers that particular, extraordinary atmosphere that had long since dissipated. For her part, Krauss too, is attempting to describe

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[53] Swedenborg, *The Letters and Memorials of Emanuel Swedenborg*, 2, ed. and trans. by Alfred Acton, (Bryn Athyn, PA: Swedenborg Scientific Association, 1948-55), p. 687.

[54] Spiritualism as a movement is said to have begun in 1848 with the Fox sisters, whilst the first spirit photograph is considered to have been by William Mumler, c. 1869.

[55] Krauss, p. 42.

and understand this self-same evaporated fog by applying her rigorous analysis to the subjective, unstable lens of Nadar. At odds with her subject in terms of approach she nevertheless ends her essay with a sense that rational observation will only take you so far in your understanding: 'Nadar's urgency in trying to recall that mood reminds us that aesthetic media have surprising histories just as they have uncertain futures: difficult to predict, impossible to foreclose'.[56]

It is through careful analysis of this conversational source material that Krauss arrives at Swedenborg and identifies his spiritual (visionary) influence permeating the atmosphere that surrounded the invention of photography. His significance is not on that intelligible surface of photography; it is underlying and overlaying. Like all atmospheres it permeates, affecting conditions and actions in ways that are difficult to see. Unsurprising then that the many written accounts of that extraordinary time make no mention of his name.

Krauss leans heavily on the side of Swedenborg that is mystical. I wish to approach him in the round. In doing so he occupies not just the spiritual aspect within Krauss's atmosphere, but its scientific aspect too, the union of which produced an offspring – the photograph. As a result the pseudo-science becomes genuine, adding mass and energy to Krauss's atmosphere. The missing ingredient to this now slightly different but similar mix is that of prophecy: a quality attributed to Swedenborg and a quality that Benjamin has already, earlier identified in 'Little History' as being inherent to the first photographs and the aura that they emanated. It is Benjamin who has laid the theoretical ground to this research project, and it is Krauss who has overlaid a clearer understanding of that prevailing atmosphere, as well as – it seems to me – planting a seed: Swedenborg as a helpful figure in the understanding of just what photography is. The potential of which is not to be identified until the twenty-first century, through a contemporary of Krauss, Kaja Silverman.

In *Flesh of My Flesh* (2009), Silverman wishes to reclaim the productive use of analogy in art and literature from what she regards as its somewhat discredited, and therefore hidden position – in order to remind us of its ability to emphasise connection over division; 'From Plato until the end of the sixteenth century, resemblance, not difference was the organizing principle of the universe'.[57] Analogy, Silverman states, is found through 'the act of turning around', an act and its significance that she traces back to Ovid's *Metamorphoses*, where

[56] Krauss, p. 47. Here I am reading the word 'mood' as an equivalent to 'atmosphere'.

[57] Silverman, *Flesh of My Flesh* (California: Stanford University Press, 2009), p. 1.

'every phenomenal form rhymes with many others'.[58] In particular the complete story of Orpheus and Eurydice and the ensuing communion between death and life: 'These correspondences connect us to both ourselves and others, promoting transformation rather than stasis, equality rather than hierarchy, and an "unfinished universality" rather than a closed order'. [59]

The book is organised into two parts: 'THEN' and 'NOW'. It is in the introduction, residing outside of these two categories, and on page two that we find Swedenborg once again.

> But there is another modernity—one that looks back to Ovid and Leonardo, instead of Descartes, and that emphasizes kinship, instead of separation. In 1758 Emanuel Swedenborg published *Heaven and Hell*, a book that offers a modified version of the Great Chain of Being. Swedenborg argues that there are three levels of meaning in the Bible, corresponding to three worlds—one natural, one spiritual, and one celestial—and that many other analogies are contained within these overarching correspondences. *Heaven and Hell* was an enormously influential book, which helped to shape Balzac's account of society in *The Human Comedy* and inspired many other nineteenth-century authors, including Alphonse-Louis Constant, Charles Baudelaire, and Ralph Waldo Emerson. As Emerson notes, there are also striking similarities between Swedenborg's correspondences and Fourier's Universal Analogies.[60]

I have quoted this section in full, as it is the total extent of Silverman's direct consideration of Swedenborg in this book of two hundred and twenty-one pages. The only further addition she makes is to inform us that Fourier, Balzac and Baudelaire were interested in correspondences 'because they saw them as the basis for an ideal social order. Several of the other nineteenth-century writers who were attracted to analogies also saw them as a blueprint for, or a vehicle of, social transformation'.[61]

It is in the 'NOW' section where she turns her attention to time-based art (photography, video, projected images). In the final chapter, 'Photography by Other Means', she engages with Gerhard Richter's art and writing, specifically his use of photography in the making of his 'photo-paintings'.[62] She notes Richter's own frequent use of the term 'analogy' and the fact that he finds in it a prototype model for his approach to photography.

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[58] Silverman, p. 1.

[59] Ibid. p. 2.

[60] Ibid. pp. 2-3.

[61] Ibid. p. 3.

[62] Her main source of reference is: Gerhard Richter, *The Daily Practice of Painting: Writings and Interviews 1962-1993*, ed. by Hans-Ulrich Obrist, trans. by David Britt (London: Thames and Hudson, Anthony D'Offay Gallery, 1995).

> In Richter's view, however, the photograph inhabits the same world as its referent—the world of forms. Neither takes priority over, or constitutes a replacement for, the other; instead, the two relate the same way all other forms do: by corresponding with each other. The correspondences between a photograph and its referent are extraordinarily abundant—so much so that one can be seduced into believing that if the former were enlarged, it would match up point for point with the latter.[63]

It is through her analysis of Richter's working practices that Silverman comes to see that it is photography in particular that has 'a special kind of *analogy* – the kind that our culture most needs'.[64]

> The analogy that comes into existence when a photograph locates one of its relatives is historical in nature; it links the past to the present. It remains in a state of latency, though, until we recognize it. Fortunately for us, photographs do not passively await this recognition; instead, they actively solicit it by "dropping" on the "doormat," like advertising flyers.[65]

Flesh of My Flesh bookends two distinct ideas: on the one hand Swedenborg as integral to an understanding of the use of analogy and correspondences, and on the other hand the idea of photography as possessing a special kind of analogy.

In a recorded conversation between Silverman and George Baker, printed in *Artforum International,* February 2010, the two art historian theorists predominantly focus on the themes contained within *Flesh of My Flesh*. Towards the end of the conversation they look ahead to the subject of Silverman's next book, *The Miracle of Analogy: or The History of Photography, Part 1* (2015). In her closing remarks Silverman makes both a declaration and a supposition:

> For the first two decades of its existence, photography was an ontological calling card; it showed its viewers that Being is a gift from elsewhere and that resemblance is its enabling condition. Maybe photography's obsolescence as an industrial medium will permit it to function this way again.[66]

In *The Miracle of Analogy* she takes her theory formulated in the last chapter of *Flesh of My Flesh* and looks back a second time, this time to the origins of photography, with the aim of

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[63] Silverman, p. 174.

[64] George Baker, 'Primal Siblings: George Baker in conversation with Kaja Silverman', *Artforum International*, New York, 48.6 (February 2010) 177-183 (p. 182).

[65] Silverman, p. 179.

[66] Baker, 'Primal Siblings', p. 183.

revealing its counter-history. Her realisation of photography as analogy leads her to assert that we have come to misunderstand just exactly what photography is. It is here that Silverman upends Krauss's previously dominant orthodoxy of the photograph as index. For Krauss the photograph is connected to the world as a trace. Silverman argues that photography is the world's way of revealing itself to us and as such the photograph is neither trace, nor copy, but an analogy.

Silverman returns to the first accounts of photography made by several of the early pioneers (in particular Fox Talbot) to assert her new theory, accounts that she states anticipate Benjamin's first account of photography in 'Little History':

> In the first half of this 1931 essay, he privileges pre-industrial instead of industrial photography, and associates it with disclosive rather than an evidentiary truth. He also attributes it to the world, instead of to technology, treats it as an analogy, instead of an index or a copy, and associates it with development, instead of fixity. Even more astonishingly, Benjamin suggests that the photographic image is propelled by a mysterious kind of intentionality toward a particular look—one that has the capacity to recognize it, and thereby to redeem it. It travels through time and space to reach this look, and when it arrives, something extraordinary happens. The present discovers itself within the past, and the past is realized within the present.[67]

Silverman picks up Benjamin's theory of the optical unconscious, focusing less on the technological aspects that reveal hidden 'image worlds' through the use of close-up, freeze-fame and slow motion, and rather more on another kind of revelation associated with the optical unconscious: 'it shows us that the world presents itself differently to the camera than to the human eye'.[68]

For Silverman the analogue that once defined photography now resides within analogy. She expands her theory further: through Fox Talbot's *The Pencil of Nature* she reminds us that 'photography was initially perceived as a graphic rather than scopic practice, and as issuing from the world, rather than from a human source';[69] that the original sensitised plates that the early photographers exposed to light were known as 'recipient plates', a term that additionally promoted the idea of the photographer as receiver; the medium exists in a condition of 'unstoppable development', and whilst we have come to think of the photograph as 'fixed' and 'still', the early photographs were dynamic, both through their lengthy

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[67] Silverman, *Miracle of Analogy or The History of Photography, Part 1* (California: Stanford University Press, 2015), p. 7.

[68] Silverman, p. 123.

[69] Baker, p. 183.

exposure times and the constantly evolving, perfecting processes of technological advances. It is these qualities that she hopes will demonstrate another way of looking at photography:

> Photography isn't a medium that was invented by three or four men in the 1820s and 1830s, that was improved in numerous ways over the following century, and that has now been replaced by computational images. It is, rather, the world's primary way of revealing itself to us—of demonstrating that it exists, and that it will forever exceed us.[70]

Photography is not something that is captured, the book asserts, it is received and, echoing Benjamin, 'it moves through time, in search of other "kin."'[71]

Silverman makes no direct reference to Swedenborg in *The Miracle of Analogy*. The 'miracle' of the title does not reside in religious experience but rather originates with Marcel Proust; the most famous of his miraculous analogies being the taste of that wonderfully absorbent humble object: the tea-soaked madeleine. An object that had to be ingested before it was able to induce a transformative state. Nonetheless, the book's analysis and exploration of the creative potential of analogy and correspondence through the medium of photography enables me to read *The Miracle of Analogy* through the lens of Swedenborg's theories. In so doing I am able to fold together Silverman's previously bookended ideas and bring two things together that are not usually considered as connected.

For Krauss and Silverman, Swedenborg is not a central lens by any means, but he is for my research project. Krauss identified his influence permeating the paradoxical fog that gave rise to the invention of photography. If we consider his entire oeuvre, not just the latter half of it, then he can be seen to occupy both the spiritualism *and* the science of that atmosphere. It is Silverman, however, with her own, very different, analysis of just what photography *is* that agitates the fog, or rather atmosphere from time past, asks us to look again and regard it as contemporaneous. Krauss offers us a glimpse of Swedenborg at the heart of the spiritualist atmosphere surrounding photography, and that is where he remained until now. In her own endeavour to understand nineteenth-century photography she plants a crucial seed – however unwittingly – that of Swedenborg as a helpful figure in this understanding. I am asserting that it is Silverman's significant re-evaluation of our understanding of photography in *The Miracle of Analogy* – added to the theories of Krauss and Benjamin before her – that bring

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[70] Silverman, p. 10. The inventors of photography referred to here have doubled to become: Nicéphore Niépce, Louis Daguerre, and William Henry Fox Talbot, with Hippolyte Bayard considered as the fourth person.

[71] Ibid. pp. 10-11.

Swedenborg's theories into view once more, this time combining with the medium of photography. This new reading of the beginnings of photography appears in much the same way as Benjamin's description of the first photograph: 'Daguerre's photographs were iodized silver plates exposed in the camera obscura, which had to be turned this way and that until, in the proper light, a pale gray image could be discerned'.[72]

For most readers, Silverman's brief mention and identification of Swedenborg's use of correspondences in *Flesh of My Flesh* will not carry over into their reading of *The Miracle of Analogy*. You have to look a certain way, and in a certain light, in order to receive it. I see this delicate still/moving image from photography's past. It changes each time you turn it in the light, but I accept Silverman's theoretical supposition – 'maybe photography's obsolescence as an industrial medium will permit it to function this way again' – as an invitation to reimagine its potential in a material way.

I reach for Swedenborg's telescope, the one that he requested at the very beginning of this chapter, and the one that Emerson advised I would need to bring him into focus. I find Benjamin and absorb his thoughts on the flowering decade of photography. I pick up Krauss's minor, but crucial, identifying thread. I note with a smile her choice of 'irrational' guide and her identification of Swedenborg as a potential guide to photography. I turn to look at Silverman and see that guide, Swedenborg, and his scientific/visionary theories underlying and overlaying her photographic theories. I find the atmosphere in photography's expanded field to be propitious and, thanks also to Swedenborg's thermometre the temperature feels about right. So I magnify these delicate threads and reposition them as part of my own original reading of Swedenborg through the lens of artistic practice and photographic thinking. By this action I create a pocket of space within photography's expanded field that I may usefully occupy.

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[72] Benjamin, p. 508.

Part 2
Reading Swendenborg

I am in the bookshop at Swedenborg House scanning the titles on the shelves. Swedenborg House is home to the Society and contains one of the most comprehensive collections of Swedenborg editions (in forty different languages) in the world. Which is to say nothing of the substantial holdings of collateral texts contained within the archive. The bookshop represents a small fraction of what the archive has to offer. It is the first space that one encounters on entering the House.

There is Swedenborg's *Arcana Caelestia*[73] – the book that Krauss references in her essay – his first major work formulated under divine guidance, as 'mediator between God and humanity'.[74] Written over approximately seven years, it was originally published as an eight-volume exegesis of Genesis and Exodus. In it, Swedenborg describes in depth the 'long-lost' spiritual sense of the Bible, each word having two meanings: outer-literal, inner-spiritual. Interspersed between these biblical translations are accounts of his direct, sensory experiences of the spiritual world: 'I have seen, I have heard, I have felt'.[75]

> Insofar as the universe is permeated by light, some part of which is divine, it can be seen as a system of symbols, as a great hieroglyphics from which to read off the meaning of divinity. The legibility of the world is Swedenborg's message; the *Celestial Arcarnum* is a massive demonstration of how propositions from the natural sphere are transformed into their correspondence in the spiritual one.
>
> Thus the visible world is, once again, a world of traces, with the invisible charged with imprinting itself on the visible.[76]

There is his most famous work *Heaven and Hell*[77] published two years later in 1758 – the book that Silverman references in *Flesh of My Flesh*. Here the biblical passages and translations have been removed, allowing the collection of visionary experiences to form their own continuous series. Swedenborg's extensive detailing of heaven, hell and the world

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[73] Emanuel Swedenborg, *Arcana Caelestia,* 1, trans. by John Elliott, 12 (London: The Swedenborg Society, 1983).

[74] Schaffer, p. 3.

[75] Swedenborg, *Arcana Caelestia*, §68, p. 35.

[76] Krauss, p. 39.

[77] Emanuel Swedenborg, *Heaven and Hell*, trans. by K. C. Ryder (London: The Swedenborg Society, 2010). Full title: *Heaven and its Wonders and Hell From Things Heard and Seen*.

of spirits, as well as the afterlife and the experiences of the soul, builds a series of vivid 'pictures' for the reader. It was the ability to commune with the spirit world that so was revelatory, made more real through the visualising of these unseen worlds. The visions are strangely familiar, however, consistently recording 'homely' details that connect everyday activities to a wider reality.

I select a slender volume, *The Worlds In Space*, also published in 1758, the same year as *Heaven and Hell* and also drawing largely on reworked material from *Arcana Caelestia* – a second iteration, therefore, from that establishing visionary work – and a further distillation. Swedenborg intended it as a pointer, an introduction to both of those major works. It is here that he claims knowledge of the fact that the universe contains more than one world and that these multiple worlds are inhabited by sentient beings. The book is a record of a series conversations between Swedenborg and spirits from other planets, some conducted over 'a day, with others a week, with yet others for months'.[78] It would appear that time is of no consequence with regard to these dialogues. Conversations between such different entities are not to be assumed and so it is here that Swedenborg must disclose for the reader how the two sides can reach a point of common ground despite their differences. We learn that the methodology used by the spirits is that of scanning – here is Swedenborg on the spirits of Mercury:

> When they were looking into my knowledge of heavenly matters, they ran through everything and kept saying: 'That's the sort of thing, that's it'. For when spirits approach a person, they review everything in his memory, calling up from it whatever suits them.[79]

In turn, and on his part, Swedenborg is able to communicate with them through a type of thought activation: picturing.

> I was allowed to show them pictures of meadows, ploughed fields, gardens, woods and rivers. (Showing pictures of such things is done by presenting them to others by use of the imagination; in the next life these look exactly like the real things).[80]

When the images are not to the spirits liking they draw all over them, when they find images that 'speak' to them they become still and their attention is caught. We learn that the spirits

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[78] Swedenborg, *The Worlds In Space*, trans. by John Chadwick (London: The Swedenborg Society, 1997), p. 1.

[79] Ibid., §13, p. 9.

[80] Ibid., §32, p. 17.

of Jupiter answer to the 'PICTURING POWER OF THOUGHT',[81] that the spirits from Mercury answer to the 'memory of ideas abstracted from earthly and purely material objects',[82] and that spirits from the 'second world in the starry sky' answer to the 'ACUITY OF VISION, and that is why they are seen to be high up'.[83] For the present, and from where I'm standing, I write notes to myself.

Emerging within a year of the publication of *Heaven and Hell* and *The Worlds In Space* is the idea of Swedenborg as a seer. There are three recorded psychic accounts that a young Immanuel Kant took upon himself to thoroughly investigate (once in a private letter to Charlotte von Knobloch, 10 August 1763, and secondly in *Dreams of a Spirit Seer*, referenced by Krauss) the first of which, at least, Kant considered entirely credible. This involved Swedenborg reporting on a fire as it was happening some three hundred miles away from where he was, corroborated by witnesses to this detailed psychic telling, later by the official account of the fire. The second incident involved a request from a widow for Swedenborg to ask her deceased husband about the whereabouts of a lost receipt, which Swedenborg duly did and the document was found. The third applies to the Queen of Sweden who asked him to seek out her deceased brother and to pass on her greeting. He did so and relayed back to the queen a message from her brother that only she and the brother were privy to. I note these prophetic accounts and their unexpected correspondence with Nadar's opening three chapters of his memoir: a document that appears as if from nowhere; remote visualisation; and a royal secret. Both Nadar and Swedenborg (in these accounts) are all-seeing, all-knowing protagonists, both able to picture from up above the earth's surface and deep underground what had hitherto not been seen.

The public interest in Swedenborg's psychic abilities gained in momentum, and size, over the following several years, resulting in the exposure that he was, in actual fact, the author of the (then) anonymously published *Arcana Caelestia*, *Heaven and Hell*, and *The Worlds in Space*. A reputation as a seer, that whilst controversial, results in a significant increase in his readership. An exposure that at the time caused him significant problems with the Lutheran church of Sweden, but that in the future would ensure his legacy as a visionary. In 1772 he made his final prediction: the date and time of his own passing.

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[81] Swedenborg, *The Worlds In Space*, §64/2, p. 44.

[82] Ibid., §10, p. 7.

[83] Ibid., §140, p. 102.

I have found my (concise) guide to his visionary cosmology in *The Worlds In Space* – a book that you could say was *also* a form of 'photography by other means'. I find my guide to his scientific cosmology in the form of an oversized tome[84] – his major philosophical and scientific work where he laid out his general cosmology, from the smallest point to the largest sphere: *The Principia* (1734). Swedenborg's response, and counterpoint, to Isaac Newton's seminal *Principia* published nearly fifty years earlier. And it was Robert Hooke, a contemporary of Newton, who was the first to place a point on a printed page under a microscope, revealing a previously hidden surprisingly spiky orb.

> Swedenborg's ideas about the mathematical point that traces out the world proceed from this kind of metaphorical thinking, in which the everyday experience of spots in the field of vision and points on a paper is transferred to the tiny particles that cannot be seen by the eye and to the enormous cosmic movements.
>
> It is from the mathematical point that the whole of Swedenborg's particle world is conjured up. [85]

I am unable to read the version of *The Principia* that I am enjoying looking at in one of the reading rooms in Swedenborg House (it is written in Latin). What I can see, however, through its magnificent illustrated plates, is that Swedenborg's cosmology is full with energy (Figs 1-4). The lithographs realise – make visible – invisible forces, and map objects suspended in space. His studies of magnetism, crystallography, phosphorescence, and metallurgy all contributed to his belief (contrary to Newton) in a full and active universe.

In *The Principia* he speculates on the nature of matter and the universe and anticipated the cosmology later formulated by Kant and Laplace: that the planets in the solar system originated in the solar mass. According to David Dunér, 'few classical works flow through Swedenborg's scientific texts as profusely as Ovid's *Metamorphoses*',[86] the book of change and transformation, and touchstone for Silverman and her theories.

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[84] Emanuel Swedenborg, *Principia Rerum Naturalium,* 1, *Opera Philosophica et Mineralia*, 3 (Dresden and Leipzig: Frideric Hekelius, 1734).

[85] David Dunér, *The Natural Philosophy of Emanuel Swedenborg: A Study in the Conceptual Metaphors of the Mechanistic World-View*, trans. by Alan Crozier, (Dordrecht: Springer, 2013), p. 287.

[86] Dunér, p. 132.

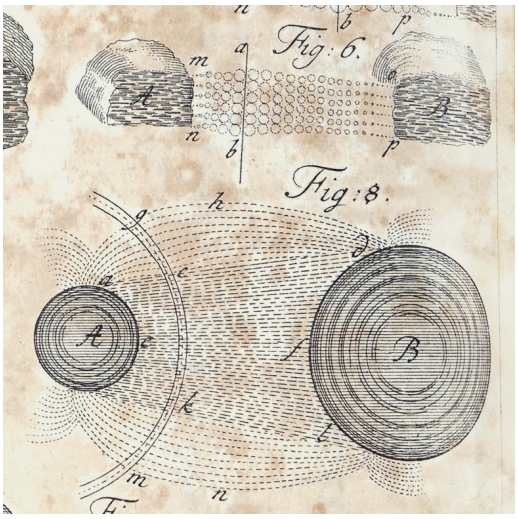

Fig 1. *The Principia*, 1, Tab: V.

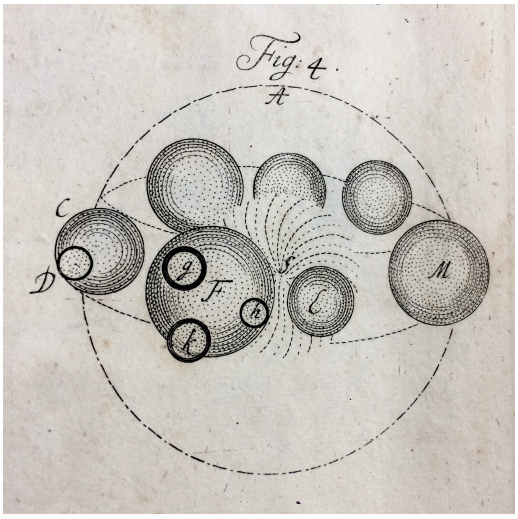

Fig 2. *The Principia*, 1, Tab: XXV1, Fig. 4.

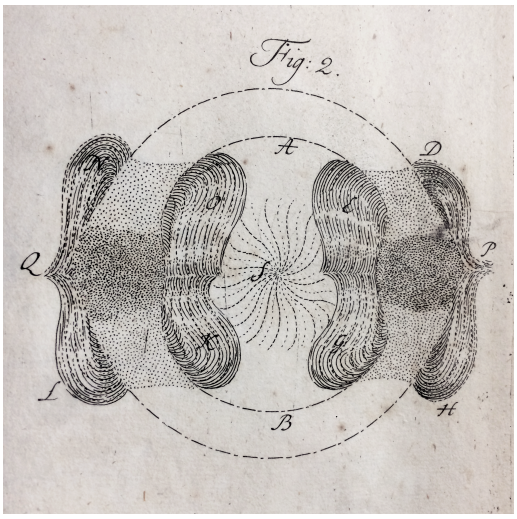

Fig 3. *The Principia*, 1, Tab: XXV1, Fig. 2.

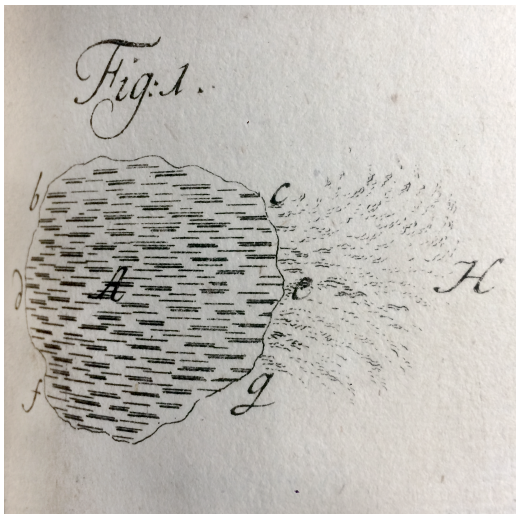

Fig 4. *The Principia*, 1, Tab: X, Fig. 1.

I now have two 'picture' guidebooks to help me on my way: one giving a 'scientific' explanation of visionary experience, the other a 'visionary' approach to science. In addition to his many publications (over fifty titles) – scientific, philosophical, psychological and visionary – Swedenborg wrote two significant diaries intended as private, personal discourse: *Journal of Dreams* (1743-1744) and *The Spiritual Diary* (1745-1765). The former, written in a simple, memorandum notebook begins as a prosaic travel journal that quite quickly ceases, only to be resumed as an account of dreams, after a lapse of some months, a number of torn paper edges, and several blank pages. Multiple nightly dreams

culminate in a vision of Christ embracing Swedenborg on the 6/7 April 1744.[87] The dream accounts, now with the occasional vision, continue to be recorded until the autumn of that year. The journal remains as a record of the emotional (and physical) turmoil that began the pivot from man of science to visionary. The latter journal, *The Spiritual Diary*, begins in 1745 and is an altogether more assured record of his visionary experiences and observances. Written over twenty years, begun in the margins of another work, and then in multiple notebooks it formed the (private) basis for his published visionary works. Both were posthumously published. It will be *The Spiritual Diary* that I turn to in my final chapter, finding a previously hidden-from-view thumbnail-sketch that I wish to bring back to life.

It was in the hall at Swedenborg House, for a public lecture in January 2015, that I heard of the one question that continued to hold an interest for Swedenborg across his entire life – and it had stayed with me. Simon Schaffer was the speaker delivering his paper 'Swedenborg's Lunars'. The question that was being unpacked was Swedenborg's principle astronomical project on the ideas of space and time – *the* great practical problem of his Age – how to determine longitude when navigating at sea. He first submitted a formulation of a method, based on astronomical observations of lunar positions, in 1710 at the age of twenty-one. He continued to submit various formulations, culminating in his final scheme being presented for judgement to the Board of Longitude in London in 1766, at the age of seventy-eight. This scheme, much like the previous versions submitted earlier, as well as those sent by the large number of 'projectors' at the time, was rejected by the Board: 'The method proposed is not new or capable of exact observations, and moreover the Author is mistaken in his mode of Calculation by supposing the Moon to have no Latitude but what is owing to Parallax'.[88]

No matter. His great achievement lay elsewhere, unbound and working to a different order. He spent his life locating and orientating objects in space, ascertaining distances firstly by degrees, then by states of being. Longitude was needed to prevent one from being 'all at sea'. I imagine he was unable to solve this great question because really he always knew precisely where he was in the universe and exactly how to get back home.

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[87] See *Swedenborg's Journal of Dreams, 1743-1744*, ed. by G.E. Klemming, trans. by J.J.G. Wilkinson, 2nd edn (Bryn Athyn, PA and London: Swedenborg Scientific Association and Swedenborg Society, 1989), §51-54, pp. 22-23.

[88] Schaffer, p. 2. The judgement by the Board was first noted in Wertha Pendleton Cole, 'Swedenborg's Work on Longitude', *The New Philosophy*, 36 (1933), 169-78 (p. 177).

CHAPTER 2

Part 1

Swedenborg As Camera Obscura

> If it were possible by some messenger, I would beg to receive the camera obscura which had a blue cylinder as a covering around it. It lies on the stone ledge in the vault near the cupboard. I intend, by its means, to make reflections on the perspective art by the taking of a number of views and prospects. If, therefore, it could be sent to me in the quickest way, it would be a great kindness to me, and my great desire would get its satisfaction.
>
> Emanuel Swedenborg, 4 March 1716[89]

In this chapter I move from Swedenborg the visionary and the medium of photography, to seeking to connect Swedenborg (during the period of his pivot from natural philosopher to mystic seer) and the apparatus of photography. He pre-dates the photographic act but, in his life-long scientific and visionary attempt to picture objects and scenes previously unseen to the human eye, parallels can begin to be drawn with photography. Through reading Swedenborg one can also begin to connect his methods and methodologies to photographic practices: a dispassionate observer, meticulous recorder, compulsive indexer, classifier and mapper, prolific in output (to the extent that scholars at one point believed him to be ambidextrous), excessively duplicating, as well as 'zooming in' on wider texts to create new 'close-up' versions. He created a system that connected the material world to the wider universe and spirit world, the keystone of which was light.

I look back to the seventeenth and eighteenth centuries and briefly consider the three main instruments of vision of the age – the telescope, the camera obscura and the microscope – before considering in closer detail the camera obscura; its evolving form and the theories surrounding it.

I look at three specific models of camera obscura: two that are extant as images only, the third being a site within the landscape that one can visit to this day. Each model selected for their imaginative potential to connect with Swedenborg at the moment in time he pivoted from his position of man of science to that of mystic visionary. I consider once more

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[89] Swedenborg to Erik Benzelius, Brunsbo, 4 March 1716, *Letters and Memorials of Emanuel Swedenborg,* 1, p. 92.

Silverman's, and Benjamin's theories, read through the lens of Swedenborg's writings. In doing so I create a conceptual camera obscura, a 'virtual' tool that promotes its own methodologies: 'Swedenborg as camera obscura'. An instrument of vision that I 'pick up' and use to reconsider and reconfigure my photographic art practice, for my exhibition 'The Eye Needs A Horizon', Frith Street Gallery, 2016.[90]

Before Swedenborg became a visionary he was preoccupied with instruments of vision. In the eighteenth century these optical instruments were not regarded as mere tools; by revealing a reality beyond what was perceptible to the senses they created a powerful new way to encounter the world and, therefore, had additional symbolic value. They encouraged a metaphorical, metaphysical way of thinking and revealed the enormous scope of what was regarded as God's creation.

It was Robert Hooke's illustrated book of microscopy, *Micrographia* (1665), the first major publication produced by the Royal Society that was revelatory to both expert and layperson alike. It redirected the gaze to see the strange and compelling world existing below the surface of the everyday. The underlying structures that comprised a flea, a fly's eye, a leaf, the point of a needle and the aforementioned printed full stop were just a few of the objects that appeared in new revelatory form. It caught the public imagination with its large-scale, immaculately detailed foldout copperplate engravings – the largest of which depicted a louse opening out to four times the size of the book. In the twenty-first century Hooke's processes in building up his extraordinary images have themselves been put 'under the microscope' and revealed to have been constructed from 'numerous observations made from multiple vantage points, under varying lighting conditions and with lenses of differing powers'.[91]

[90] The title of the exhibition is a paraphrase from Ralph Waldo Emerson's *Nature*: 'The health of the eye seems to demand a horizon'.

[91] See Janice Neri, 'Between Observation and Image: Representations of Insects in Robert Hooke's Micrographia' in *The Art of Natural History: Illustrated Treatises and Botanical Paintings, 1400-1850,* Studies in the History of Art series, 69 (New Haven CT: Yale University Press, 2008), pp. 83-107.

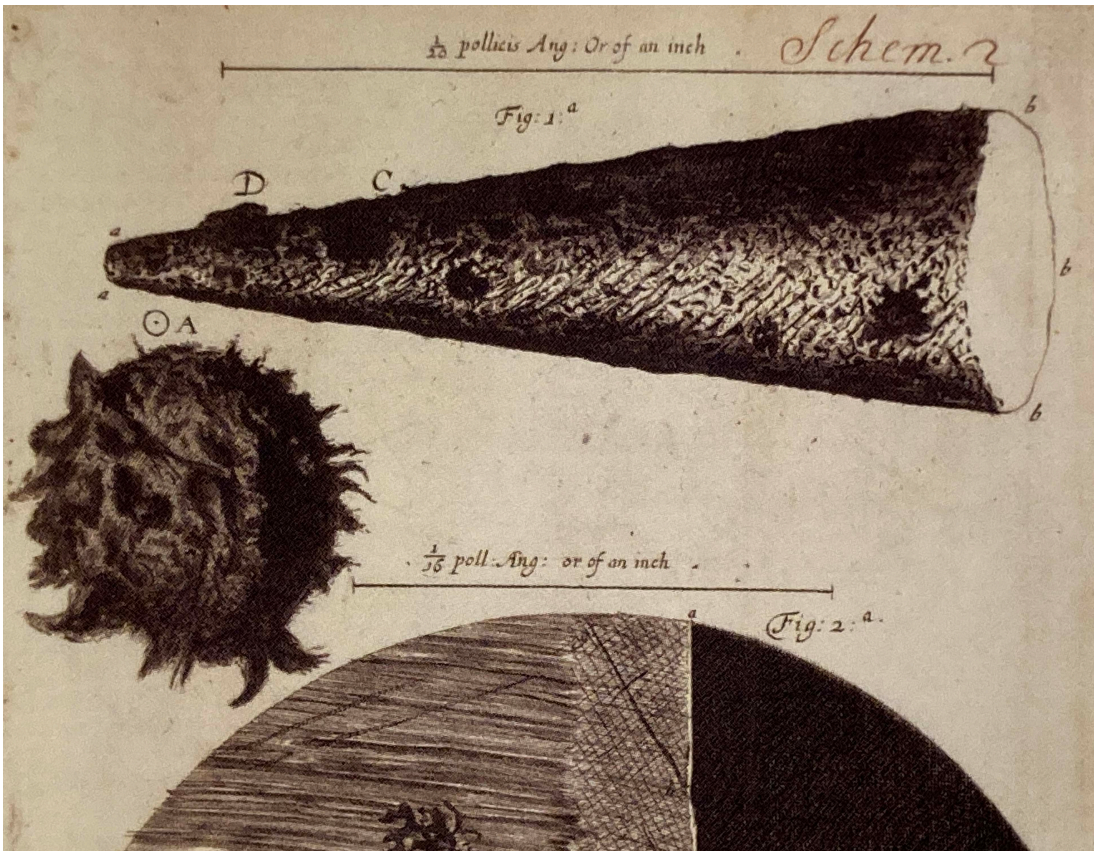

Fig. 5. Robert Hooke, 'The point of a needle; printed full-stop; edge of razor', *Micrographia*, 1665. © The Royal Society.

In addition to these minute earthly creatures and objects *Micrographia* also contained illustrations of distant planetary objects, in particular the detailed surface of the moon made by the use of a telescope. This was the first instrument of vision to enable the infinity of existence to be seen. It allowed the far away to appear up close, to create an illusion whereby vast distances between viewer and subject seemed to magically disappear, creating an entirely new up-close perspective of the faraway. The telescope opened an infinite perspective out into the universe, and the microscope opened a perspective into matter, but it was the camera obscura that opened a new perspective on the world. It was in effect *the* camera of the eighteenth century.

For a natural philosopher the telescope and the microscope in particular were vital instruments. In 1710 Swedenborg arrived in London as a young scholar seeking to further his education within this field, a key aim being to meet the inspirational Isaac Newton. He began studying the observational techniques of the Astronomer Royal, John Flamsteed, and in 1711 assisted him at the Royal Observatory, Greenwich, observing and cataloguing stars and celestial movements through the telescope. In addition he studied the works of Newton's

great rival, Hooke. It was during this period that he became a frequent visitor to John Marshall's shop, the famous optical-instrument maker of the time. Part of the remit for his stay in London was to source and purchase potential optical instruments for the scientific community in Sweden, a central figure of which was his benefactor and brother-in-law, Erik Benzelius, one of Sweden's important Enlightenment figures. Much interest was taken in the physical properties of these instruments, as well as what could be observed with them. The portable camera obscura residing in the vault that Swedenborg was so keen to receive out in the world (at the beginning of this chapter) was most likely purchased in London at this time, its use solely for pleasurable pursuit, its significance yet to emerge. It will be much later when Swedenborg has achieved his notable reputation as a mining and engineering expert that he turns his interests first towards anatomy and physiology (the circulation of blood, the nervous system, brain function and the search for the seat of the soul) that then evolve into his visionary experiences of heaven, hell and the spirit world. As he turned his attention away from natural science towards matters visionary he remains equally compelled to map, locate and meticulously describe these immaterial spaces.

In this chapter I take the position that the camera obscura is the pivotal instrument of vision that allows for this transformation to see the world differently. In taking this stance I am not doing a detailed historical exploration of the camera obscura, or the history of visuality. I am less concerned here with the apparatus as an effective copying device, more that the original camera obscura enables a (interior) way to see and encounter the outside world differently. I begin by paying attention to its evolving physical properties.

In its original form the camera obscura operated as a darkened room, a small aperture creating a natural optical phenomenon; a scene outside of the room is projected through the aperture and appears laterally reversed and inverted as an image on a surface opposite to the opening. It requires the observer to step inside in order to witness – as if for the first time – the bright world outside. Silverman in *The Miracle of Analogy* gives an evocative account of the magical experience that this would have engendered:

> A reversed and inverted stream of images that both originated in the external world and analogized it. This continuous flow of mobile and evanescent images existed only in the "now" in which it appeared, and since the viewer had to enter the camera obscura in order to see it, the two were spatially as well as temporally *co-present*.[92]

[92] Silverman, p. 14.

You step inside. The view is reversed and upside down. The relationship between the viewer and this animated, unstable imagery is constantly questioned. Objects outside, that move back and forth, advancing and receding within the projected image destabilise the constancy of the picture plane and reinforce it as an active 'energising' surface, one that appears permeable and dream-like. As early as the eleventh century the scholar Alhazen (Ibn al-Haytham) writes, in his book of optics, of the 'receiving surface' of the 'screen',[93] one that the viewer had to actively participate in by moving until the imagery became focused. The viewer is drawn to, and mesmerised by, the 'force and brightness'[94] of the stream of light imagery, at that moment becoming both viewer and receiver. In *Devices of Wonder: From the World in a Box to Images on a Screen* Barbara Stafford writes also of the heightened experiences of the camera obscura, 'chromatically intensified, natural projections brought a topsy-turvy world of passing clouds, ripples glinting on a distant river, and people hanging in midair', the effect of which was a 'commingling of inner with outer space'.[95]

In essence the camera obscura created a (surreal) cinematic experience. The viewer is encouraged to correspond with this phantasmagoric projection of the world, 'both physically and aesthetically'.[96] This is correct on one level, yet the active, imaginative space of the 'cinema' generates a double effect; creating the feeling of inhabiting something whilst remaining fundamentally outside, disembodied, almost like an out-of-body experience.

Jonathan Crary refers to the camera obscura in *Techniques of the Observer* as a 'highly problematic object'.[97] 'For what constitutes the camera obscura is precisely its multiple identity, its "mixed" status as an epistemological figure within a discursive order *and* an object within an arrangement of cultural practices'.[98] It was regarded as a philosophical metaphor as well as used for optical experiments investigating the nature of light for solar observations. From the mid-sixteenth century onwards it was a popular tool to aid drawing and painting, particularly landscapes, as well as its use for pure entertainment.

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[93] Silverman, p. 15.

[94] Ibid. p. 24. Silverman is here referring to, Francesco Algarotti, *An essay on painting written in Italian by Count Algarotti* (London: L. Davis and C. Reymers, 1764), pp. 60-61.

[95] Barbara Stafford and Frances Terpak, *Devices of Wonder* (California: Getty Research Institute, 2001), p. 80.

[96] Silverman, p. 69.

[97] Jonathan Crary, *Techniques of the Observer* (Cambridge, Mass: The MIT Press, 1992), p. 27.

[98] Crary, p. 30.

> For those who understood its optical underpinnings it offered the spectacle of representation operating completely transparently, and for those ignorant of its principles it afforded the pleasures of illusion. […] So the veracity of the camera was haunted by its proximity to techniques of conjuration and illusion.[99]

The relationship between photography and illusion has been consistently explored, often through a kind of archeological examination of the 'magical' objects and devices that make up the history of optical invention, from the sixteenth century onwards.[100] Within ten years of the birth of photography in 1839 themes of spiritualism also become bound up with the photographic act and used to provide 'evidence' of the spirit world.

As the design of the camera obscura evolves over the centuries the observer is taken from the immersive, mesmerising effect of the world projected within interior space, and placed outside. In the sixteenth century the images became clearer and brighter due to convex lenses inserted in the aperture. The seventeenth century upturned the inverted image by the use of concave mirrors and the room transformed into a portable box, the manual focus moving from the screen to the mechanical eye of the lens. Now it was the external eye alone in contact with the stream of imagery. In the eighteenth century the camera took on an additional form as a piece of furniture – a table or desk – the screen becoming the tabletop. It is from the seventeenth century onwards, when the camera could be held in one's hands, that it started to be referred to less as a receiving instrument and more an instrument to 'take' the view of nature. Silverman writes: 'the idea that photography means "camera," and that the camera is an instrument for mastering the world, emerged early in the history of the so-called medium'.[101]

In reevaluating the origins of photography Silverman proposes that photography is 'receptive, rather than productive'. She calls on several examples from early pioneers and critics who cite photography as emerging and autonomous: Fox Talbot writes, 'it is not the artist who makes the picture but the picture which makes itself';[102] Lady Eastlake's accounts of photography crucially alter 'from the notion that photography *creates* the world to the

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[99] Crary, p. 33.

[100] Examples of contemporary exhibitions that take this approach are**:** 'Devices of Wonder: From the World in a Box to Images on a Screen'*,* J. Paul Getty Museum, LA, (2001-02) and 'Eyes, Lies, Illusions' Hayward Gallery, London (2004). And more generally the Werner Nekes collection, and films, on which the latter was based.

[101] Silverman, p. 9.

[102] Ibid. p. 10. Cited from a letter from Fox Talbot to the editor of the *Literary Gazette*, 1839.

notion that photography *reveals* it';[103] and referring to Count Francesco Algarotti's views of the camera obscura as 'the agency through which we learn to see the world differently'.[104]

Silverman builds her theory in reference to Benjamin's 'Little History of Photography'. She too associates photography with 'disclosive rather than evidentiary truth'. It is in Benjamin's essay that he writes of 'waking dreams' in relation to the optical unconscious:

> For it is another nature which speaks to the camera rather than to the eye: "other" above all in the sense that a space informed by human consciousness gives way to a space informed by the unconscious.[105]
>
> Photography reveals in this material physiognomic aspects, image worlds, which dwell in the smallest things—meaningful yet covert enough to find a hiding place in waking dreams, but which, enlarged and capable of formulation, make the difference between technology and magic visible as a thoroughly historical variable.[106]

Picking up this thread and developing it Silverman writes:

> At its most rudimentary, the optical unconscious consists of those aspects of the visible world that are too small for us to see, or that occur too quickly for us to register, but which photography and film make available through close-ups and slow motion. But photography reveals another kind of optical unconscious: it shows us that the world presents itself differently to the camera than to the human eye.[107]

It is by entering a waking dream, or rather hypnagogic state, through a breathing meditation that Swedenborg is able to receive and record the image worlds that reveal themselves to him. These periods of 'receiving' – exposure time you might say – could last as long as eight hours, approximating the estimated exposure time necessary to produce the earliest extant photograph, *View from the Window at Le Gras*, by Nicéphore Niépce, c. 1826.[108] And picking up my Swedenborgian thread from Silverman I imagine that Swedenborg becomes an apparatus in order to 'see', in order that, not only will the world reveal itself differently to him, but that a *different* sort of world is revealed. A camera obscura that is both still and moving, from before photography's invention, in the act of imagining and realising its future self. Photography, like the visionary experience, is an act of revelation.

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[103] Silverman, p. 33.

[104] Ibid. p. 24.

[105] Benjamin, p. 510.

[106] Ibid. p. 512.

[107] Silverman, p. 123.

[108] As Benjamin notes in his opening to 'Little History', photography has more than one beginning.

In looking back through the history of the camera obscura I find three specific examples from the late-seventeenth/early-eighteenth century. I approach each one as a prompt to imagine their role as early signifiers for Swedenborg as he pivoted from man of science to seer and mystic visionary. Two of the designs are by Robert Hooke, the first considered to be a prototype of the second. Hooke, as the Curator of Experiments at the Royal Society, was able to conduct significant research into the process, design and demonstration of the camera obscura over thirty years.[109]

In Hooke's 'Lectures of Light' (1681) – published posthumously – we find written assembly instructions for a 'do-it-yourself' camera obscura, accompanied by an annotated diagram (Fig 6):

> Prepare therefore a Box of the shape in the seventh Figure, let it be four or five Foot long from A to DE, and make the bottom of it BC, Concave towards the End A […] At A place a Convex Glass […] the larger it is the better […] let the inside of the Concave bottom be made very White, to receive and reflect the Points of Light, and make a Hole in the side of the Box H, covered about with Leather, or thick Wollen Cloth, with a Hole large enough to put one's Face into it, so as to see the Species or Picture of outward Objects upon the bottom, then turning the end A where the Glass is placed toward the Object […] slide the moveable bottom B C, to or fro, 'til be looking in at the Hole H, you perceive the Representation of the outward Objects very perfect, […] It may be convenient to fix a Ball and Socket underneath it to make it more easy to be managed.[110]

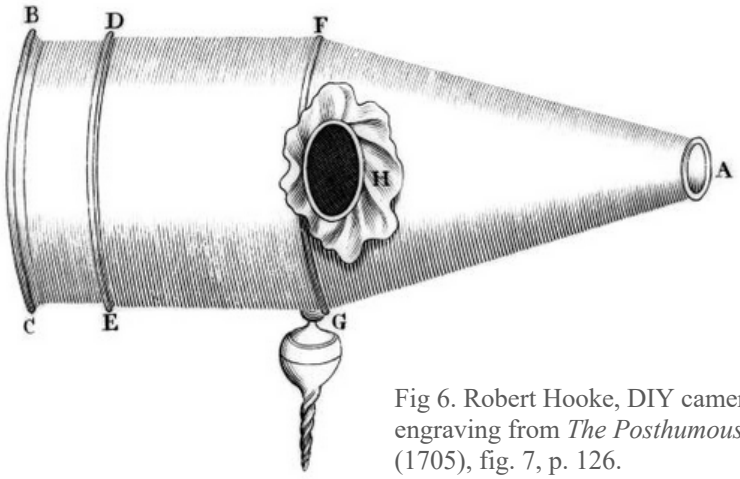

Fig 6. Robert Hooke, DIY camera obscura (1681), anonymous engraving from *The Posthumous Works of Robert Hooke*, (1705), fig. 7, p. 126.

[109] Hooke conducted his camera obscura research from 1663 to the late 1690s. See Matthew C. Hunter's article: '"Mr. Hooke's Reflecting Box": Modeling the Projected Image in the Early Royal Society', *Huntingdon Library Quarterly*, 78:2 (Summer 2015), pp. 301-328.

[110] Robert Hooke, 'Sect. V. Lectures of Light', in *The Posthumous Works of Robert Hooke*, ed. by R. Waller (London, 1705) pp. 119-128 (pp. 127-128).

The image of the camera obscura appears in its completed state. For the operator of this apparatus, the parts cannot be purchased and do not come prefabricated; materials are to be found and components fashioned by hand, each camera obscura, therefore, will be similar in form but not exact replicas. This first handmade – puppet-like (almost funfair-like) – camera obscura is held at a transverse angle to the body. The observer remains outside of the object apart from the observer's head which is placed inside the opening, looking down along the bottom of the camera obscura, in order to view the reflected stream of projected imagery, the head now obliged to move back and forth in a sideways motion.

By the time of the second camera obscura, thirteen years later, it has evolved into a forward facing instrument of vision (Fig 7, also published posthumously, more than twenty years after Hooke's death). This later model is attributed to a lecture that Hooke delivered to the Royal Society on 19 December 1694, 'that may be of Use to curious Navigators and Travellers',[111] so that they will be 'rightly and truly informed for the future'.[112] The operator/receiver makes an appearance here, shown as partially contained within the body of the camera obscura.

Fig 7. Robert Hooke, portable camera obscura, 1694. © The Royal Society.

[111] Robert Hooke, 'An Instrument of Use to take the Draught, or Picture of any Thing', in *Philosophical Experiments and Observations of the Late Eminent Dr. Robert Hooke*, ed. by W. Derham (London: W. Derham, 1726), 292-96 (p. 292).

<https://archive.org/details/bub_gb_I6m4P2H7m2wC/page/n309> [accessed 1 November 2021].

[112] Ibid. p. 295.

In the lecture Hooke speaks of the technical capabilities of this 'small Picture-Box, much like that which I long since shewed the *Society*',[113] a reference to the earlier DIY model. The cone-shaped device of this second image looks to approximate the four to five feet of the earlier model, seeming to refute Hooke's claim of a 'small Picture-Box'. Now it fits over the head and has enveloped the observer/receiver, so that the upper torso and arms can operate within the instrument. Now the eye sees what the camera sees, both acting in unison, moving, observing and recording as one. The act of both receiving and recording, as one entity, a significant development from the earlier, simpler device.

The image of the camera obscura is shown with no visible means of attachment to the figure and as if in cross-section so that we, the viewer, also see through the camera, the cone of the device mirroring a cone of light. The camera lens (the source) touches the picture's edge (the world) and the receiving screen is shown to be the body. The body, now acting as photographic negative – a 'psychic photographic plate'.[114]

The viewer of this image looks to an inhabited island in the near distance with a mountain range beyond, but the camera/man looks sideways and elsewhere to what, one might imagine to be, an entirely different view. A curious awkward morphing of man and machine, both comparable in scale, and in light of Hooke's own remarks about being 'rightly and truly informed for the future' suggestive of an early prototype for a virtual reality headset.

Swedenborg, who considered himself a curious traveller and navigator, had carefully studied Hooke's writings and experiments. I picture him encountering the first prototype image and noting its do-it-yourself nature. I picture him also viewing the later image of a 'bodily camera obscura' and noting its potential. In addition I picture him reading Hooke's speculation in his preface to *Micrographia*:

> One day man will be able to design even better optical aids with which to discover living creatures on the moon or other planets, or to find figures in particles of matter and perhaps even mechanical inventions to refine the other senses and amplify our perceptions of taste, smell and feeling.[115]

Now I picture Swedenborg, the camera/man, looking elsewhere to a different sort of world.

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[113] Hooke, p. 296.

[114] Silverman, p. 158.

[115] Dunér, pp. 49-50.

Hooke preceded Swedenborg by some fifty years, but an exact contemporary (born in the same year, 1688) was the poet, and pioneer of landscape design, Alexander Pope who in 1725 had created an underground grotto that also doubled as a camera obscura, the last of our three examples. Pope devised this subterranean camera obscura out of the cellars of his newly built four-storey villa in Twickenham, situated on the sloping banks of the river Thames. The entrance to the subterranean grotto/camera obscura emerges out onto those banks facing east down the Thames and to the landscape beyond. It was the way that visitors arriving by river entered the grand house. It was also the way by which people moved from the house to the main garden via an underground tunnel that led from the grotto – the house and main garden being otherwise separated by a public road. Today the grotto and passageway are all that remains of Pope's once grand villa with its five acres of beautifully designed garden. Yet for all of the public spectacle and indeed fame that became attached to the grotto, both at the time and subsequently, it also occupied for Pope a private, creative, otherworldly existence.

> When you shut the Doors of this Grotto, it becomes on the instant, from a luminous Room, a Camera Obscura, on the walls of which all the objects of the River, Hills, Woods, and Boats, are forming a moving Picture in their visible radiations.[116]

Pope continuously developed, altered and added to his grotto/camera obscura over twenty years, right up until his death. Originally he conceived of it as a haunt where 'the muses' were to communicate with him and, no doubt in seeking to extend that potential, it early on came to have a dual function: the camera obscura transforms into a magic lantern.

> And when you have a mind to light it up, it affords you a very different Scene: it is finished with Shells interspersed with Pieces of Looking-glass in angular Forms; and in the Ceiling is a Star of the same Material, at which when a Lamp (of an orbicular Figure of thin Alabaster) is hung in the Middle, a thousand pointed Rays glitter and are reflected over the place. [117]

By day this cave-like interior had the potential to contain a rich darkness that allowed a captivating natural spectacle to occur. By night, with the fading of the sunlight, it inverted, through the illumination of a lamp, to become a different sort of illusion: a dazzling, fracturing spectacle disorienting the viewer/receiver with its angular pieces of looking glass and reflective materials. It becomes its own landscape, destabilising the rational, distorting

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[116] Anthony Beckles Willson, *Alexander Pope's Grotto: A guide to the history and development of the last remaining part of Alexander Pope's villa,* 3rd edn (London: Pope's Grotto Preservation Trust, 2019), p. 11.

[117] Ibid. p. 11.

the senses and detaching one's bearings – a 'crystalline machine', a vision of a room-sized kaleidoscope (before its invention).[118]

Pope finishes his 1725 description of the grotto in a letter to his friend, Edward Blount:

> You'll think I have been very poetical in this description, but it is pretty near the truth. I wish you were here to bear testimony how little it owes to art, either the place itself, or the image I give of it.[119]

A statement that implies this camera obscura has an agency all of its own.

A pen and ink sketch attributed to William Kent made some years later shows Pope in his grotto, here in the form of a magic lantern (Fig 8). The globe light made from alabaster is drawn above and behind Pope's right shoulder, the artist depicting fine lines of radiating light in contrast to the thick, black brushstrokes depicting the grotto walls. All marks, however, are fluid and dynamic, appearing to be executed at speed, lending the impression of an active, ever changing space. Pope himself is shown deep within its interior, one hand resting on his face as if in contemplation, the other in the midst of writing on a large piece of (blank) paper whilst winged creatures hover above his head. A description that becomes prescient when thinking of Swedenborg receiving, communicating, and recording his visionary experiences with angels and spirits – that for now are yet to emerge.

Fig 8. William Kent, 'Alexander Pope in his grotto/camera obscura', ink drawing, c. 1730-40. Credit: Devonshire Collection, Chatsworth/ Bridgeman Images.

[118] The kaleidoscope was invented in 1816 by the physicist, Sir David Brewster who turned the notion of stereopsis from a scientific fact into an instrument of popular entertainment. See Stafford and Terpak, *Devices of Wonder*, p. 357.

[119] Anthony Beckles Willson, 'Alexander Pope's Grotto in Twickenham', *Garden History*, 26.1 (Summer, 1998), 31-59 (p. 38).

By the end of 1739 Pope had a new obsession in mining and geology and began to turn his grotto/camera obscura/magic lantern into a new form, a 'museum' dedicated to his new interests. Eventually, copious amounts of mineral and rock material donated by friends and admirers from all over the country as well as abroad – the more 'luminous' the better – decorated the entire surface area of the grotto/camera obscura, with further chambers needing to be added. The collection of reflective rocks and stones also included 'petrified wood, fossils, glass, coral and humming-bird nests'.[120] In addition a cascade of water and a spring had also been unearthed and became part of the spectacle that greeted visitors. An anonymous written account from 1748 states, that 'every object is multiplied', and that, 'by a fine Taste and happy Management of Nature, you are presented with an undistinguishable Mixture of Realities and Imagery'.[121]

Pope's picturesque grotto/camera obscura/magic lantern/mine started as a single chamber but continued to evolve until his death in 1744, at which point it stood as five distinct chambers. Soon after his death an *Account* was published, a tourist guide detailing the garden and the grotto, including the placement and description of the hundreds of specimens and varieties of materials used within.[122] Many people subsequently came to see Pope's famous grotto and many would take a small piece of that grotto as a souvenir or relic, encouraged perhaps by the last verse of a poem also printed in the tourist guide:

> *Then, some small Gem, or Moss, or shining Ore,*
> *Departing, each shall pilfer, in fond hope*
> *To please their Friends, on every distant Shore,*
> *Boasting a Relick from the Cave of Pope*[123]

Pope did not own the land upon which he built his villa and so on his death the lease immediately reverted back to the owners. By 1808 the villa had been demolished and the grotto/camera obscura stood for many years increasingly derelict and open to the sky until much later when buildings were once again constructed on top.[124]

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[120] Beckles Willson, *Alexander Pope's Grotto*, p. 28.

[121] Ibid., p. 30.

[122] The *Account* was compiled by Pope's gardener of twenty-years, John Serle, and published by Robert Dodsley.

[123] Beckles Willson, *Alexander Pope's Grotto*, p. 29. Dodsley's prescient poem was written before Pope's death, not to be published until after his death, as part of Dodsley's contribution to the guide.

[124] The grotto now exists as part of Radnor House School.

There is no record that Swedenborg knew Pope personally, but it is known that these two contemporaries were both acquaintances of the then Swedish Ambassador in London, Count Carl Gyllenborg.[125] During the twenty-year period of the grotto/camera obscura's development Swedenborg was a member of the Swedish House of Nobles, and an Assessor for the Board of Mines, Pope was a man of considerable fame, and they shared interests in mining, geology, poetry *and* camera obscuras. In light of these facts it is not such a stretch to imagine that their mutual acquaintance, Gyllenborg, could have made these areas of their common interest known to one another. It does not seem possible that the two men actually met – Swedenborg lived in London between 1710-12, and not again until 1744-5. Pope died in 1744. Between 1743 and 1744 Swedenborg was first addressed by a spirit and wrote his *Journal of Dreams* as a private document of this transition period. It is possible, however, that Swedenborg was prompted to visit the grotto/camera obscura after Pope's death, during that second stay in London, and once there, took away a small souvenir – an angular piece of looking-glass. His presence within that instrument of vision enacting its own reversal and inversion: encouraging a reversal from the final form of the 'mine' back to the original form of the camera obscura, and an inversion of Swedenborg's mechanistic, geometrical world-view into an organic world-view – 'the world was no longer a machine but something living'.[126] The man of science was developing into a seer: one who sees and one who predicts events and developments. For the next twenty-seven years he would receive and record his visionary experiences.

The first Hooke 'do-it-yourself' camera obscura exists as a diagram only, one that the viewer must mentally pull apart in order to start the process of understanding each element and their relationship and connection to one another. In the diagram the observer/receiver is not present. They exist only in the imaginative act of constructing the object, guided and instructed by the unseen Hooke. As this technology evolves over time the observer/receiver is introduced into the picture and partially joined with the instrument of vision to create a hybrid. The final incarnation occupies the basement of a house, emerging onto a moving landscape and shows the observer/receiver to now be subsumed and incorporated within the receiving, recording machine. I described earlier how the camera obscura evolved over many centuries from darkened room to portable camera, and the corresponding shift from the

[125] The research on these acquaintances is by James Wilson, Editor at the Swedenborg Society. For Pope's connection to Count Carl Gyllenborg, see Joseph Hone, *Alexander Pope in the Making* (Oxford: OUP, 2021), p. 182 and Valerie Rumbold, *Women's Place in Pope's World* (Cambridge: CUP, 1989), pp. 231 ff.

[126] Dunér, p. 8.

figure inside, to the figure holding this adaptable object within their hands. The three camera obscuras that I have chosen upend that order. They move through space and time gaining in form and scale as they do so: from plan, to object, to subterranean landscape,[127] drawing the observer/receiver from an imaginary space until the figure resides at the heart of this perpetually developing apparatus.

I picture a camera obscura haunted and steered by the writings and theories of Swedenborg, man of science, seer and mystic visionary, creating a past/present/future instrument of vision. The concept of Swedenborg as camera obscura creates a dynamic virtual tool that I use to adopt new approaches to my photographic art practice. It seeks to receive and record images in a suspended state of co-existence. Images that are still *and* moving, interior *and* exterior, faraway *and* close-up, as well as earthly *and* otherworldly, made manifest through the playful use of analogy. I pick up this ghostly apparatus and add it to my twenty-first-century toolkit as my thoughts turn towards my forthcoming exhibition 'The Eye Needs A Horizon'.

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[127] In chapter 4 Pope's excavated camera obscura finds its positive counterpart: otherworldly in origin, it too is made from earth, this time to form a freestanding, solid structure, with prophetic capabilities. Received in the eighteenth century, it takes on yet another materiality in this twenty-first-century research project.

Part 2

The Eye Needs A Horizon

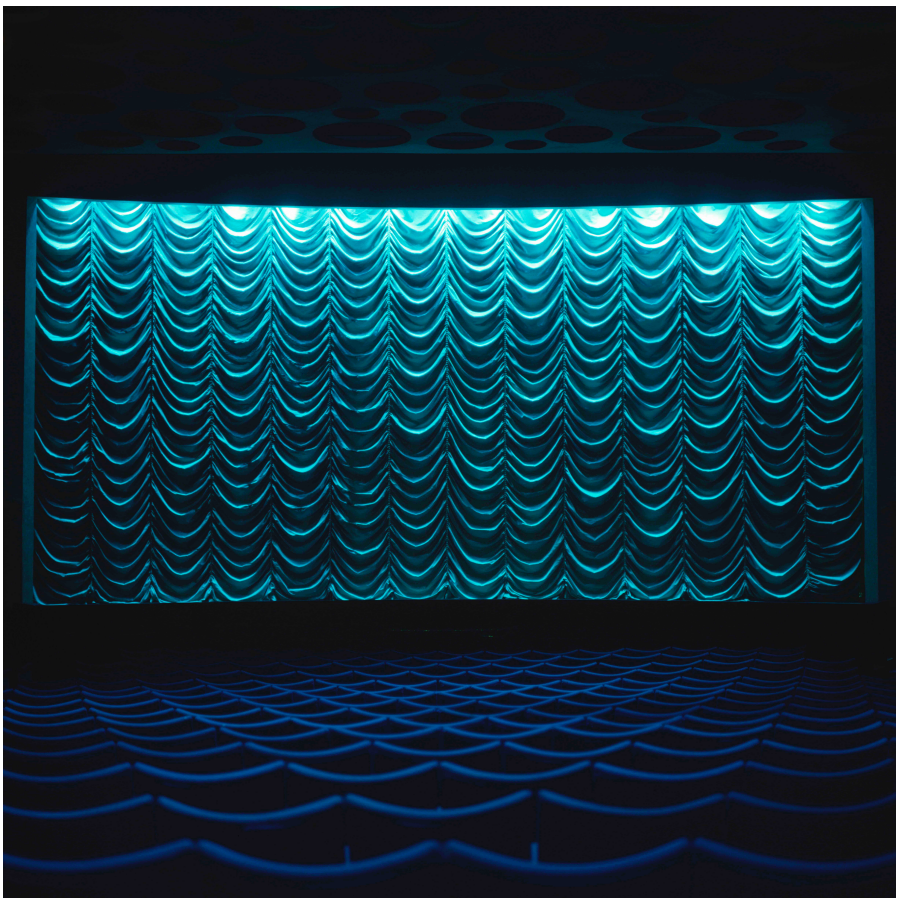

Fig 9. Bridget Smith, *Odeon (Blue)*, 1995,
Colour transparency, 6 × 6 cm; C-Type photograph, 183 × 183 cm.

To step inside the original camera obscura, that darkened interior with its naturally occurring projection of light transmitting moving images from the outside world is to essentially engage in a cinematic experience. In order to begin this practice-led research project I perform my own act of looking back: to the beginning of my career as an artist and to a single, analogue, documentary photograph of a cinema interior, *Odeon (Blue)*, 1995 (Fig 9). A twentieth-century photograph that I see, from my position in 2015, offers the potential to be reconsidered and reimagined for this current photographic atmosphere; a documentary image that until now has been fixed in the past that I wish to reinvent as past, present and future-facing. In the present it is still possible for the (fading) analogue and the (rising) digital to coalesce. In the spirit of Hooke's first prototype, imagined via my own virtual Swedenborg apparatus, I approach this photograph as a potential do-it-yourself model that has the ability to create new relationships and dynamics within my photographic art practice: analogue *and* digital, still *and* moving, the photograph *and* the object, and the photograph as

object. From my vantage point of twenty years later I wish to disassemble my original photograph, reimagine and reconfigure the elements, and spatially rearrange into a new cinematic ‘camera obscura’. The site for this installation is Frith Street Gallery, London: an interior space that can be seen from the outside due to its floor-to-ceiling windows; two generous rectangular exhibiting spaces effectively operating as one capacious room. The viewer, absent from the original cinema interior photograph, will become present within this open, expansive soon-to-be photographic/cinematic landscape.

I went back to another beginning, to one of the earliest photographic processes, the cyanotype – the original blueprint. A process and image more useful in depicting construction plans for architects and engineers than for mimetic representation. Later becoming the blue of carbon paper placed under the original to create the copy, morphing still further into the abbreviated, imagined action of the ‘cc’ of an email. I choose the cyanotype process specifically because it fails to achieve an exact mimetic representation, and that it is a 1:1 contact process.

I scan my original 6 × 6 cm transparency and separate the curtain and the seating into two images. Before digital processes were possible, cyanotypes were bound by either the size of the negative (often no more than 10 × 8 inches) or by the size of the object placed on the photosensitive paper. I begin with the image of the seating pattern, turning it into a digital monochrome negative that I print onto a piece of acetate 110 × 230 cm. As negative and positive are equal in this process this allowed for the image of the chairs and an actual chair to be comparable in scale.

Watercolour paper of the same size as the negative (110 × 230 cm) was evenly coated in a darkened room, with a recipe mix of two chemicals to create the particular shade of cyanotype blue. The paper and the negative are placed together and exposed to the light. The paper is then washed in order to remove the excess chemicals and to fix the cyanotype. Where there were black marks on the negative the white of the paper remains.

In *Blueprint for a Sea (rising)* – Fig 10 – the rows of seats face away from the viewer and recede into the distance, whilst also appearing to rise up. The abstracting process of the cyanotype highlights the wave-like patterns of the seating, prompting the viewer to regard the image as a seascape. The photograph creates an image whereby interior and exterior space co-exist through an invitation to ‘see double’; the viewer never losing sight of the fact that these are seats, as well as the potential to be waves looking out to sea.

I photograph a new cinema interior with a digital camera to create a second pattern, *Blueprint for a Sea (infinity)* – Fig 11. Here the seating pattern moves inward, in a classic perspective towards the horizon and away from the viewer. The dual action of these differing patterns a nod to real tidal movements. Four *Blueprint for a Sea (rising)* photographs hang on two walls, one *Blueprint for a Sea (infinity)* hangs on a third wall within the heart of the installation. The repeat pattern built up by four of the same images, with their unique subtle variations from the handmade process, sets up a resonance that begins to take on the effect of moving light waves, disrupted by the one 'infinity' pattern. The viewer in looking at all five together assumes the position of the fourth wall, completing the circuit. All five cyanotype photographs create an optical effect whereby new rippling patterns are generated as the viewer moves position within the central space (Fig 12).

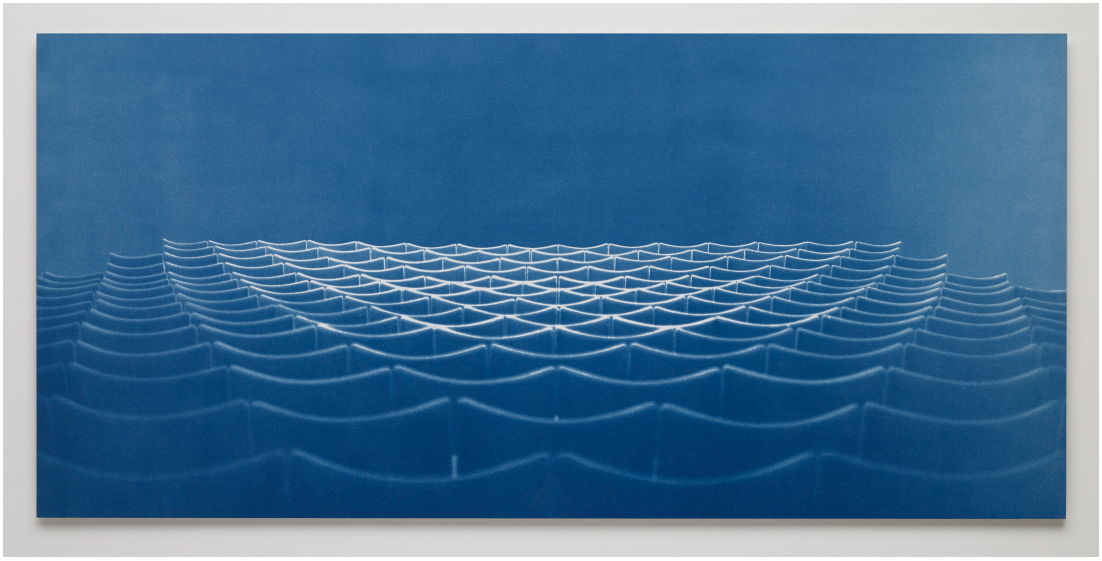

Fig 10. Bridget Smith, *Blueprint for a Sea (rising)*, 2015-16.

Fig 11. Bridget Smith, *Blueprint for a Sea (infinity)*, 2015-16.

Fig 12. Bridget Smith, *Blueprint for a Sea (infinity)*, 2015-16.

As an installation, the series *Blueprint for a Sea* is exhibited with props, antique opaline globes that adopt several roles: as a real source of illumination within the gallery space, as a visual stand-in for the sun or moon 'creating' the light refractions depicted in the photograph; and thirdly as a relic from an original cinema interior. These particular globe lights (of differing sizes) hang, at varying distances and heights, in relation to each cyanotype and can appear, from a distance, to be two-dimensional flat discs. Real and artifice come together and co-exist and each alters our perception of the other.

Using the same process I make *Blueprint for a Curtain* (Fig 13), the first artwork the viewer encounters on entering the gallery. In order for this cyanotype photograph to replicate the 1:1 scale of a theatrical, ruched curtain I create multiple negatives from the single new scan of the curtain. The photograph-as-sculpture is to be 4m high × 4.9m wide, the whole being made up of fifteen cyanotype prints originating from five different negatives: a photograph that reveals its tiled construction. *Blueprint for a Curtain* acts as a prop within the exhibition, hanging the full height of the wall, but unlike a real cinema curtain, that just sufficiently covers the rectangular cinema screen, this blueprint falls onto the floor asserting its sculptural presence. In doing so it takes on the look of a classic photographic prop: the backdrop. Through the hand-painted process of the cyanotype technique the artwork is a 'painted' backdrop much like the ones used by the early commercial portrait photographers of the nineteenth century, both within the studio, as well as out in the landscape, most commonly the seaside.

Fig 13. Bridget Smith, *Blueprint for a Curtain*, Frith Street Gallery, 2016.

The art of the background is brought to the fore, and by its display it is also understood as an unfurled roll of paper(s) of the kind still used in contemporary photographic studios (despite the digital era). The photograph is still, whilst the pattern it depicts and its materiality implies a falling motion. As a sculpture the photograph is also a model (blueprint) for a potential curtain.

The historical failure of the cyanotype to be useful for pictorial purposes, due to its purely blue colour, became for me a valuable tool, enabling the viewer to have an associative response and, therefore, see the analogy within the image without the difference between either seat, or wave, collapsing into any one singular form. As the only colour in the entire exhibition it is left to create a dominant tone, or rather mood. Colours, as we know, carry emotional connotations; the word ‘blue’ is derived from an early English word meaning melancholy or sadness but it is also a paradoxical colour. In Goethe’s seminal nineteenth-century *Theory of Colours* he writes of blue:

> This colour has a peculiar and almost indescribable effect on the eye. As a hue it is powerful, but it is on the negative side, and in its highest purity is, as it were, a stimulating negation. Its appearance, then, is a kind of contradiction between excitement and repose.[128]

Blue has the shortest wavelength of all the colours of the spectrum and is, therefore, the one that we are able to see above all others when we look at the sky and the sea. Rebecca Solnit has written of 'the blue of distance' and writes of Yves Klein's use of blue as representative of 'the spirit, the sky and water, the immaterial and the remote, so that however tactile and close-up it is, it is always about distance and disembodiment'.[129] Here is Goethe again:

> 780. As the upper sky and distant mountains appear blue, so a blue surface seems to retire from us.
>
> 781. But as we readily follow an agreeable object that flies from us, so we love to contemplate blue, not because it advances to us, but because it draws us after it.[130]

In the exhibition, the sense of the infinite is brought up-close but, as the references note, whilst blue 'draws us after it', 'it is always about distance and disembodiment'. We associate blue with melancholia, absence and longing and as the only colour within the photographic installation, these emotional resonances carry an underlying (invisible) link to Swedenborg's notion of place – not significant as material form but as representative of an immaterial state of being – a place or space having the ability to dictate the kind of thoughts one might have when residing within it.

The spatial approach to my photographic art practice began with my exhibition, 'If You Want To Talk About Light, You Have To Talk About Waves', 2015. This research project, however, specifically locates the 'landscape' as photography itself. In the 'Eye Needs A Horizon' I take the premise of the original (cinematic) camera obscura and open it up to twenty-first century light and space. The analogue photograph remains at the heart of this approach but is reimagined by a digital process, that is then woven back into the analogue – here the cyanotype – a process that found its success as the groundwork for potentiality: as a plan, a model, a blueprint for an imagined material object. The photograph is now at the service of an overtly imaginative response that takes the viewer 'elsewhere'. The series *Blueprint for a Sea* and *Blueprint for a Curtain*, through process, materiality and titling

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[128] Johann Wolfgang von Goethe, *Theory of Colours*, trans. by Charles Lock Eastlake (London: John Murray, 1840), p. 310, no. 779.

[129] Rebecca Solnit, *A Field Guide To Getting Lost* (Edinburgh: Canongate Books, 2017), p. 159.

[130] Goethe, p. 311.

forefronts the idea of the copy, not as mechanical and identical, but shows it to be similar and considers the photograph a site for reimagining, for potential as much as realisation. Interior furnishings in the form of rows of seats and a curtain become, through the photographic process, analogous to an elemental landscape made up entirely of waves. I used the medium of photography to correspond with the space of the imaginary. I was only able to realise the scale of artworks that I wanted through using a digital process, generating multiple, large-scale negatives from a small, singular analogue transparency. The flattening, cropping, freezing actions frequently associated with photography now become expansive, mutable and dynamic.

The element that was implicitly missing from my original cinema photograph, but existed imaginatively as part of its conceptual intention, was the act of seeing a projected movie. Now, in order to complete my installation of a reimagined camera obscura, I wished to materialise this previously absent element, and to do so by focusing solely on the action of projection. This final artwork – moving in a wave like motion, made up entirely of particles – is to sit opposite the (falling) cinematic/photographic curtain.

Working with a cameraman, Martin Testar, and using a 4K high-definition video camera on a cinemascope ratio, we filmed a projected beam of light transmitting a movie. The cone of light was made visible through the dust motes moving in the air. Shot as a single full-frame image it was later divided into four 16:9 ratios. The four pieces of footage were then played in sync across four LED monitors. The intangible given sculptural form, both by its depiction and its display, reading as a cone of light travelling seamlessly (magically) through the framework of four screens (Fig 14).

The carbon motes ebb and flow in perpetual wave-like formations silently transmitting a never-ending unseen movie onto an unseen screen. An illusion made manifest by light that allows both tiny particles to be observed up close as well as the sense of the infinite. It is a ‘theatrical’ beam of light, both real and constructed. To depict a clearly defined cone of light amidst darkness I ‘fed’ the warm air currents (generated by the unseen projector) graphite powder that manifested as the sparkling, animated points of light moving through space. The process is seen solely through its effect: a different sort of drawing with light.[131]

[131] The etymology of the word ‘photograph’ comes from Greek roots: ‘*photo*’ – light, and ‘*graph*’ – instrument for recording, ‘drawing with light’. It was the astronomer and physicist John Herschel, the inventor of the cyanotype process, who coined the term ‘photography’ and introduced it to the public as part of his lecture at the Royal Society, 14 March 1839.

Fig 14. Bridget Smith, *Projection*, 2016, Frith Street Gallery.

For moving image documentation, see: <**https://vimeo.com/160751616/6e3c89ca5d**>
Please note that the artwork has no sound, the sounds on the recording are the ambient sounds of the gallery.

The disembodied nature of the artwork from its cinematic apparatus of projector and screen liberates the restless beam of light from a prescribed space. The darkness surrounding the light could be the darkness of the cinema interior as well as the deep black of outer space and the title *Projection* carries several meanings – literal and otherwise – including the sense of prophecy in forecasting future events. For all its meanings, however, it has a common root, the idea of something being propelled forward.

A moving image artwork that promotes a trance-like, hypnagogic state, through its perpetual motion whilst remaining at the same time fixed in place. Hypnagogia, the key physical process by which Swedenborg unlocked a previously unseen world, and, if one is to pick up from Benjamin and Krauss, one might also say that it is possible for this moving image to now start to evolve, changing and adapting through time and space in search of 'kin'.

In 'The Eye Needs A Horizon' the viewer is presented with numerous 'blueprints' and 'asked' to 'reconstruct' – to create new relationships and connections between each element: still and moving, photograph as object, photograph and object. The observer/receiver is

asked to reconsider their relationship between interior and exterior space, the up-close and the far away. Photography here is used to question ways of seeing and what we see. The camera becomes an unreliable recording machine allowing for multiple readings. The original darkened interior has opened up to both light and space, placing the observer within its open structure. Viewing *Projection*, the contemporary observer is held in part by the mesmeric dance of light imagery but remains at a remove from it, in much the same way as the historic observer was captivated by this same phenomenon standing within the darkened room that was the camera obscura, held at a remove from the world outside. Here, however, the phenomenon is generated not by nature but by technology, in the form of a projector and a high-definition video camera. The motion of the artwork is paradoxical; it appears to be on a forward trajectory, the cone of light widening the further it moves away from its source, yet on closer inspection the graphite motes are moving back towards the heat of its source, like moths to a flame. And the contemporary viewer's gaze, whilst taking in the forward trajectory of the beam, is also asked (by the artwork) to turn from side to side. The two single actions required by each of Hooke's camera obscuras are here brought together. The viewer's attention is caught most, however, in the detail of the side-to-side action. This shift in focus encourages a different sort of compelling, contemporary, absorption in moving imagery – the magic of transmission through space.

CHAPTER 3

Part 1

The Art Of The Experiment

> I study Newton daily, and am very anxious to see and hear him. I have provided myself with a small stock of books for the study of mathematics, and also with a certain number of instruments, which are both a help and an ornament in the study of science; such as, an astronomical tube, quadrants of several kinds, prisms, microscopes, artificial scales, and *cameræ obscuræ* […] which I admire and which you too will admire.
>
> Emanuel Swedenborg, London, 13 October, 1710[132]

In this chapter I wish to pause and take a close look at light: its properties and behaviour. To imagine what it is to look inside light, just as we have looked inside the camera obscura. Light the agent by which 'the seemingly magic transfer of the photograph is effected',[133] the heart of the Swedenborgian system, the conduit between the material world and the world of spirit. And light an element capable of permeating a fog and changing the atmosphere.

Throughout this research project motifs and themes are reworked and reconfigured, taking on different qualities and new forms as I move through the project's time span. A certain light has already been required in order to see the connection between Swedenborg's theories and photography. That self-same light formed into a 'landscape' of waves and a hypnagogic-inducing projection as part of my experimental visualisation within the research project.

In thinking about light, I look to two seminal experiments and the mutating shapes that they occupied over time: one is by Isaac Newton from the seventeenth century and one is by Albert Einstein from the twentieth century. They feature two prisms (one rotating and one fixed) and two boxes (one real and one imaginary). One is a real experiment, the other an imaginary experiment. One was intensely private for a long time, the other, immediately public. The first experiment took over thirty years to resolve, the second appeared to be

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[132] Swedenborg to Erik Benzelius, London, 13 October, 1710, *Documents Concerning The Life and Character of Emanuel Swedenborg*, 1, trans. by R L Tafel, (London: The Swedenborg Society, 1875-7), p. 207.

<https://archive.org/details/documentsconcern01tafe/page/206/mode/2up?q=marshall&view=theater > [accessed 26 October 2021].

[133] Krauss, p. 37.

resolved in one night. The epilogue to both culminates in recorded dialogues in, and with, the spirit world. Two experiments, each in their own way regarded as classic experiments, but each having a hidden-from-view underside that I would like to turn over and expose to the light.

I begin with Newton, that influential figure that the young Swedenborg, newly arrived in London in 1710, was so anxious to both see and hear. Newton the great determinist natural philosopher, first modern scientist, whose seventeenth-century theories formed the bedrock of eighteenth-century Enlightenment ideology. It was Newton who Swedenborg wished to meet and learn from as part of his own ambition to become an important natural philosopher. This was not an unrealistic hope as by 1710 Newton was active as President of the Royal Society, London. His reputation as one of *the* great natural philosophers of the age was already secured by the influence of his major works: *Principia* (1687) and *Opticks* (1704) both in their different ways considered to be two of the most important works in the history of science.

The *Principia* formulated the laws of motion and universal gravitation that dominated scientists' views of the physical world for centuries. It became known as the first great unification of physical theories, as Newton was able to trace the connection between gravity on earth and astronomical movements. In charting the mathematics of motion and change Newton created a new mathematical system, the calculus. The *Principia* signalled a revolution in physics, yet for all its theoretical brilliance few found it easy to comprehend its abstruse Latin text. The *Opticks*, equally brilliant in its contribution to science was, by contrast, a collected record of Newton's experiments with light and colour conducted over many years. Written in (plain) English it contributed to the development of a vernacular science literature. The opening sentence declares its intention: 'My Design in this Book is not to explain the Properties of Light by Hypotheses, but to propose and prove them by Reason and Experiments'.[134] Today few non-specialists will have read Newton's experiments with light and prisms. Instead his theory of light and colour has come to be widely received and understood through one defining image: a beam of light refracting through a prism into a rainbow spectrum of colours.[135]

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[134] Isaac Newton, *Opticks: or, a Treatise of the Reflexions, Refractions, Inflexions and Colours of Light. Also Two Treatises of the Species and Magnitude of Curvilinear Figures* (London: Royal Society, 1704).

[135] An eighteenth-century scientific image that is perhaps today most commonly identified in mainstream popular culture as the iconic graphic album cover for Pink Floyd's 'The Dark Side of the Moon', 1973.

I wish to step away from the idea of the experiment generating a singular image by looking at what lies behind the surface: the art and science of recording experiments. I begin not with the eighteenth-century Newton and his surety, but rather look back to the seventeenth century where the picture is full of potential. It is 1666 and a young Isaac Newton is at home in Lincoln, his studies at the University of Cambridge temporarily suspended due to the plague. The scene – once again – is a darkened chamber with a small aperture that lets in a beam of light. It is here that Newton's 'glass works' experiments began and a new instrument was controversially added to the natural philosopher's toolkit of the telescope and the microscope: the prism, an object with more than one side to it.

Newton believed, like many natural philosophers of the era, that there was an unseen, hidden reality not so far away from us, that required 'breaking open the universe to see what was inside'.[136] Light was one such element and the object that 'broke it open' was the prism. Familiar to us today but what he saw became a counterintuitive, revolutionary theory – spectral colours. 'Whereas previous theories had taken white light for granted and tried to explain how colours were formed, Newton reversed the position by assuming that colour is a basic property that can be used to explain white light'.[137]

Writing many years in the future from his initial experiment, Newton begins simply enough:

> In a very dark Chamber at a round hole about one third part of an Inch broad made in a Shut of a Window I placed a Glass Prism, whereby the beam of the Sun's Light, which came in that hole might be refracted upwards toward the opposite Wall of the Chamber, and there form a coloured Image of the Sun. [138]

This seminal experiment with one prism created a prismatic projection of at least twenty-one feet across the space of the room to the opposite wall. Newton was able to observe that the spectrum of colours exiting the prism were oblong, even though the light rays entering the prism had been circular. And from the shape of the image he drew the conclusion that different rays have different refrangibility (refraction).

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[136] David Bodanis, 'On Isaac Newton', Swedenborg House, London, 26 October 2018.

[137] Patricia Fara, 'Newton shows the light: a commentary on Newton (1672) 'A letter…containing his new theory about light and colours…'
<https://royalsocietypublishing.org/doi/10.1098/rsta.2014.0213>.

[138] Isaac Newton, *Opticks*, Book I, Part I, PROP. II. Theor. II. Exper. 3.

< https://www.newtonproject.ox.ac.uk/view/texts/normalized/NATP00033> [accessed 26 October 2021].

In total sixty-four experiments were recorded in his manuscript detailing projections, often using multiple configurations of prisms, screens and lenses. The forty-fourth experiment involved not one but two prisms. This use of two sequential prisms was his innovation. By isolating individual rays after the first refraction, and refracting them for a second time, he was able to conclude that blue-making rays were refracted more than red and that these rays could not be split into further colours; colours were, therefore, immutable. 'The separation of such rays was a novel feature of experimental optics. The existence of such rays was a novel feature of optical theory'.[139]

It was this trial, with its attendant claims, that was to become the focus of much controversy once Newton went public with his findings on optics some six years later in 1672.[140] He was by this point, Professor of Mathematics at the University of Cambridge when he sent his letter to the secretary of the Royal Society, London. With a few minor edits it was immediately published in the Society's journal *Philosophical Transactions* and carried two important implications for the future: the nature of light was composed of tiny particles, and the properties of colour.[141] Within a week of publication, however, Newton's methods and methodologies were under attack, starting from within the Royal Society itself, with Robert Hooke, before spreading further afield to the Continent. It took Newton the next thirty years to fully address and quell his critics. As Simon Schaffer writes:

> The experimenter is never alone with nature: there is always an audience, real or implied, which must be addressed and persuaded that what one experimenter makes is meaningful and important even in their very different circumstances. Experimental products must make sense for these others, and this sense is made successfully only if the original experimenter can enable the meaning of a trial to transcend the space in which that trial is performed.[142]

In seeking to understand how Newton transcended his domestic interior, I trace the path of his forty-fourth experiment as it evolved through time. I pay particular interest to the artefacts that are part of this experiment and those that come about as a result of it: the prism, that transparent object at the heart of his sculptural experiments; the pen and ink sketch of

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[139] Simon Schaffer, 'Glass Works: Newton's Prisms and the Uses of Experiment' in *The Uses of Experiment: Studies in the Natural Sciences*, ed. by David Gooding, Trevor Pinch and Simon Schaffer (Cambridge University Press, 1989), pp. 67-104 (p. 79).

[140] It remains to this day a matter of philosophical and historical attention amongst scientists and historians.

[141] *The Uses of Experiment: Studies in the Natural Sciences*, ed. by David Gooding, Trevor Pinch and Simon Schaffer (Cambridge University Press, 1989), p. 7.

[142] Ibid. p. xiv.

his ‘crucial experiment’ drawn on the back of a scrap of paper, that becomes the basis of the engraving in later editions of *Opticks*; as well as his great artistic legacy, the colour wheel; and finally a seventeenth-century box that was not opened until the twentieth century.

In his published letter Newton begins with his key observations and then sets out what he called his crucial experiment (*Experimentum Crucis)*: a trial involving two prisms. Behind the first prism Newton set up a board with a small hole so that by rotating the prism slightly on its axis he could project different parts of the spectrum through the hole. Halfway across the room another board with a hole was placed to allow the beam to pass. The second prism was placed behind this board in a fixed position. One rotating prism, one fixed. There was no diagram at this point of publication to illustrate the configuration of the experiment.

It was here that ‘spectrum’ became a new technical term, Newton, at this point, naming five colours: red, yellow, green, blue, violet. It was here that he adopted Hooke’s use of the phrase ‘*Experimentum Crucis*’ (from *Micrographia*) and tried to persuade his audience of the veracity of his new theories through the *one* crucial experiment. The term is nowhere to be found in his notebooks, drafts or lectures prior to this point. Newton’s forty-fourth trial of six years earlier, the ‘double-prism’ experiment, had been reworked, rewritten and retrospectively labelled as the *one*. Its conclusion was that ‘light consists of rays differently refrangible’. Yet his ideas about colour were now not included as part of this crucial experiment, but were written in the form of thirteen propositions.

In seeking to test Newton’s theories and replicate the experiment the members of the imagined state of the ‘Republic of Letters’[143] found him to be lacking on specific details, thereby making any attempt to reproduce his findings extremely difficult and problematic. Newton’s critics were having difficulty in uniting the now colourless crucial experiment with his colourful theory. In their attempts at unification, the prism(s), that simple transparent toy, pivoted on its axis and became a highly contested object.

> How […] do experiments acquire their identity? Scientific instruments play a decisive role in this process. […] Instruments help make experiments compelling, because the self-evidence which is attached to instrumental procedures after closure links complex experiments to agreed matters of fact. This closure makes instruments into what are seen as uncontestable transmitters of messages from nature, that is, it makes them ‘transparent’.[144]

[143] The ‘Republic of Letters’ refers to a correspondence network at the time, whereby letters, drawings and specimens were circulated amongst members across Europe.

[144] Schaffer, p. 70.

It is thought that Newton first picked up his famous prism(s) at a local summer fair – 'I procured me a Triangular glass-Prisme'[145] – but the casualness of that gesture belies the fact that to use a prism at all as a key instrument of experimental optics was a radical move. This untested, previously unexamined instrument, combined with an idealised account of an experiment, meant that the 'transparent' nature of Newton's prism was now under question.[146] In order that it might achieve 'transparency', the dissenting experimenters sought answers about the quality of glass used,[147] the exact geometry and size of each prism and their precise locations within the experiment set-up. Newton's new instrument of experimental physics, however, continued to occupy a shape-shifting space at the heart of his crucial experiment, living up to its seventeenth-century reputation as 'playfully deceitful'.[148]

In the future it would come to light that Newton's prisms took on many forms: he used at least three different prisms separately and in combination; he used 'Prismatick Vessels, made with pieces of broken looking-glasses, and filled with rain water'.[149] And to increase the refraction he sometimes added lead salt to the water; he used two prisms tied together 'basis to basis'; he used prisms that had one side covered with black paper. In terms of orientation: sometimes the prisms were parallel, sometimes they were crossed, sometimes they were in front of screens, sometimes behind. 'Newton began changing the commercial 'triangular glass prism' into a complex experimental instrument'.[150] But for the present (1672) all of this was unknown and there was just one experiment by which the whole of Newton's new theory of light and colour stood to be discredited if that experiment was essentially refuted. What was known was that Newton's basic answer to his critics was that a good prism was one that made 'primitive rays' and that if it were unable to do so it was due to the fact that it was a 'bad' prism. Despite furnishing some further details on the quality of glass, design, preparation and positioning of the prisms, there remained, after several years, no absolute consensus on the right kind of prism. Newton withdrew and became essentially

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[145] Isaac Newton, 'A Letter of Mr. Isaac Newton… containing his New Theory about Light and Colors', *Philosophical Transactions of the Royal Society*, no. 80 (19 Feb. 1672), pp. 3075-3087 <https://www.newtonproject.ox.ac.uk/view/texts/diplomatic/NATP00006> [accessed 26 October 2021].

[146] Schaffer, p. 70.

[147] The quality of glass from that period was frequently full of flaws and air bubbles. Venetian glass was regarded as of the highest quality, with all other glass compared to its standard.

[148] Schaffer, p. 73.

[149] David Scott Kastan with Stephen Farthing, *On Color* (New Haven and London: Yale University Press, 2018), p. 48.

[150] Schaffer, p. 76.

silent on the subject of optics for the next quarter century. In the future historians such as Simon Schaffer would also note that Newton was not in the right location to be purchasing a prism from the particular summer fair of 1665, that there had been no summer fair of 1666 due to the plague, and that none of the extant prisms associated with Newton correspond with any of his descriptions of those that he used in his experiments.[151] Newton's imagined prisms.

We jump forward to 1704, the start of the new century of Enlightenment, and the publication of Newton's collected works on optics, thirty-seven years after his first experiment with a prism. It is the year after he was elected President of the Royal Society, and the death of his great rival Robert Hooke. The term '*experimentum crucis*' has disappeared once more to be replaced by an 'experimenter's handbook', the *Opticks*: thirty-three experiments and forty-eight observations. It is thought that in the long intervening years 'the need to support each thesis of the new theory by doing separate experiments emerged'.[152] The forty-fourth trial/crucial double-prism experiment, had been reconfigured once more, this time in the form of several similar experiments, the closest being an experiment that uses a prism-lens combination: Book 1, experiment 12. The weighting towards theory in the 1672 letter/article, had shifted towards an experimental approach and within that Newton's main theory about light shifted more towards the spectral nature of colour; its immutability.

The term '*experimentum crucis*' might not have appeared in the *Opticks*, but it resurfaces in the form of an image, specifically an engraving to serve as the frontispiece for a lavish French edition produced in 1722 (Fig 15). The publisher asked Newton to provide a suitable sketch. Newton chose to sketch the prism-lens experiment (Fig 16). The famous French painter Arlaud was asked to make a drawing from the sketch but he decided to commission the artist Chaufrier to make the drawing, and the engraver Herisset to make the engraving.[153] The 'vignette' appeared as a head-piece to each part of the Paris edition, and is considered to be the last representation of the final version of the '*experimentum crucis*', and a concrete example of experiment 12 from Book 1 of the *Opticks*.

The engraving process meant that Newton's sketch came to be seen in reverse and due to the cross-hatching technique, the publisher, Varignon informs Newton that as 'each single ray

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[151] Schaffer, p. 78.

[152] Yoshimi Takuwa, 'The Historical Transformation of Newton's *experimentum crucis*: Pursuit of the Demonstration of Color Immutability' *Historia Scientiarum,* 23.2 (2013), pp. 113-140 (p. 123).

[153] See J. A. Lohne, 'Experimentum Crucis', *Notes and Records of the Royal Society of London*, 23.2 (Dec. 1968), pp. 169-199 (194).

cannot be discerned in the illuminated space, it should be made wholly white'.[154] Newton's split white light had become whole again. Apart from aesthetic alterations, the vignette also showed some scientific inaccuracies that were either not observed by Newton or he did not regard the diagram as having to portray scientific accuracy; 'I can only thank you for amending and making more elegant the scheme which illustrates how primitive and immutable colours may be separated from each other';[155] an idealised image of an idealised experiment.

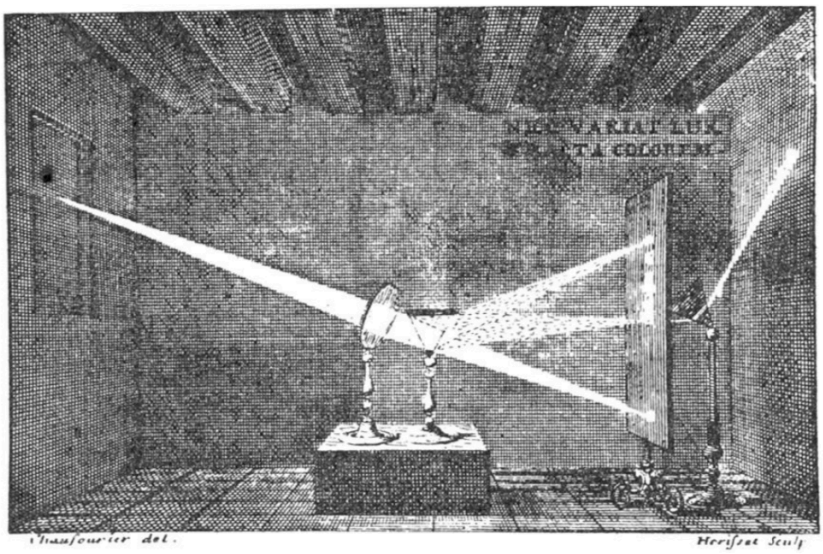

Fig 15. Isaac Newton, 'Vignette' (engraving by Antoine Herisset based on Newton's sketch), *Opticks*, Paris edition (1722).

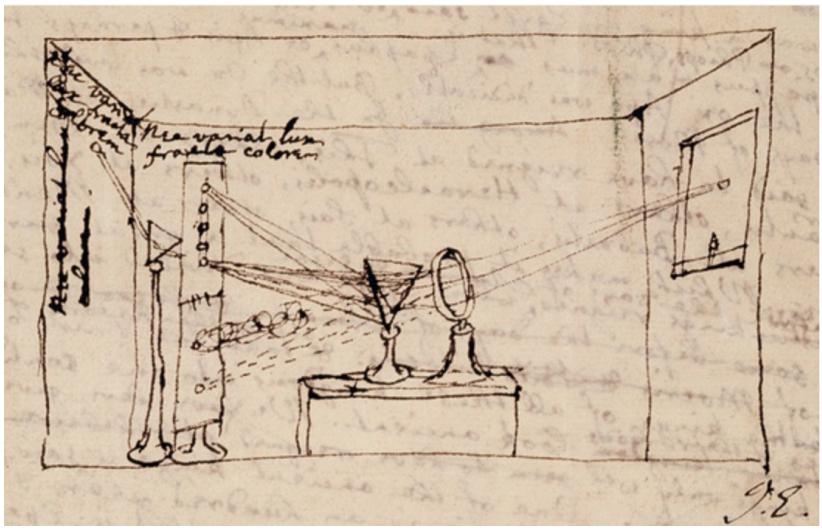

Fig 16. Isaac Newton, Ink sketch of the prism-lens experiment. New College Library, Oxford, MS 361/2, f. 45v. © Courtesy of the Warden and Scholars of New College, Oxford.

[154] Lohne, p. 194.

[155] Ibid. p. 194.

The original pen and ink sketch (Fig 16) is now considered one of the most pivotal images in scientific history. It shows a beam of light entering the room from a window on the right via a small hole in the window-shutters. It then passes through a lens on a stand before it passes through the first prism.[156] The light is refracted and Newton draws five circles to indicate the holes in the board. One selected ray is refracted for a second time. At the point where the single ray hits the wall at the top left of the sketch Newton has written (following the perspective of the left wall) 'Nec variat lux fracta colorem' (Refracted light does not change colour). This fundamental property of light is written for a second time across the top of the facing wall – the double text now following the arc of the refracted beam of light.

The question of Newton's acuity of observation comes up once more with the other seminal diagram from the *Opticks*: Newton's colour wheel. In the seventeenth century he named five spectral colours. The eighteenth-century engraving that adorned each section of the later editions of the *Opticks* depicts five holes in the screen corresponding to five spectral colours. Yet Newton's now circular spectrum – within the same book – shows seven spectral colours with the addition of orange and indigo. In a letter dated 7 December 1675 to Henry Oldenburg, the secretary of the Royal Society, he admitted that his eyes were 'not very critical in distinguishing colours'. Occasionally he reported seeing as many as eleven, mainly he saw only five. It is seven that we accept to this day as the rainbow colours of the spectrum.

Despite their inclusion he considered the two 'new' colours as less important referring to them as semi-tones. It is here that the analogy with music appears; there are seven notes in a diatonic scale that comprise five whole steps and two half steps in each octave. Frequently the scale refers to the musical elements of the 'white note scale'. In addition to the pleasing unity of the number of named colours being analogous to a musical scale there were other factors coming into play:

> The world was created in seven days. And the rainbow was a sign of cosmic harmony, so it had to have seven colors and Newton therefore added (saw?) orange between red and yellow and indigo between blue and violet […] Newton's faith based seven.[157]

It would appear that it was not so much Newton's eyesight that was an issue more perhaps what he wanted to see; an idealised vision that would fit in a satisfyingly complete way with

[156] Newton came to add a lens to his double-prism experiment in order to better focus the light and create a more intense spectrum.

[157] Kastan with Farling, p. 12.

his beliefs. Newton's imagined colours. Their immutability now also unfixed over time: Newton's indigo is now what we would call blue, and the blue has become cyan. The spectral colours, we now know, are made up of six not seven: red, orange, yellow, green, blue and violet. [158]

In the future (the present) Newton's prism-lens sketch will come to reside in the second of four bound volumes of Newton's papers, held as part of the collection at New College, Oxford.[159] The volume contains miscellaneous loose papers. The sketch appears on the verso side of a sheet of paper that has a torn jagged bottom edge. There is writing below that is upside down to the drawing, and follows the contour of the jagged edge of the page and the recto side is entirely covered by writing (Fig 17). The underside and face of this seminal scientific image shares its space not with writings on optics in particular, or scientific matters in general, but with Newton's (then private) writings on theology and historical biblical chronology, that will also only come to light in the future.

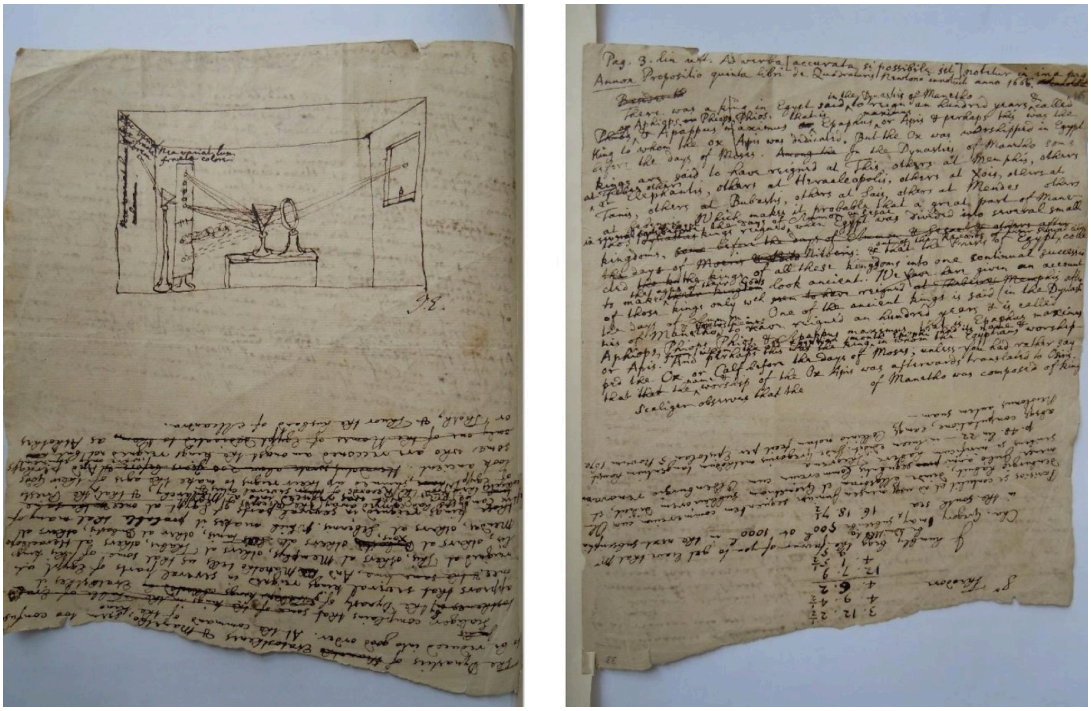

Fig 17. Isaac Newton, Ink sketch drawing manuscript.
New College Library, Oxford, MS 361/2, f. 45v and r. © Courtesy of the Warden and Scholars of New College, Oxford.

[158] Joann Eckstut and Arielle Eckstut, *The Secret Language Of Color: Science, Nature, History, Culture, Beauty of Red, Orange, Yellow, Green, Blue and Violet* (New York: Black Dog and Leventhal, 2013), p. 16.

[159] Jason Morgan, 'Seeing the Light: Being the story of Sir Isaac Newton's prisms and papers and the means by which they came to New College', *New College Notes* 9 (2018), no.10, p. 1. <https://www.new.ox.ac.uk/node/1631> [accessed 26 October 2021].

In the future, now past (1936), a box containing a sizeable portion of a vast collection of Newton's manuscripts, that he had packed up in 1696 on leaving Cambridge for London – that had been kept secret both by him and future custodians – was put up for auction. John Maynard Keynes, the great twentieth-century economist was able to purchase and reassemble half of the contents of this box over time. What he discovered in this tranche of manuscripts was Newton's obsessive interest in apocalyptic writings, Church history and a great interest in alchemy: transmutation and the philosopher's stone. 'He was occupied with this when composing the *Principia* […] He was almost entirely concerned […] in trying to find meaning in cryptic verses, to imitate the alleged but largely imaginary experiments of the initiates of past centuries'.[160] According to Keynes the 'unpublished works on esoteric and theological matters are marked by careful learning, accurate method and extreme sobriety of statement. They are just as sane as the *Principia*, if their whole matter and purpose were not magical'.[161] It was now that a new side to Newton, alternative to the conventional eighteenth-century picture of him was revealed. For Keynes this did not diminish the man, rather it made him all the more extraordinary.

The secret box, packed in 1696 is a pivotal object that marks the turning point in Newton's life; moving from the seventeenth century to the eighteenth century and the Age of Enlightenment. The box and its paradoxical contents, its methods and methodologies, were an integral (hidden) part of Newton's great work, produced in the seventeenth century. Once he left for London, the magic packed away, he embarked on his eighteenth-century life, reigning supreme in London for more than another twenty years. For Keynes, however, he was never again to concentrate in the same way, with such intensity or make any new work. The focus was on the presentation of what had gone before – the creation of certainty: the polished surface, the solid ground. In the future/present that solid ground has broken up and become unmoored, floating in a sea of probabilities and uncertainty.

> Newton the great empiricist, the great positivist, the great determinist, the great mechanist. All these honourifics left hanging as questions. All co-existing along with other ghosts of Newton that speak of the undoings of mechanism, determinism, positivism, scientism.
>
> Superpositions, not oppositions. Physics has always been spooked.[162]

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[160] John Maynard Keynes, 'Newton, the Man' in *The Collected Writings of John Maynard Keynes: Volume X, Essays in Biography*, 4th edn (Cambridge: Cambridge University Press, 2012), pp. 363-374

[161] Ibid.

[162] Karen Barad, 'Quantum Entanglements and Hauntological Relations of Inheritance: Dis/continuities, SpaceTime Enfoldings, and Justice-to-Come', *Derrida Today*, 3.2 (2010) 240-268 (p. 258).

It is thought that the young Swedenborg never did get to meet the venerable Newton during his few years in London, despite meeting and engaging with several of the great scientist's contemporaries. Both lives, near identical in longevity moved in very different trajectories: the one moving away from esotericism, the other towards it. Swedenborg formulated his own scientific cosmology in direct correspondence with Newton's, creating speculative drawings of particles in 1734 where Newton had earlier 'imagined' colours. Both *Principias* were published when their authors were in their mid-40s and proved a turning point for each, and a point of crossing between them. Both, unsurprisingly for the times, were devout Christians, but both were unorthodox and would have been called heretics had their views been made public. Both were seers, with Newton predicting in 1704 (through calculating from his biblical chronology) that the end of time would come in 2060. 'His prediction hidden away for a time not his own'.[163] Their paths, however, were to cross in the spirit world. Swedenborg was finally able to meet and converse with Newton. On one occasion, as he recounts, 'some spirits then went over to him and said, "Think please, of colours not from the perspective of some small prism or the way they appear on some wall, but from the perspective of the greenness of all the forests and all the grassy fields throughout the entire world in which you have been'.[164] The perception of colour – something that Newton had not ventured to consider – would only take on an importance in the future.

Newton's theory that light was made of particles held sway until 1801 when Thomas Young and his two slit experiment showed that light was in fact made up of waves. In 1865 James Clerk Maxwell demonstrated that electric and magnetic fields travel though space as waves, and established the speed of light.[165] A few years earlier in 1861 Maxwell had conducted an experiment: three black and white magic lantern slides were created of the same multi-coloured tartan ribbon under three different lighting conditions: red, green and blue. The resulting black and white slides, of the same image but with slight variations due to the differing lighting conditions, were then projected through red, green and blue filters. This 'second' seminal light projection, after Newton's first prismatic projection, created what is regarded as the first colour photograph – not a fixed image but three projected beams of light focused together to create the one full-colour (spectral) image.

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[163] Barad, p. 257.

[164] Emanuel Swedenborg, *The Last Judgment [posthumous]*, in *Three Short Works*, trans. by N. Bruce Rogers (Bryn Athyn, PA: General Church of the New Jerusalem, 1997), §291, pp. 163-4.

[165] Maxwell's electromagnetism theory led to his prediction of the existence of radio waves and to what many regard as the second great unification in physics.

In 1905 Albert Einstein set about to disprove Newton's theory that space and time are completely separate. He used Maxwell's speed of light equations as justification for his revolutionary new theory on Special Relativity that included the most famous equation in mathematics: $E=mc^2$ (energy equals mass times the speed of light squared). It shows that energy and mass are interchangeable: they are different forms of the same thing. Time is relative. It took a further ten years before he published what he considered to be a complete solution: a new theory of gravity, The General Theory of Relativity, with the revelation that 'the gravitational field is not diffused through space; the gravitational field is that space itself'.[166] Einstein's 'most beautiful of theories' states that space curves where there is matter. In 1919 when astronomers were able to measure the bending of starlight around the sun during a solar eclipse his theory of general relativity was confirmed and he became 'the first superstar of science'.[167]

He won the Nobel Prize in 1921, not for relativity, however, but for his 'crazy idea' of the photon (light quantum). It had been Max Planck in 1900 who – by 'a peculiar trick of calculation'[168] – proposed the idea that energy is exchanged through discrete packages rather than continuously, without having a complete understanding of why his calculation worked. It was Einstein who, in one of four papers published in 1905, 'came to understand that these 'packets of energy' were real';[169] light, he proposed, was not simply made up of waves, it could also be thought of as discrete individual particles or quanta, today referred to as photons. A few years later he would propose his wave-particle duality theory. Quantum theory was born. It is said that Planck started it, Einstein nurtured it and Niels Bohr pioneered its development with 'quantum leaps'.

Bohr was to set up his institute in Copenhagen bringing together a whole new generation of physicists. By 1925 the first equations of quantum theory were written by a young German, Werner Heisenberg, instantly replacing the entire mechanics of Newton.

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[166] Carlo Rovelli, *Seven Brief Lessons on Physics*, trans. by Simon Carnell and Erica Segre (UK: Allen Lane, Penguin, Random House, 2015), p. 6.

[167] Manjit Kumar, *Quantum: Einstein, Bohr and the Great Debate About the Nature of Reality*, 3rd edn (London: Icon Books, 2014), p. xvi.

[168] Rovelli, p. 12.

[169] Ibid. p. 12.

> Heisenberg imagined that electrons do not *always* exist. They only exist when someone or something watches them, or better, when they are interacting with something else. They materialize in a place, with a calculable probability, when colliding with something else. The 'quantum leaps' from one orbit to another are the only means they have of being 'real': an electron is a set of jumps from one interaction to another. When nothing disturbs it, it is not in any precise place. It is not in a 'place' at all.[170]

The basic components of quantum theory, however, were finding their place, and were in the ascendency, but there was no doubting that the ground had been pulled from under everyone. Einstein's theory of relativity remained accurate in the domain of the very large and Planck's, Bohr's and Heisenberg's quantum theory was accurate for the smallest possible unit. Both could not be true for everywhere.

We have left behind Newton's real (idealised) double-prism experiment, and moved into the territory of thought experiments (*gedanken*); idealised, imaginary experiments conjured up as a way to test the consistency and limits of a theory, principle or hypothesis. As Carlo Rovelli writes 'science is above all about visions. Science begins with a vision. Scientific thought is fed by the capacity to 'see' things differently than they have previously been seen'.[171] I look at one specific thought experiment from 1930 that proved pivotal in the public debates between Einstein and his greatest rival Bohr. In doing so we make the leap from Newton's real box of magic to Einstein's imaginary box of light.

The setting is the sixth Solvay Conference on 'Magnetism' held at the Club of the Fondation Universitaire, Brussels, 1930.[172] The Solvay international conferences were established to bring together (every three years and by invitation only) the finest minds working in physics to discuss the big open questions of the day. This was to be Einstein and Bohr's second public encounter to try to settle once and for all the nature of reality. It was at the previous conference that they debated a *gedanken* experiment based on Young's original two-slit experiment conducted over a hundred years earlier. An experiment that Karen Barad, in the twenty-first century, will also revisit in her reevaluation of Bohr's philosophy-physics:

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[170] Rovelli, p. 15.

[171] Ibid. p. 21.

[172] See: Jagdish Mehra, *The Solvay Conferences on Physics: Aspects of the Development of Physics Since 1911*, (Dordrecht, Holland and Boston, USA: D. Reidel, 1975).

> There is no expectation that a gedanken experiment will ever be performed (on the contrary), and therefore there are no practical restrictions. […] But recently something startling has happened. Experimental, technological, and theoretical progress has made it possible to *actually perform* certain *thought* experiments, experiments that directly test the *metaphysical* foundations of the quantum theory. Welcome to the world of "experimental metaphysics"![173]

For now though we are in the Club and Einstein is telling a confident Bohr about his new thought experiment devised in order to prove that Heisenberg's Uncertainty Principle was inconsistent:

> Imagine a box full of light. […] In one of its walls is a hole with a shutter that can be opened and closed by a mechanism connected to a clock inside the box. The clock is synchronized with another in the laboratory. Weigh the box. Set the clock to open the shutter at a certain time for the briefest of moments, but long enough for a single photon to escape. We now know […] precisely the time at which the photon left the box. […] weigh the box again.[174]

Léon Rosenfeld, a fellow attendee and witness, recalled in the future:

> It was the occasion when Einstein thought to have found a counter-example of the uncertainty principle with his well-known box from which a photon is emitted […] It was quite a shock for Bohr to be faced with this problem; he did not see the solution at once. During the whole evening he was extremely unhappy, going from one to the other and trying to persuade them that it couldn't be true, that it would be the end of physics if Einstein were right; but he couldn't produce any refutation. […] The next morning came Bohr's triumph and the salvation of physics; Bohr had found the answer.[175]

In formulating the thought experiment Einstein used his $E=mc^2$ equation. In refuting his experiment, Bohr used Einstein's theory of gravitation to argue against Einstein, and in doing so won the argument. This well-documented event appears, in the retelling, to resolve the question of the nature of reality in one sleepless night. It may not have done so but it did prove to be the turning point whereby the younger generation of physicists began to turn their backs on Einstein for his inability to embrace quantum mechanics or 'spooky action at a distance' as he liked to refer to it.

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[173] Karen Barad, *Meeting the Universe Halfway: Quantum physics and the entanglement of matter and meaning*, (Durham and London: Duke University Press, 2007), p. 288.

[174] Kumar, p. 282.

[175] Léon Rosenfeld, 'Some Concluding Remarks and Reminiscences', *Fundamental Problems in Elementary Particle Physics: Proceedings of the Fourteenth Conference on Physics at the University of Brussels, October 1967*, (London, New York, Sydney: Interscience, John Wiley & Sons, 1968), p. 232.

There exists a photograph of a section of Bohr's blackboard, taken in his office in Carlsberg, Copenhagen on Saturday, 17 November 1962 (See Fig 18). As it would turn out this would be the day before he died, and so through timing the reading of the photograph changed – it became an image of the last marks he made. The photograph is portrait in format and crops closely in on two rough sketches. The trace of several dynamic sweeping gestures, created by Bohr's hand that held the chalk eraser, are clearly visible behind the diagrams. The sketches appear to float in front of this 'ghostly field', suspended in mid-air. As a final image it remains vital through the trace of bodily movements and actions; the erasure gestures clearly carry on beyond the frame, their arc cut purely by the photographer's hand/eye.

In the lower half of the image, Bohr has drawn his impression of 'Einstein's box of light', Einstein having died some seven years earlier. The photograph was taken at some point during a wide-ranging interview between Bohr and four physicists, including Léon Rosenfeld, who had been present in 1930.[176] I read the transcript of that final interview where it is noted, like stage directions, when Bohr moves to the board to make his drawing. A short time later he returns to his rendition of Einstein's box and adds a horizontal line, to denote an emerging photon – a belated, dynamic action, that animates the still image. The transcript covers numerous topics but essentially reveals that Bohr, right until the very end, was engaged in vigorous, now ghostly (spooky) debate with Einstein, some thirty years after he first introduced his thought experiment about a box of light with its emerging single photon.[177]

[176] The interview of Niels Bohr by Thomas S. Kuhn, Léon Rosenfeld, Aage Petersen, and Erik Rudinger was conducted over five sessions between 31 October and 17 November 1962 in Bohr's office, Carlsberg, Copenhagen, Denmark.

[177] American Institute of Physics, 'Oral History Interviews: Niels Bohr – Session V', <www.aip.org/history-programs/niels-bohr-library/oral-histories/4517-5 > [accessed 27 October 2021].

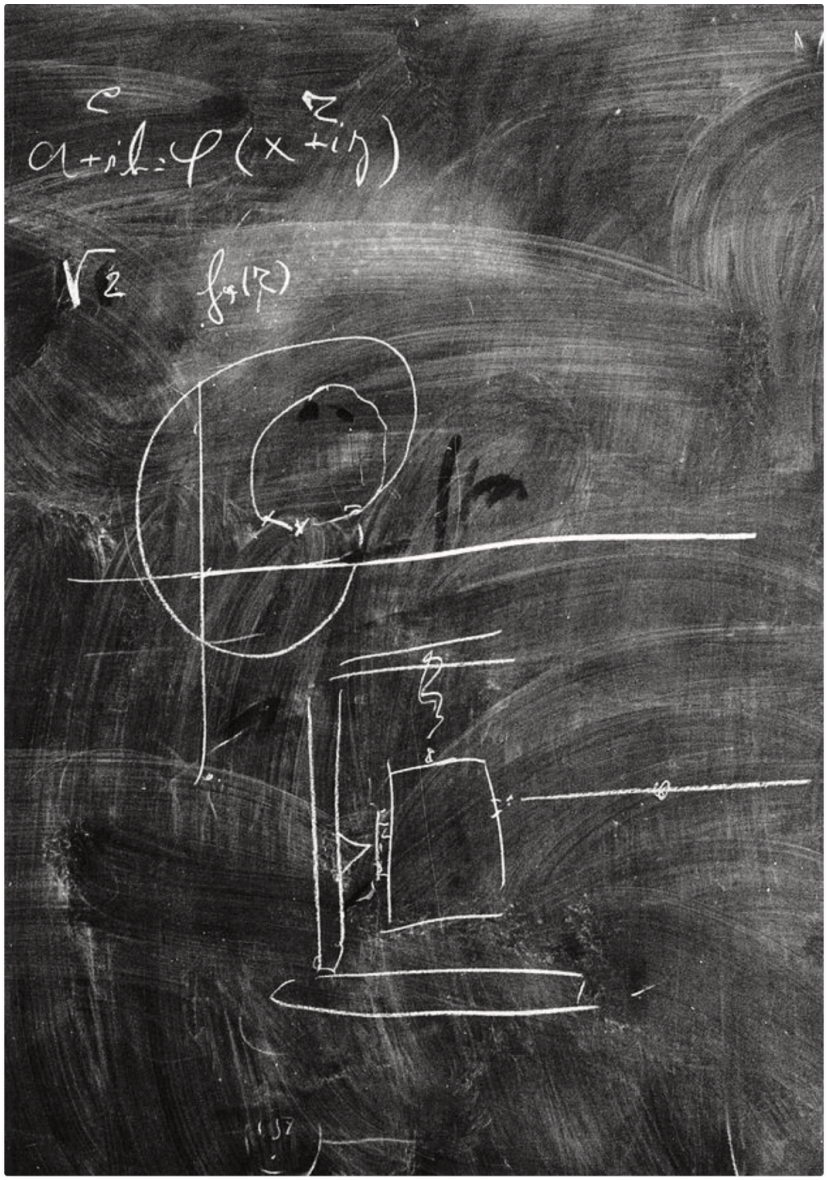

Fig 18. Niels Bohr, Last blackboard drawing: Einstein's box of light (lower half of the image), 17 November 1962. Credit: AIP Emilio Segrè Visual Archives.

In part 1 of this chapter Newton's seventeenth century (real) prismatic light projection that permeated a darkened room became a twentieth-century (imagined) box of light that emits a single photon. I receive the artefacts from both light experiments equally. In part 2 I am invited by a university physics department to consider a twenty-first century box. A box that is now full with visions, from which an artwork must emerge.

***

Part 2
Thinking Light

We move now to the construction of the Beecroft Building, University of Oxford, designed by Hawkins\Brown architects and site of my new public art commission, *Thinking Light*.[178] The building aims to bring together for the first time theoretical and experimental research physicists under one roof: an oversized box of visions, this one with hidden depths. The hidden-from-view basement, deeper below ground than the height of the building above ground, contains 'black box' laboratories that require extreme standards of vibration isolation in order to conduct nano-scale experiments. Above ground, the repeat interior motif is to be the multiple oversized blackboards (2.5 metres high), still the preferred method in the twenty-first century of working through theoretical questions and equations, here, however, not flat but curved. In between below ground and above ground is a street level façade, 2.5 metres high by 21 metres long. A horizontal layer, like a midway stratum in this deep box, a 'cinemascope screen' where the two disciplines come together at ground level is the site for my new artwork. The façade changes angle by a small, but noticeable degree, thereby making it a wall with two planes (one 6 metres in length, the other 15 metres). It is the nature of this site that leads to my decision that the artwork should depict, not just a close (imagined) look at light, but also depict an image of a single thread of light (that has escaped from the building) diffracting at the point where the building itself changes shape.

I began this research project by taking apart a still photograph of a cinema interior in order to create multiple artworks that generated new spatial and conceptual connections to one another, and crucially, to materialise the absent 'motion' missing in that still picture. It is the video of the cinematic projected beam of light that I now select as my new jumping off point. In *Projection* my intention was for the viewer to be held mesmerised, eyes following the dance of photons moving through space and time, the animation of graphite particles tracing the action of transmission itself. Now I wanted to rethink the idea of this perpetually moving, restless beam of light and closely observe its behaviour: to look inside light. Not only that but I wished to invert the premise of that earlier artwork: what was moving was to be stilled; what were mere specks were to be magnified so that the shape and nature of each photon could be clearly seen in a way that the eye alone could never realise; what had been a depiction of something close to immateriality was to now be of weight and substance; where

[178] The title takes its cue from the spirit of Italo Calvino's five chapters in *Six Memos for the Next Millennium*: Lightness, Quickness, Exactitude, Visibility, Multiplicity.

the viewer had stood within the gallery space observing the minute, intricate action within the projected beam of light, they were now to be invited outside and put in motion. In his autobiographical notes Einstein recalls how, at the age of sixteen, he imagined chasing after a light beam.[179] Here the viewer will walk alongside a magnified, up-scaled light beam: *Thinking Light*.

The inherited material for the artwork/exterior façade is aluminium. I visit the site, at this point a vast, shored-up deep crater in the ground and take a tour of the old facilities. In the mechanical engineering workshop they fabricate precision components for models and large assemblies for the experimental physicists, as well as outside agencies. I observe a base plate inside a 3-axis robotic machine (Fig 19), the same machine that the workshop has used for creating parts of the ATLAS experiment at CERN.[180] It reveals the fabrication traces of multiple components and models. The robotic cutter machines into the base plate by a small amount leaving the outside trace of each model, overlaid by the trace of the subsequent model; demarcations of the plans for imagined components that form imagined assemblies. Holes puncture the surface like an inverted constellation.

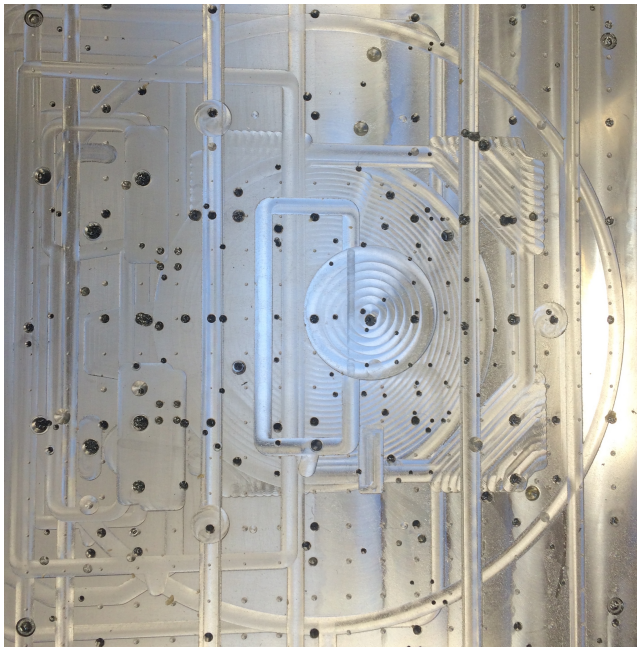

Fig 19. Aluminium base plate, 3-axis robotic machine, Mechanical Engineering Workshop, Physics, University of Oxford.

[179] This thought experiment played a key role in the development of his Special Relativity theory.

[180] ATLAS is the largest general-purpose particle detector experiment at the Large Hadron Collider and was one of two LHC experiments involved in the discovery of the Higgs boson in 2012.

I had the concept for my diffracting beam of light, and now I have the method and methodology by which to fabricate it. The aluminium will become black through anodising, the 3-axis robotic arm (a sophisticated automaton) will be remotely instructed to describe and reveal the trace and patterning of the silver light beam. A robotic instrument used by experimentalists, the result a nod to the theoretical physicists and their past/present/future equations inscribed on blackboards.

A sculptural artwork that has, at its core, a moving and a still image, a description of light that generates light patterns of its own. The box of light (the Beecroft building) will emit a single thread of light that diffracts where the building changes angle, revealing the light's hidden complexity, flowing outwards and forwards with a momentum that, looking face on, is cut by the edge of the building, continuing solely by the implication of its trajectory, beyond the building to the wider world. From another angle, it is revealed that a small section of the light beam follows the return of the building.

In the previous exhibition, 'The Eye Needs A Horizon', I created analogue blueprints that both referenced the idea of the prototype or model, and were unique artworks. In the spirit of Newton and his 'handbook of experiments' I will describe here a digital blueprint, one that creates the virtual modelling necessary for fabricating the finished artwork; the unseen processes and reconfigurations that become the virtual layers, the strata of digital materiality, that is the underside to the polished surface, the solid ground.

In order to construct my diffracting beam of light I begin by viewing a video documentation of *Projection*; a film of the film. I pause this film, revealing a fixed pattern of photons mid-flight; the particles held in suspended animation when changing energy, their shapes organic and slightly irregular – a snapshot of transmission in action. Within this still image a strobe effect – created through the scene changes of the unseen movie – is also captured creating dark lateral spacing within the light beam (Fig 20).

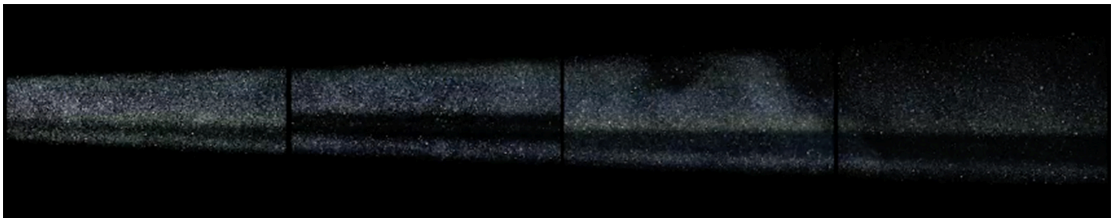

Fig 20. Video still, *Projection*.

The digital still image of the film is my starting point. Working with an assistant, Rosy Head, we apply a vector graphic program to the image that will turn each photon into a vector shape (Fig 21). Vector images are based on mathematical equations made up of points, lines and curves (Newton's calculus) rather than the square pixels of a JPG, PNG or TIFF file. The make-up of the vector graphic means that the image remains the same no matter how much one scales up or down; unlike the camera, there is no reveal. Such images, therefore, lack the detail that one might find in a photograph. The process is useful in delineating the outline of a shape in much the same way that the original camera obscura was most useful in achieving the outline of a view rather than the detailed substance.

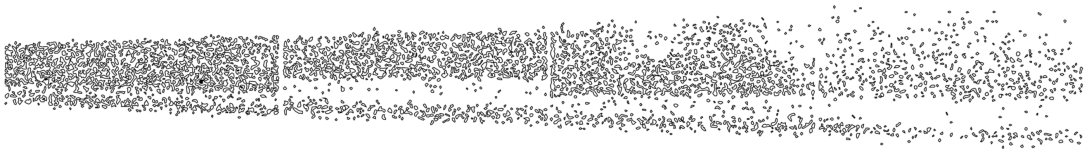

Fig 21. Vector program applied to video still, *Projection.*

By changing the parametres of this virtual tool one varies the output; in effect what the computer 'sees' and uses to create a new version/vision of the original file. These parametres are focused mostly on light and dark, and shapes of varying forms and sizes. Testing the edge of what the computer can 'see' and how it reads it. I also mapped, by hand, where the lightest points occurred and transposed that diagram onto the digital layers. The numerous versions become different digital layers of information, that when overlaid, create a random collision of photons that are then applied to the scaled-up dimensions of the artwork. I laterally reverse the light beam so that it will appear to come from within the building moving outwards. Before I proceed with the actual fabrication I print a to-scale paper version, fifteen metres in length that I hang in the basement of Frith Street Gallery. Minor adjustments are then made to the overall image in terms of the spacing, scale and rearrangement of the 'photons'.

The light beam hits the kink in the wall and diffracts. The beam exists as both wave and particles – the work embodying these different behaviours of light. The particles and their pathways were also adapted to further highlight these dual behaviours, as well as create a

sense of depth within the frieze. As the beam expands from the point of ‘diffraction’ the particles of light increase in size, gaining in momentum. The ‘image’ becomes a sculptural cross-section of an imagined cone of light.

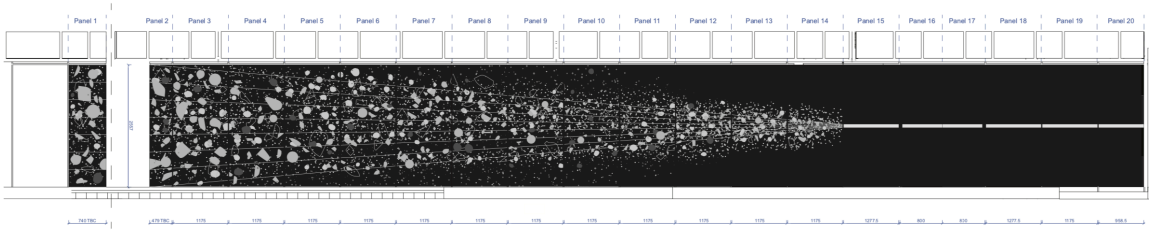

Fig 22. Bridget Smith, *Thinking Light,* final artwork, AI drawing.

The 2D Illustrator file is converted to a 3D CAD file (Computer Aided Design), the particles of light now ascribed their positions in space, but still existing in outline only. The CAD file becomes another digital 3D model, enabling it to be ‘read’ by the 3-axis robotic arm: digital translations and reconfigurations that build to create the façade of *Thinking Light.* In order to complete the picture I must imagine the photons.

A palette of different effects created by the size of the robotic cutter, the type of instruction it undertakes and the speed at which the task is undertaken is constructed for me by the mechanical engineering workshop. Each milled photon, each inlay, line, outline, recess and hole must be given a specification and depth (in millimetres) and an order of fabrication (Fig 23).

LAYER	CUTTER HEAD SIZE	CUTTER HEAD ANGLE	CUTTER RATE	DEPTH	SURFACE DIAMETER	FINISH
50% AIRFLOW PERFORATIONS	6mm	-	-	THROUGH-HOLES	6mm	Black Anodised interiors
25% AIRFLOW PERFORATIONS	6mm	-	-	THROUGH-HOLES	6mm	Black Anodised interiors
HOLES 1 - SMALL	-	-	-	THROUGH-HOLES	6mm	Black Anodised interiors
EVERYTHING ABOVE THIS LINE TO BE MILLED BEFORE BEING BLACK ANODISED EVERYTHING BELOW THIS LINE TO BE MILLED AFTER BLACK ANODISING						
FAN LINES	5mm	-	3L	0.5	-	LINE
PARTICLE 1	8mm dia / 6mm step - over	-	2S	0.3	-	RASTER
LIGHTEST POINTS	30mm	-	5L	1.0	-	SPIRAL
OUTLINES 1	10mm	-	5L	0.8	-	LINE
OUTLINES 2	13mm	-	4L	1.2	-	LINE
RECESSES 1 – LARGE/CIRCULAR	ROUND HEADED CUTTER	8mm radius	-	5.0	24mm ALL CIRCULAR	FILLETED, SOFT-SCOOP
RECESSES 2 – IRREGULAR	Range	90/120	-	Range	Range	ANGLED OR SOFT-SCOOP
SPOTS – SMALL/CIRCULAR	7mm	90	-	-	7mm	ANGLED
SOLIDS 1 – SPIRAL	10mm / 50% STEPOVER	-	2S	1.5	-	SPIRAL
SOLIDS 2 - SPIRAL	20mm / 50% STEPOVER	-	1L	1.5	-	SPIRAL
HOLES 2 - LARGE	-	-	-	THROUGH-HOLES	Range	-
SOLIDS 3 – RADIATING	6mm / 50% STEPOVER	-	4S	1.3	-	RADIATING AROUND OBSTRUCTIONS (holes from HOLES 2 – LARGE layer ONLY)
OUTLINES 3	10mm		6L	1.6	-	LINE
INLAYS 1 - IRREGULAR	20mm	-	3L	TO BE RECESSED NOT CUT-THROUGH	-	SPIRAL MILLED BEFORE BEING BLACK ANODISED
INLAYS 2 - CIRCULAR	50mm	-	0L	TO BE RECESSED NOT CUT-THROUGH	Range	SPIRAL
SILVER BAND	SEE TENDER INFO .doc for specifications					

Fig 23. Table of specifications: fabrication process, *Thinking Light*.

Each specific milled pattern will reflect differently, and appear to change, depending on the time of day, the weather and passing objects such as people and cars. Through an optical illusion the ‘photons’ sometimes create their own light effects, appearing to hover in front of the façade – a different sort of spectral light.

Fig 24. Bridget Smith, *Thinking Light* (detail).

Fig 25. Bridget Smith, *Thinking Light*, 2018, Beecroft Building, University of Oxford.

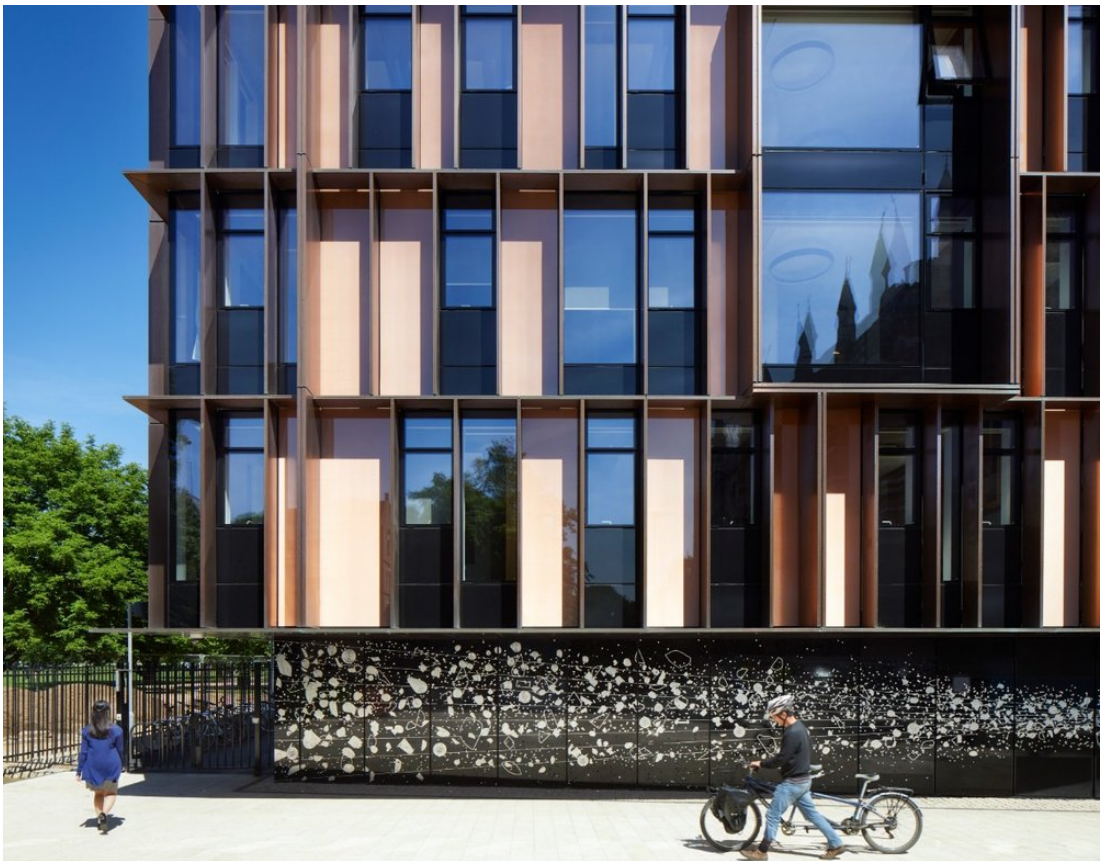

Fig 26. Bridget Smith, *Thinking Light*, Beecroft Building, University of Oxford. Architects: Hawkins\Brown. Photo credit: Jack Hobhouse.

We leave this chapter here, in the twenty-first century, walking alongside a single thread of light emitted from a 'box of visions'; a light expander instrument, like the seventeenth-century prism, that reveals this particular light's properties and behaviours on a grand scale. For the present, the experimental and theoretical physics of the future remain contained inside. This twenty-first-century box is a weighty, architectural structure rooted deep in the ground, yet from a distance it appears to float, as if by magic, above a dark void of deep space, held aloft by nothing more than (imagined) light quanta.

CHAPTER 4

Part 1
Visions (The View From Here)

> LIST OF VALUABLES OF EMANUEL SWEDENBORG FROM THE YEAR 1770
> The following articles are deposited in a drawer:
> One antique waiter made of a shell, mounted in silver, with several genuine stones.
> Four tea-spoons and a pair of tongs of gold, in a case.
> One scent-bottle of crystal with gold mountings, in a case.
> One porcelain snuff-box, in the form of a female figure, with a gold "charnière", in a case.
> One gold-watch, with gold chain.
> Six snuff-boxes, and a small one with two rings in it.
> One microscope with everything belonging to it.
> Diploma of nobility, in which there are also the deeds respecting the garden.
>
> The above articles are left in charge of the agent, the wife of Carl Wilhelm Seele.
>
> EM. SWEDENBORG.
> In the year 1770, in the month of July.
>
> On behalf of the heirs of the late Assessor Emanuel, we, the undersigned, have received from Mrs. Maria Seele all the plate and other articles mentioned above, with the exception of one tea-spoon, and two small articles belonging to the candle-sticks, all of silver, but in their stead there was found a box of mirror-glass and two small snuff-boxes not mentioned in the list. All these we have received and sign our names.
>
> Jonas Breding, Joh. George Ridder[bielke].
> 16 July 1772[181]

In this chapter I return once again to the darkened interior that is the original camera obscura: this time not as a site of the cinematic but as a site of the domestic interior, regarded not through its framework, but through its contents. The site of this dwelling does not remain closed but opens up; the boundaries do not hold but fall away. It is the objects that we accrue through our lives, and pass on at death, that speak of domesticity and home. I deconstruct, reimagine and reconfigure this second camera obscura in order to realise the potential of this past habitat of photography as a present-day instrument of vision. Homely objects now with nothing to contain them become activated by representations of light and space.

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[181] *Documents Concerning The Life and Character of Emanuel Swedenborg*, I, Document 139, ed. and trans. by R. L. Tafel, 3 (London: The Swedenborg Society, 1875-7), pp. 389–390. <https://archive.org/details/documentsconcern01tafe/page/388/mode/2up?q=marshall&view=theater> [accessed 27 October 2021].

Before the walls come down, I consider two of Swedenborg's homes: his home and garden in Stockholm considered in the light of visionary experience; and Swedenborg House, home to the archive in London, where real objects are regarded for their imaginative potential and visionary objects are realised in material form. I create my final installation, 'Let Us Record The Atoms As They Fall', 2019: a manifestation of a temporary 'home' for contemporary photographic art practice borne out of an atmosphere that surrounds photography (past *and* present) – a picture of an atmosphere pieced together through its objects.

*

The inventory of Swedenborg's domestic items listed above informs us that they were packed away in a drawer in July 1770. The storage of the disparate items was due to the fact that Swedenborg was leaving for one of his many extended trips abroad that he had undertaken over the years, this time his seventh trip to London. He left his house in Hornsgatan, Stockholm with its sizeable plot of land containing his much-loved garden and the *lusthus* (summerhouse) that he had designed. It was to be, however, his final trip. He died in lodgings in Cold Bath Fields, Clerkenwell, London, on 29 March 1772 at 5pm – a date and time that he had predicted.[182]

In reading such an inventory, confirmed and added to in death, one is immediately returned to life; to the surface, and quotidian aspect of his domestic everyday eighteenth-century life. And through the contents of his home being revealed we can begin to piece together a picture of that life. It is a picture that hovers as a seeming disjuncture with his life as a visionary. Yet Swedenborg the visionary was not so much 'elsewhere' but in two places at the same time, and both places were often located in the domestic.

At the age of fifty-five, (the time of his pivot from natural philosopher to visionary) Swedenborg purchased both 41 and 43 Hornsgatan, Stockholm that he then converted into a single plot, with a house and a garden that he had laid out and planted. 'At the moment he chose to settle most firmly on earth, buying property and planting seeds, he was himself being transplanted to another world'.[183] A few years later he added his summerhouse, a single-room structure where he was able to be for many hours in revelation. It was positioned at the western boundary of the property, looking east, down the length of the

[182] A joint affidavit to this effect, from Swedenborg's landlord, Richard Shearsmith and his wife Elizabeth resides in the Swedenborg Society Archive.

[183] Kristin King, *Gardens of Heaven and Earth* (London: The Swedenborg Society, 2011), p. 84.

garden, back towards the main house. The garden was a project and a passion that was very much part of his domestic life. He participated in the physical acts of digging and planting, most unusual for an eighteenth-century aristocrat to engage in. The garden was to become an abundant acreage of land:

> In addition to vegetables, fruit trees, poplar and cypress, there were arrays of flowers: tulips, hyacinths, carnations, sweet peas, larkspur, violets, scabiosa, sweet william, Canterbury bells, catmint, chalcedonica, spurrey, lilies, sunflowers and roses of many varieties: African, Adonis, white, blue and velvet. There were stone paths and a tall enclosing fence, an ornate gate and an orchard, a kitchen garden, bird house, summer house, garden house, library, maze and a mirror creating the illusion of a doubled garden.[184]

The summerhouse was a space that he retreated to over the next twenty-seven years in order to receive, experience and record his visions. Already by 1745 'what had been fortuitous or occasional now seems to have become a continuing dialogue between earth and heaven'.[185] It is the summerhouse then where you might say he was most at home, an interior that helped promote that transitional state between wakefulness and sleep known as hypnagogia – a waking dream that we have already found within photography's optical unconscious.

> I have been shown the way in which these angels function. To open the eye and grant the benefit of light, they seemed to roll away towards the septum of the nose the surface tissues of the left eye. The person himself perceives this altogether as an actual occurrence, but in fact it is an appearance.[186]

The experience is both local – bodily – whilst travelling 'to worlds on the edge of the universe'[187] at the same time. The experience is not 'mere metaphor for insight but a substantive influx that influences the eye and the understanding. This is correspondence'.[188] It was an extended durational act, often for many hours at a time. A process that I have come to regard in much the same way as on a par with the exposure time required to realise the early photographs, with Swedenborg the 'recipient plate', making visible what had previously been unseen.

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[184] King, p. 86.

[185] Peter Ackroyd, *Introducing Swedenborg* (London: The Swedenborg Society, 2021), p. 25.

[186] Swedenborg, *Arcana Caelestia*, §183, p. 69.

[187] Swedenborg, *The Worlds In Space*, §125, p. 90.

[188] King, p. 42.

The spirit worlds that Swedenborg is granted access to see might be ethereal but they are made of substance and so Swedenborg's reports are 'concrete' rather than abstract. The visions are often detailed accounts of day-to-day life in heaven, hell and the spirit worlds, with dwellings and gardens making multiple appearances: 'copious matter-of-fact detail, setting his report on the afterlife very much apart from that of most theologians'.[189]

> The effect of reading Swedenborg's account of heaven is of something like a double exposure. There are often pedestrian descriptions of 'life in heaven', but through the reports of angelic 'day-to-day' activities, one catches glimpses of a vibrant, complex, radiant world, a kind of supernal mosaic whose parts infinitely reflect each other.[190]

As a visionary, Swedenborg was much preoccupied with domesticity as a way to point toward a wider spiritual meaning within our daily activities. As a natural philosopher he traced a cosmology, and in his lifelong pursuit of longitude, he was forever seeking to locate 'home' within a constantly moving, unstable environment. Home was important to him but always a small part of a much bigger picture. He died seemingly at peace in temporary lodgings in a foreign land. Upon his death the objects from the drawer were received by his heirs, with the exception of a few small silver items missing between packing and unpacking. In their place they received a box of mirror-glass. I picture this previously unaccounted for box that has appeared as if by magic, and its 'looking' contents; contents that when held in the light will fragment a once familiar space, revealing similar but different and surprising correspondences. I file the thought-picture away for later use.

*

Swedenborg House in Bloomsbury is, you might say, his 'afterlife' house: established by his followers in the nineteenth century, it is home to both the Society[191] and the archive, and as such to the contemporary researcher also: there are the impressive holdings of his writings and extensive collateral texts, as well as artefacts and ephemera. The House, built c. 1760, was originally two dwellings. By the time the Society acquired the freehold in 1924 it had

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[189] Gary Lachman, *Introducing Swedenborg: Correspondences* (London: The Swedenborg Society, 2021), p. 10. Lachman notes their similarity to reports obtained by some members of the Society for Psychical Research in the early twentieth century.

[190] Gary Lachman, *Into the Interior: Discovering Swedenborg,* (London: The Swedenborg Society, 2009), p. 124.

[191] The Society was founded in 1810. Swedenborg House was acquired in 1924.

long changed its use and become amalgamated. The Society made its own extensions and refurbishments to create the one capacious House that it is today.

Within this expansive structure the collection of artefacts is modest, disparate and 'accidental' in nature. Several have uncertain provenances and authentications, several are fragments: objects that are yet to be fixed, existing in an ambiguous state, a kind of suspended animation. Objects that are small glimpses of what was once a big picture, but what they lack in authentication they make up for in imaginative potential.

There is the mahogany drop-leaf table in the Wynter Room (one of two reading rooms in Swedenborg House) that may or may not have been Swedenborg's table from his final London lodgings at the wigmaker's Richard Shearsmith, upon which he wrote his final (unfinished) manuscript *The Coronis*. There is the 1859 silver inscription affixed to the table that declares it to be his, and lists its provenance. There is also the 1841 letter offering Swedenborg's table from Shearsmith's lodgings to the Society, but with an entirely different provenance. There are the two near identical typewritten notes from 1930 stating that the table in the Wynter Room is not the table referred to in the letter; two tables (one 'real', one imagined). The note(s) propose a recollection from the caretaker that the now disappeared table was lost during extensive refurbishments when the Society was based in Bloomsbury Street, before it moved to its current location in Bloomsbury Way: another object missing between packing and unpacking.

Also with regard to the matter of writing is the fragment of light beige blotting paper smattered with dark brown ink spots creating a constellation of sorts (black turned sepia over time) – Fig 27. It is reputed to have been used by Swedenborg and was donated by Robert James Tilson, a former bishop of the General Church of New Jerusalem and one-time librarian of the Society.

It is said, rather unexpectedly, that the colour of the universe (the spectrum of light emitted by galaxies) is light beige.[192] For Swedenborg, 'the everyday experience of spots in the field of vision and points on a paper is transferred to the tiny particles that cannot be seen by the eye and to the enormous cosmic movements'.[193] The fragment of blotting paper begins to take on the look of a universe in miniature.

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[192] See Maggie Nelson, *Bluets* (Seattle and New York: Wave Books, 2009), pp. 89-90.

[193] Dunér, p. 287.

Fig 27. Emanuel Swedenborg, fragment of blotting paper (actual size),
4.5 × 9.2 cm, Swedenborg Archive.

There is the small piece of bark (also donated by Robert Tilson) now in a brass matchbox (4.5 × 3.5 × 1 cm) with handwritten label: 'Bark from Poplar tree in Swedenborg's Garden'; an extant fragment from the garden that meant so much to him. There were originally two poplar trees directly in front of the summerhouse, immediately in sight should Swedenborg look up from his recording task. By the time Professor Carl Theophilus Odhner[194] made a pilgrimage to the Hornsgatan site in 1895, nothing of the garden remained 'excepting perhaps a very ancient and decaying poplar tree just outside the summerhouse'.[195] It is believed that it was the American, Odhner, who dislodged and took the flake of bark and gave it to his friend Robert Tilson, presumably for fear that soon the last remnant of Swedenborg's 'famous' garden would disappear completely; in 1896, the following year, the summerhouse, now quite dilapidated, was itself dismantled and reconstructed elsewhere.

[194] Odhner was a theologian and member of The General Church, USA, (later to become The General Church of the New Jerusalem) and editor of *New Church Life*. He was to translate Swedenborg's *On Tremulation* in 1899.

[195] Carl Theophilus Odhner, 'Professor Odhner's Visit to England and Sweden', in *New Church Life* (December 1895), p. 187. The research on the provenance of the bark was undertaken by, Alex Murray, Librarian at the Swedenborg Society.

Swedenborg died away from home and was laid to rest in the vault of the Swedish Church in Wapping, London in 1772.[196] It is because of this fact that the archive also contains bodily artefacts: three hair samples and two ear bones (the malleus and the incus), believed to have been taken from the coffin as relics or souvenirs on one of several occasions that the vault and coffin were opened. These relics passed through numerous hands before finding their place in the collection.

There is also the plaster cast skull, one of several made by J. V. Hultkrantz, Professor of Anatomy at Uppsala University, Sweden that was donated to the Society in 1910. Fifty years later it was revealed to be a cast that had, in fact, been made from the wrong skull. It is now known that the original was stolen in 1816 and replaced with a ringer. The coffin was raided once more in 1817 when the replacement skull was stolen and plaster casts were subsequently made.[197]

The two tiny ear bones held in the collection are believed to be authentic; a minute from the 1881 Committee meeting at Swedenborg House notes 'an earbone (in a case) originally in the possession of Dr Spurgin',[198] second Chairman of the Swedenborg Society and Senior Physician to the Foundling Hospital.[199] The malleus (hammer) and the incus (anvil) are part of three auditory ossicles; the smallest bones in the body that normally reside in the middle ear. They transmit sound waves from the air to the fluid-filled spiral cochlea of the inner ear. The two ear bones (Fig 28), now unfixed both from body and velvet backing, are the material objects that conduct what Swedenborg termed 'tremulations' (Fig. 29) and for which he formulated a theory during his scientific period.

---

[196] The Swedish Church, Prince's Square, Wapping opened in 1728. In 1911 the congregation moved to a newly built church in Marylebone, taking the contents of the church with them. Ten years later the empty and increasingly dilapidated church was demolished. In 1938 Prince's Square was renamed Swedenborg Square. The bordering houses were, themselves, demolished in the early 1960s, leaving only the gardens from the original site, now called Swedenborg Gardens.

[197] See Stephen McNeilly, *ad caput capitis: the lost skulls of Swedenborg*, (London: The Swedenborg Society, 2017). <https://www.swedenborg.org.uk/wp-content/uploads/2019/06/ad-caput-capitis-leaflet.pdf >.

[198] Ibid. p. 13.

[199] The Foundling Hospital was not a hospital in today's terms but a home providing 'hospitality' for abandoned and displaced children, set up in 1739, by philanthropic sea captain Thomas Coram.

Swedenborg interprets the world, the senses, and life as tremulations, as wave movements, undulations, and tremulations. Everything shakes and quakes.[200]

Thinking is a kind of tremulation too. There are thought vibrations. […] It often happens, he says, that one falls into another person's thoughts, that one anticipates what another person will do and think.[201]

The spread of tremulations can explain our ideas, dreams and fantasies. Associations are tremulations which are caused by similar tremulations.[202]

Fig 28. Emanuel Swedenborg, ear bones: incus and malleus, Swedenborg Archive.

[200] Dunér, p. 130.

[201] Ibid. p. 181.

[202] Ibid. p. 205.

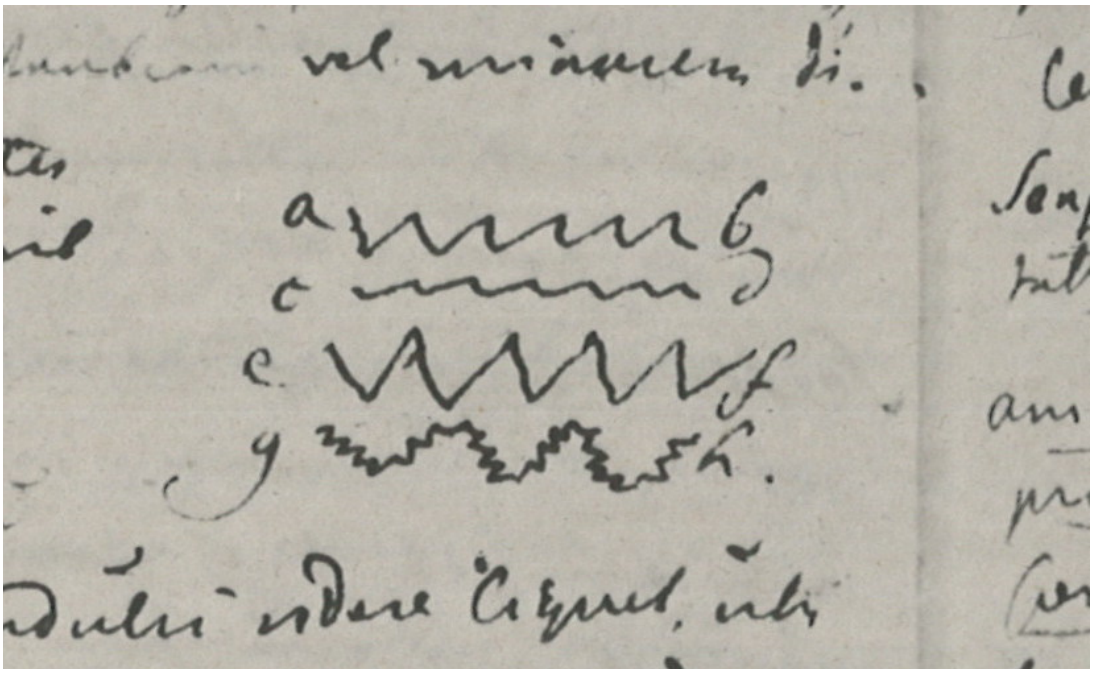

Fig 29. Emanuel Swedenborg, sketch of tremulations (differing speeds), Swedenborg Archive.

Two tiny human bones residing within the body of the archive: displaced and dormant but carrying the potential to conduct thought vibrations and telepathy. ‘In short we are dealing with *reliquiae*. And relics are incredibly charged objects’.[203]

Charged, disparate objects, rich in imaginative potential, ‘mobile’ within the archive. If one is to think and look associatively – tuning in to Swedenborg’s tremulations – the objects can start to correspond to electrons: like electrons they exhibit properties of both particles and waves and generate a magnetic field. As they accelerate they radiate and absorb energy in the form of photons.

*

I am in the Wynter Room at Swedenborg House looking at a large, bound phototype album from 1905: a facsimile of Swedenborg’s original *Diarium Spirituale, Vol. II*, written by hand in Latin. A language that is incomprehensible to me, but one that I am scanning in the hope of finding a visual prompt or clue as to the next step in my art practice. What I do know is that it was posthumously termed *The Spiritual Diary* by a nineteenth century translator and

[203] McNeilly, p. 6.

that it marked a new phase following on from his *Journal of Dreams*. It too, like the earlier journal, contains a pivotal vision, this time occurring not in the dead-of-night in private lodgings, but at midday in a London inn.[204] The entries first appeared in the margins of another work at some point in 1745. 'Notes of dreams, visions, ideas and revelations'[205] that eventually warranted their own dedicated notebooks, filled over a twenty-year period. These few years (1743-46) affected the pivot from natural philosopher to visionary; speculation, a significant tool for the scientist, became, for Swedenborg, observed reality alongside the occasional prophecy; instruments of vision such as the telescope, camera obscura and microscope become Swedenborg's own ability to record up-close views, as well as accounts from the furthest reaches of a spiritual cosmos and deep in the underworld. Swedenborg is now enabled to be his own instrument of vision, prophetically enacting not just the birth of photography nearly a century later, but also the technological capabilities of twenty-first-century photographic practices.

If I want my photographic art practice to open out in unexpected ways then I need to look for clues in the archive as to how to move forward. Which is why I am turning the pages of the *Diarium Spirituale*, to see if my guide Swedenborg has a prompt that I might use.

Two oddities. Firstly, that he compiled two indexes to its contents. Secondly, many entries were frequently crossed by long diagonal strokes on the page, sometimes in a cross, other times in one direction only, like slashes of rain across the field of text. It is not known for certain why he did either, but it has been suggested that he marked sections once he had quoted them in his published works, or that he marked them off in the process of compiling the two manuscript indexes.[206]

In one such hand-written entry on a long sheet of paper, I observe, floating within the text and partially crossed out, a small drawing; a sketch of what appears to be a hut, a round-roofed structure with what looks like five doorways along its length and one door at its end (Figs 30 and 31); a habitation that came to him in a vision that he felt necessary to convey as an image. There are very few drawings in existence by Swedenborg, a rare example being his invention for a flying machine from 1714 ('a flying carriage, or the possibility of staying

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[204] See Swedenborg, *The Spiritual Diary*: *Experiences in the Spiritual World*, 1, trans. by W. H. Acton and A.W. Acton (London: The Swedenborg Society, 2002), §397, p. 123.

[205] Ackroyd, p. 24.

[206] See *The Spiritual Diary*, Stephen McNeilly, 'Preliminary Note to the Text', pp. v-vi.

in the air and being carried through it').[207] Instead there are numerous small fragmentary sketches in the margins of, and amongst, his scientific and visionary writings: light passing through lenses and prisms, a map of heaven and hell, the different wavelengths of 'tremulations', and now this 'dwelling'.

It sits approximately in the middle of the long page, mid-sentence even, a habitation within a field of text, the slash through it denoting its displacement to elsewhere.

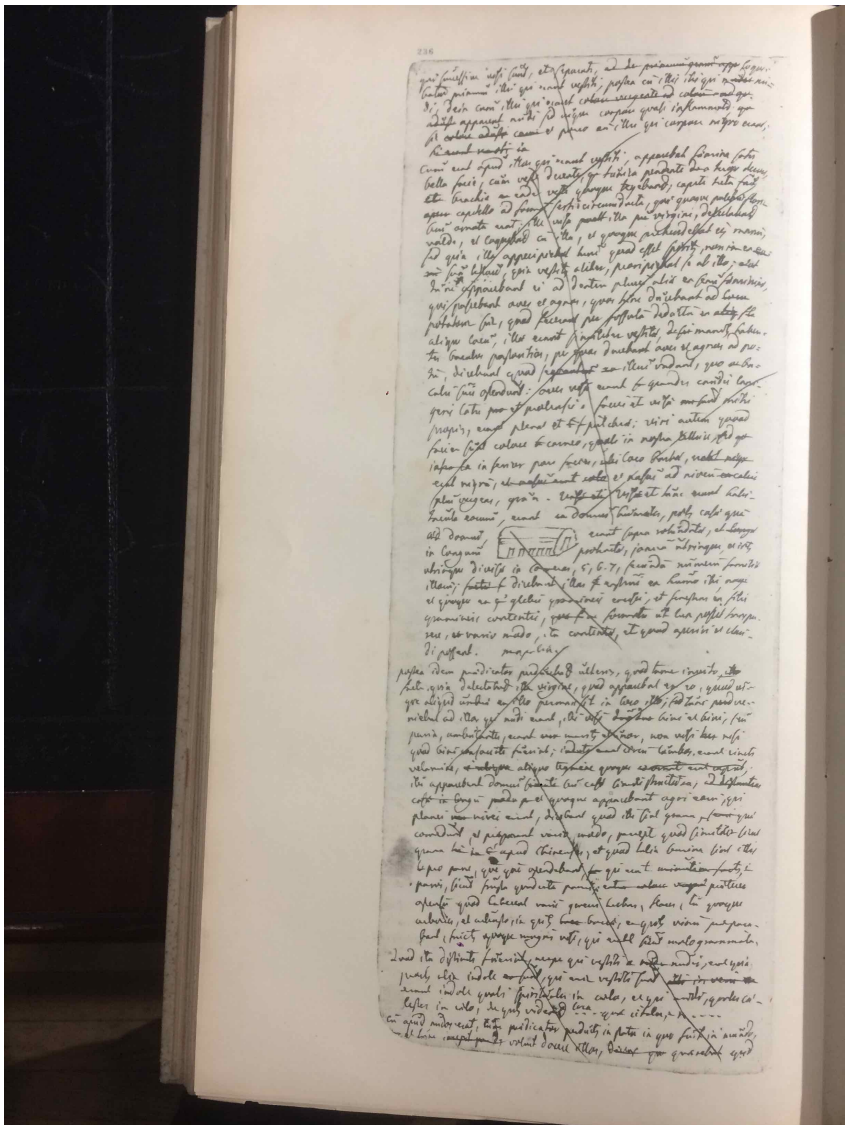

Fig 30. Emanuel Swedenborg, *Diarium Spirituale,* II, photolithograph, §4832, p. 236. Swedenborg Archive.

[207] Swedenborg, *Letters and Memorials of Swedenborg*, 1, p. 58.

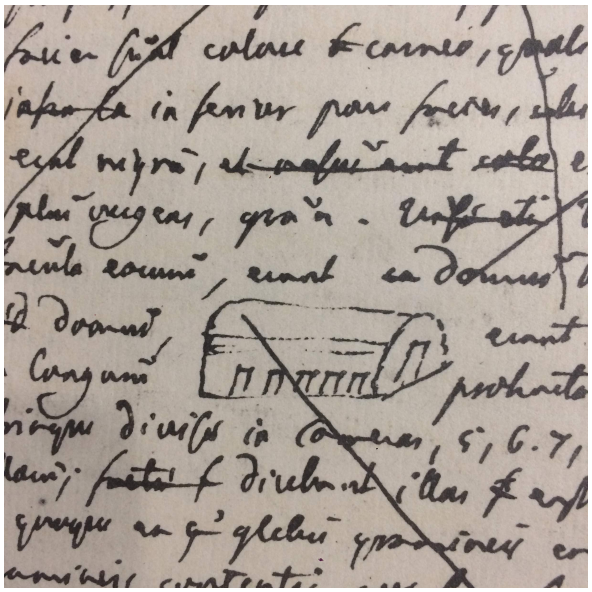

Fig 31. Emanuel Swedenborg, 'Dwelling', ink sketch (detail), *Diarium Spirituale,* II, 1.3 × 2.4 × 1 cm (dimensions in 3D), Swedenborg Archive.

I find it elsewhere, in volume four of a nineteenth-century edition of *The Spiritual Diary*, the Latin text now translated into English.[208] The original sketch is now accompanied by its own visual translation by Arthur Hodson Searle, making a double-dwelling: facsimile and interpretation (Fig. 32).

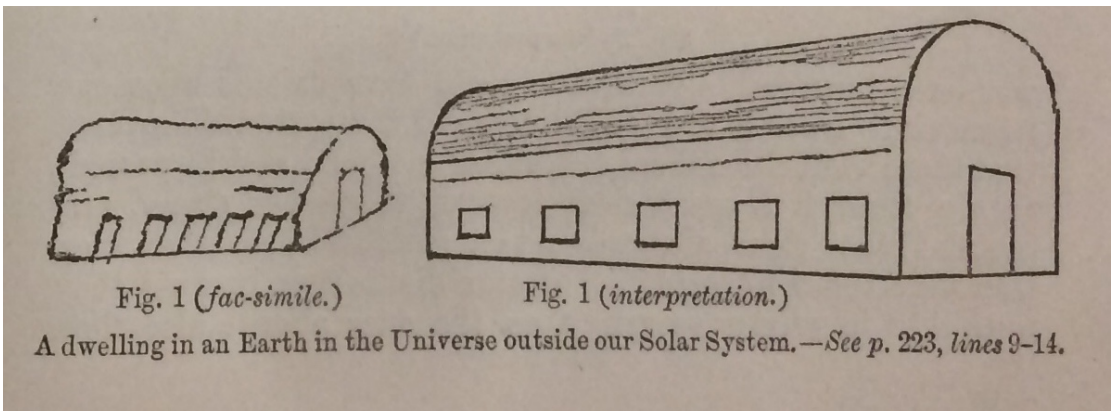

Fig 32. Emanuel Swedenborg, *A dwelling in an Earth in the Universe outside our Solar System*, *The Spiritual Diary*, IV, visual trans. by Arthur Hodson Searle, 1889.

[208] Emanuel Swedenborg, *The Spiritual Diary*, IV, trans. by George Bush and James F Buss (London: Swedenborg Society, 1889), p. 355.

The private eighteenth-century drawing – a dwelling seen in a vision – has now, in the nineteenth century, become double, disassociated from any ground and from the relevant written passage by one hundred and thirty-two pages:

> Then, also, their habitations were seen: they were poor houses))), (rather huts than houses…They were rounded above, and extended lengthwise, having a door on both sides, and within, on both sides, they were divided into chambers, 5, 6, 7, according to the number of their family. They said that these are constructed from the soil there, and also from thick grassy sods, and the windows of grassy fibres interwoven, formed so that the light may be able to pass through, thus interwoven in various ways; also, that they could be opened and closed).[209]

A dwelling made of earth from another earth: *A dwelling in an Earth in the Universe outside our Solar System*. I look further in the archive and find a text but no image in Swedenborg's *The Worlds In Space* that seems to concur less with the doorways of *Fig. 1 (fac-simile)* and more with the windows of *Fig. 1 (interpretation)*:

> In addition I saw in that world their homes, which were low, long houses, with windows in the sides corresponding to the number of apartments or rooms into which they were divided. The roof was rounded, and there was a door at either end. They said they were built of earth and roofed with turf. The windows were made of grass thread, so woven as to admit light.[210]

Dislocation, repositioning, reconfiguring, translation and histories of representation are all themes that occur throughout this research project. In discovering this thumbnail sketch of a dwelling, seen in an eighteenth-century vision, I have found my prompt.

The simple dwelling, observed up close in outer space, has its earthly counterpart: Swedenborg's *lusthus*, the summerhouse in the garden, that he designed with particular thought to his need to receive visions.

*

It is April 2019 and I am standing in the original plot of land that Swedenborg bought in Stockholm in 1743, the year that he began his *Journal of Dreams*, and began his journey as seer and visionary. The land is now a communal garden surrounded by tall apartment housing on all four sides. Swedenborg located his summerhouse on an east/west axis. The modest one-room dwelling (10 × 13'), in its original form was flanked on either side by a

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[209] Swedenborg, *The Spiritual Diary*, p. 223.

[210] Swedenborg, *The Worlds in Space*, §166, p. 123.

library and a store for gardening tools. Today, neither the house nor the summerhouse, remains on the site. A replica summerhouse, however, was built in the 1980s and repositioned in a north/south aspect within the communal garden for use by the residents. The original was dismantled at the end of the nineteenth century, repaired and reconstructed as a stand-alone structure in Skansen, an open-air museum island, off mainland Stockholm (Fig 33).

Fig 33. Emanuel Swedenborg, original *lusthus*, Skansen, Stockholm.

The original designed for private communing now on public land for public viewing, the replica built on private land for the communal use of the residents only: more dislocation and reconfiguring. A double pairing of dwellings, with no foundations to keep them rooted to the ground: one pair on planet earth (Hornsgatan and Skansen) the other 'pair' in an earth in the universe outside our solar system ('the fourth world in the starry sky').[211] The earthly dwelling built to successfully, and comfortably receive visions, the visionary dwelling a result of successful transmission; receiver and received. What is received is a barrel-vaulted dwelling – the original camera obscura – with prophetic ways of operating.

*

[211] See Swedenborg, *The Worlds In Space*, pp. 113-124.

I began this thesis by looking back to Benjamin's 'fog' that hovered low around the 'beginnings' of photography; a fast-moving, perpetually evolving mass, seeming to obstruct the legibility of photography. Despite this, Benjamin was able to identify the first decade as photography's period of 'flowering' before industrialisation stunted its growth. Through this identification he forms his theories on the optical unconscious and the aura. Nearly fifty years later, Krauss picked up Benjamin's thread and also looked back to the origins of photography, through the eyewitness account of Nadar. The obstructive fog was now regarded as an atmosphere: a swirling, contradictory mix of science and spiritualism. It is within this paradoxical mix that Krauss identifies Swedenborg's presence, his influence. Krauss's atmosphere and photography are in dialogue, whilst being regarded as separate entities. Kaja Silverman's twenty-first-century look back to Benjamin's photographic fog of 1839 sees an atmosphere that resides not just in the past but also in the present due to photography's recent obsolescence as an industrial medium. For Silverman, the analogue that once defined photography has become analogy. She reminds us that photography was initially perceived as 'a graphic rather than scopic practice';[212] that the photographer (and photography) receives rather than takes or captures; that early photographs were dynamic rather than 'still', and that the medium exists in a condition of 'unstoppable development'. Silverman with her new analysis of just what photography is and her assertion of the creative potential of the use of analogy and correspondences enables Swedenborg's theories to come to the fore where they had previously been deeply buried. Benjamin's obstructive fog to the legibility of photography has evolved into an enabling atmosphere; this 'just-about-right' past/present/future atmosphere and photography are now fully entangled. Silverman, from her vantage point of the twenty-first century, sees this atmosphere as creating the potential for photography to flower once more and, as such, issues an invitation. An invitation that this practice-led research project is attempting to address.

The low-lying dense fog turned rising atmosphere has always moved at speed, but now that photography's analogue moorings are no longer holding, the fixity of photography has become disseminated. Exposure onto a single photographic plate, film or sheet of paper has become broken up into millions of tiny illuminated sensors, each one (pixel) a minute part of the wider picture, stored as an enormously long string of numbers, ready to be translated from those numbers back into precise visual detail – the hidden fragmentation behind the whole. Photography existing now in a sea of acronyms: JPG (Joint Photographic Experts Group, after the scientists and mathematicians who thought up the idea); TIFF (Tagged

[212] Baker, 'Primal Siblings', p. 183.

Image File Format); PNG (Portable Network Graphics). Photography has moved from matters of fixity to being mobile fixed points, permeating all aspects of our lives; vast amounts of imagery now appears to reside out there in the 'ether'. Yet the 'virtual' file sizes of photographic imagery persistently take up too much space and continually require more (actual) storage. Compression has become a pressing issue.

The material and conceptual fragmentation at photography's core is something I wish to harness and work with; the single entity now become multiple parts seems to offer potential for new connections and ways of seeing. The question of the volume of photography, that has plagued this medium ever since its beginnings, becomes voluminosity in the material form of photographic-based installations. The drive for compression is something to resist in these terms. Not, however, the possibilities that now arise from the wide-ranging nature of current digital recording capabilities that co-exist with, and help reconfigure, the earlier analogue capabilities. The material manifestations of what it is (means) to record an image in this atmosphere – to point towards the multiple dwelling positions of photography – entangled with the eighteenth-century scientist-seer-visionary Swedenborg is something that I take up in my final photographic installation 'Let Us Record The Atoms As They Fall', 2019. [213]

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Part 2

Let Us Record The Atoms As They Fall

We are back, where we began, in the heart of Swedenborg House, in the hall with the vaulted ceiling – another camera obscura of sorts. The atmosphere, you might say, is somewhat heavy in this grand, neoclassical space designed for an assembly: the walls have a low Wainscot oak panelling, interspersed by ionic oak columns; a proscenium arch at one end of the room frames a fully retractable stage, opposite to which, at the far end, either side of one

[213] The title of my final exhibition is the beginning of a longer statement by Virginia Woolf, 'Modern Fiction' in *Virginia Woolf: Selected Essays,* ed. by David Bradshaw (Oxford: Oxford University Press: 2009) p. 9. Full quote: 'Let us record the atoms as they fall upon the mind in the order in which they fall, let us trace the pattern, however disconnected and incoherent in appearance, which each sight or incident scores upon the consciousness. Let us not take it for granted that life exists more fully in what is commonly thought big than in what is commonly thought small'.

of two entrances and exits, are the stained glass windows bearing Swedenborg's coat of arms; a marble bust of Swedenborg sits on a wooden plinth 'looking' out into the body of the hall. A space that is more often than not used for lectures, this time it is to be the site of a different kind of assembly and knowledge dissemination.

Fig 34. Bridget Smith, 'Let Us Record The Atoms As They Fall', Swedenborg House, 2019.

In order to begin, I look back to that weighty sculptural beam of light that is *Thinking Light* and to its imagined photons accelerating and gaining in scale as they emerge from the academic interior out into the world. Continuing my paradoxical approach I now look to make its interior, lightweight counterpart; this time in the form of a free-floating curtain/screen, *Wavering Light*. I return to the digital (virtual) blueprint that enabled the construction and fabrication of *Thinking Light*; information that had been extracted from the original screenshot of *Projection*, 2016. What was underlying now comes to the surface. What had been filled in reverts back to the most basic of recording techniques: outline and flat-colour shape only (a return to the camera obscura). This most basic of design now takes on the suggestion of musical notes on a scale (which in turn comes back to Newton's colours).

Working with a textile printing studio I create a new TIFF file of the design, resized for its new location: 2.6 × 11.2 metres. Using a sublimation printing process, a paper version of the design is made (here an underlying paper curtain printed in nine sections); through heat the dye changes from a solid into a gas and as it begins to cool it solidifies, once more binding itself into the fabric, here black chiffon: the fabric screen (an echo of the earliest makeshift, 'receiving' screens hung in the original camera obscuras), with its amalgamated light beam design, and its own narrative to tell (Fig 35).

Fig 35. Bridget Smith, 'Let Us Record The Atoms As They Fall':
Wavering Light, 2019; *Atmosphere 2019*, 2019, opaline globe light.

An optical effect of the solid *Thinking Light*, were the multiple light patterns that were generated, appearing to hover in front of the surface of the wall as a result of light hitting the milled patterns of the 'photons'. Here light passes through the sheer curtain that appears as if free-floating, hovering a few centimetres above the floor, receptive to the changes in the air currents within the room. The optical effect here depends upon the relation of the viewer to the sheer curtain; when standing close to the artwork and looking along the trajectory of the light beam it reveals itself to be a deep black (Fig 38).

Fig 36. *Thinking Light*, 2018 (detail).

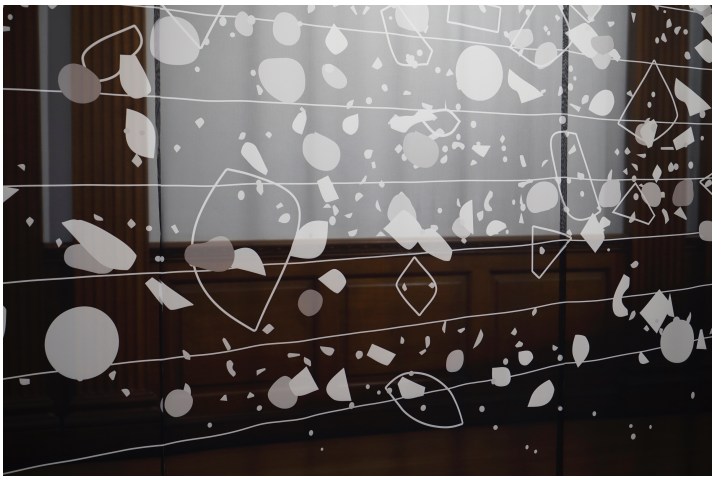

Fig 37. *Wavering Light*, 2019 (detail).

Fig 38. *Wavering Light*, (optical effect).

The curtain/screen/light beam runs to nearly the full length of the hall, positioned at a dynamic angle; starting in the far corner by the window it ends in front of the proscenium arch, thereby disrupting the geometry of the architectural focal point of the room. This ghostly but present beam of light appears, through its design, to come from a point by the actual windows of the hall. Photons propelled this time, not by the heat of an unseen projector,[214] but through the imagined aperture in this new camera obscura, propelled perhaps by an unseen air current into the space, the photons increasing in size, this time as they travel further into the room.

[214] As in *Projection*, 'The Eye Needs A Horizon,' 2016.

The positioning of *Wavering Light* establishes an off-kilter placement of artworks that begins a 'spiral' around the room that ends/begins in a central position within the space. The artworks are not dependent on the walls as structures that hold. What does hold are several pieces of freestanding bespoke furniture, designed in collaboration with the furniture designer Michael Marriott for this disassembled, reimagined domestic camera obscura: two tables, two oversized 'book stands' with plywood flats, one upturned table-cum-lectern and one steel bar for hanging the curtain. The opaline glass globe lights from the exhibition 'The Eye Needs A Horizon' appear once more in a new configuration/constellation.

Wavering Light uses outline, flat colour and scale to suggest photons moving in a beam of light. Where the light ends in front of the proscenium arch a long, linen-covered table sits (77 × 248 × 65 cm). On top of the table laid out in three rows, in pairs and singularly, with differing spacing are sixteen tintypes and three ambrotypes (10 × 12.5 cm): *Objects in Space*.[215] Previously working with cyanotypes, here, ambrotypes and tintypes, part of my enquiry into the full spectrum of evolving photographic technologies since photography's invention.

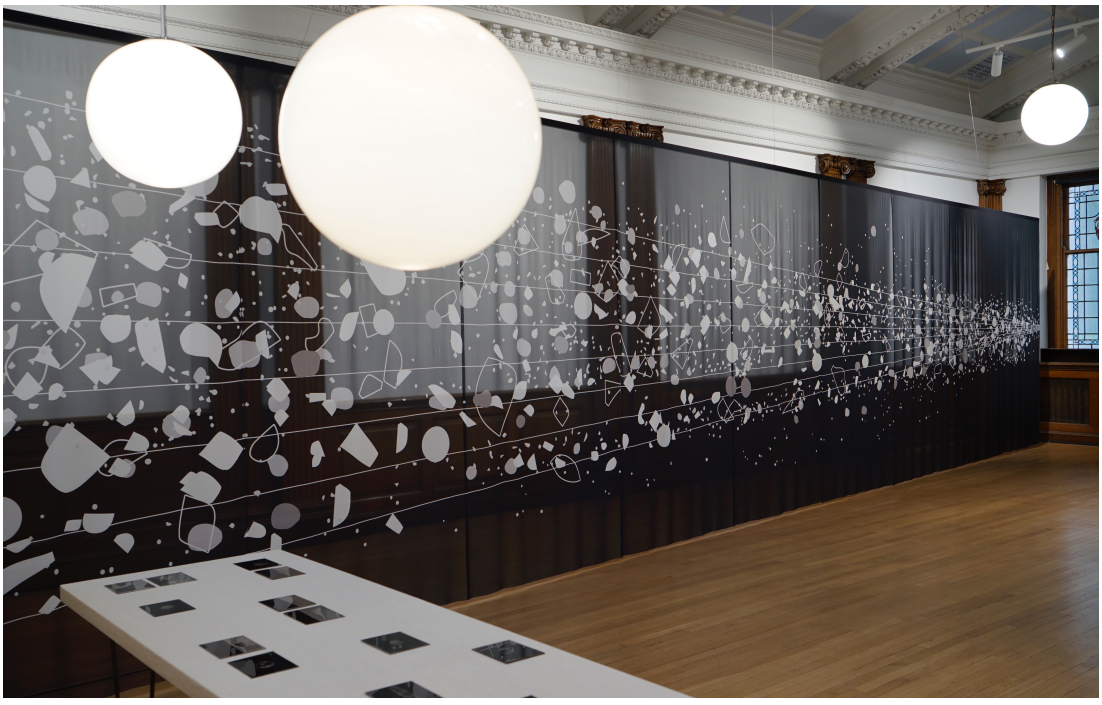

Fig 39. 'Let Us Record The Atoms As They Fall':
Wavering Light, 2019; *Objects in Space*, 2019.

Linen covered table, steel legs, designed by Michael Marriott, 77 × 248 × 65 cm.
Opaline globe lights.

[215] I worked with ambrotype and tintype artist Nicky Thompson to create the series.

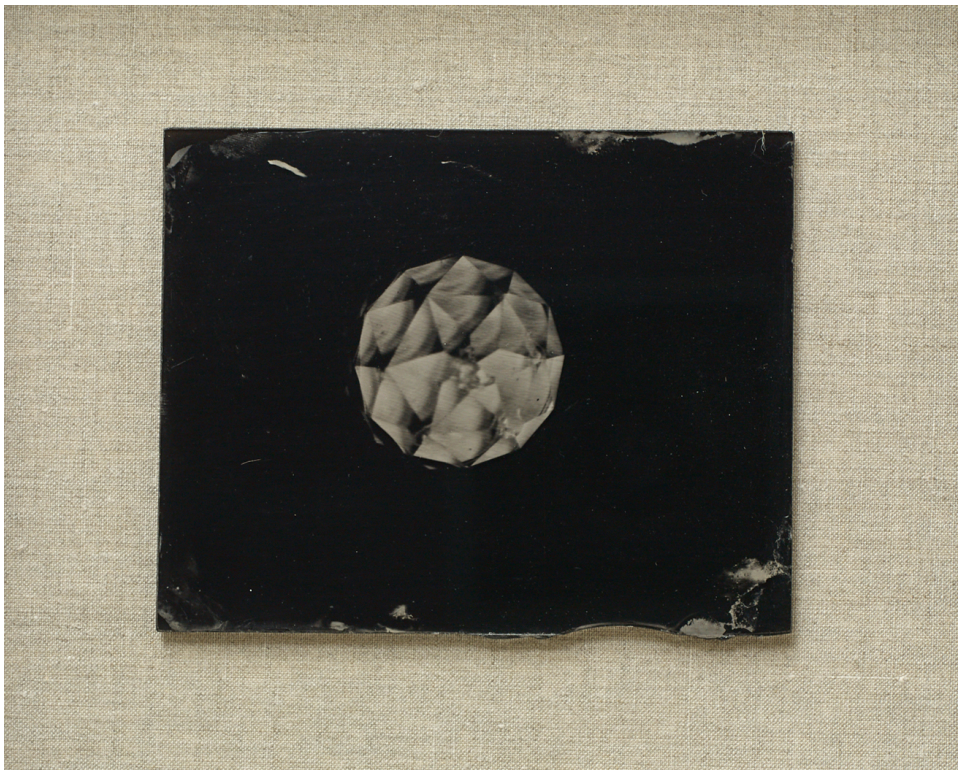

Fig 40. Bridget Smith, *Objects in Space (Orb I)*, 2019, ambrotype.

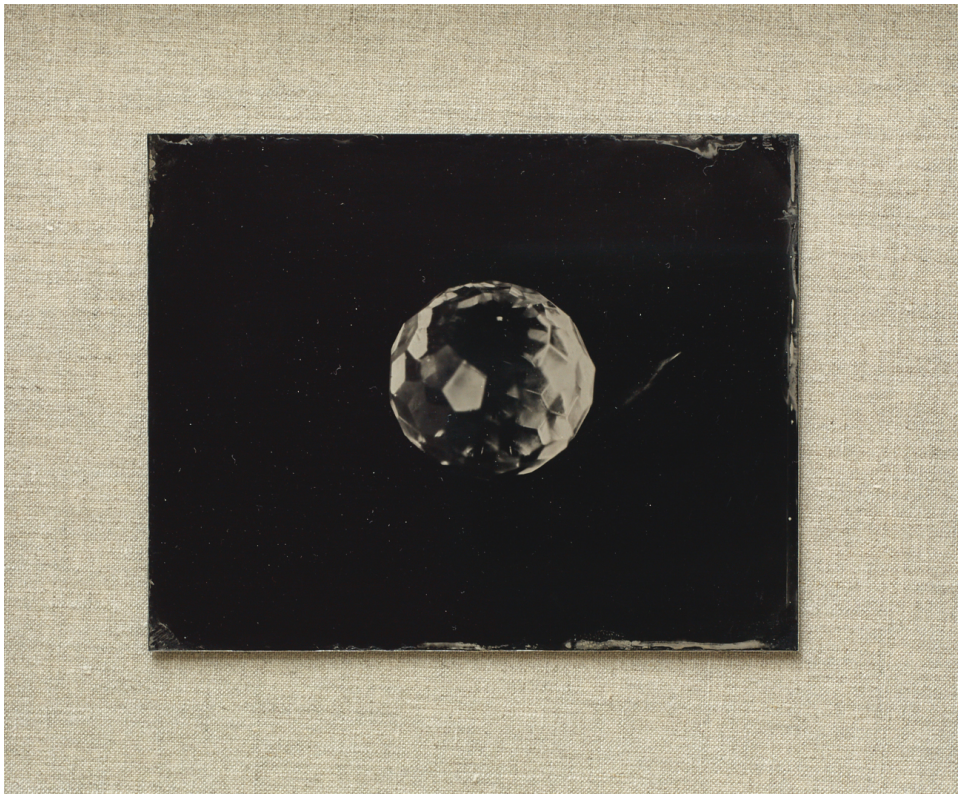

Fig 41. Bridget Smith, *Objects in Space (Orb II)*, 2019, tintype.

Ambrotypes were introduced in the 1850s, replacing the daguerreotype as a less expensive process. The bright mirror-like metallic surface that made a daguerreotype difficult to view, has become a deep polished black. The ambrotype is made on a glass plate by a wet collodion process, creating a negative until transformed into a positive by the glass having a black coating applied to its underside, thereby revealing the image; an image then that contains both negative and positive (Fig 40). The ambrotype soon became superseded by the tintype, that isn't actually tin but a thin black-lacquered iron sheet – a material that isn't quite as it seems (Fig 41). Tintypes were more commonly made by itinerant photographers at open-air fairs and carnivals; a process that was successful and suited to being on the move, rather than in the formal, static photographic studio. Both processes create unique images – like the now near obsolete Polaroid. Both are coated with a polished wax surface in order to create the deep, depthless black; the kind that one associates with the deep black of outer space. Both became superseded by albumen prints on paper around the mid 1860s;[216] a momentary burst of metallic light in photography's history.

However, for me, they do not reside purely in the past. Many of the objects depicted appear up close out of the deep black that is the historical outer space of photography's origins, and along with their scale – fitting in the palm of one's hand – start to correspond with the deep black of the un-activated liquid-crystal display screen of a mobile phone – a device that people receive most of their images on today. I think back to my theoretical starting point at the beginning of this research project, to Benjamin's seminal essay on photography and the legibility of the photograph:

> The beholder feels an irresistible urge to search such a picture for the tiny spark of contingency, of the here and now, with which reality has (so to speak) seared the subject, to find the inconspicuous spot where in the immediacy of that long-forgotten moment the future nests so eloquently that we, looking back, may rediscover it.[217]

The images of the ambrotypes and the tintypes are predominantly of crystals and glass objects. Images of the solid condition of matter that will in time evolve into a liquid state – LCD (Liquid-Crystal Display) – that will itself be superseded by the technological advance of OLED (Organic Light Emitting Diode) where each individual pixel has a tiny amount of organic material that fluoresces when current flows, each pixel creating light directly. As

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[216] The tintype remained in limited use for portraits taken by amusement park photographers as late as the 1930s. The wet plate collodion process continued to be used by the printing industry into the 1960s for simple line and tone work.

[217] Benjamin, p. 510.

such *Objects in Space* can be seen as past/present/future images. These (technically) early photographic images lie not in isolation within the exhibition but in the middle of the constellation of artworks, thereby encouraging their fixed historical position to be dislodged and regarded alongside more contemporary means by which to record an 'image'. They exist as the starting point, emblematic of the 'original photograph', from which all the other artworks stem. They are the most detailed, the most fully realised as a depiction of matter, referencing a microscopic image in their clarity. Some of these unclassified objects appear on a ground much like a still life and some seem as if to emerge directly from deep space. The choice of table display can be seen as both domestic and as an archival, museum-like display of artefacts. The table directs the viewer's gaze, not directly ahead at the still lives, and not up and outwards at the planetary-like images, but asks that you look down from above, and lean forward to meet these images.

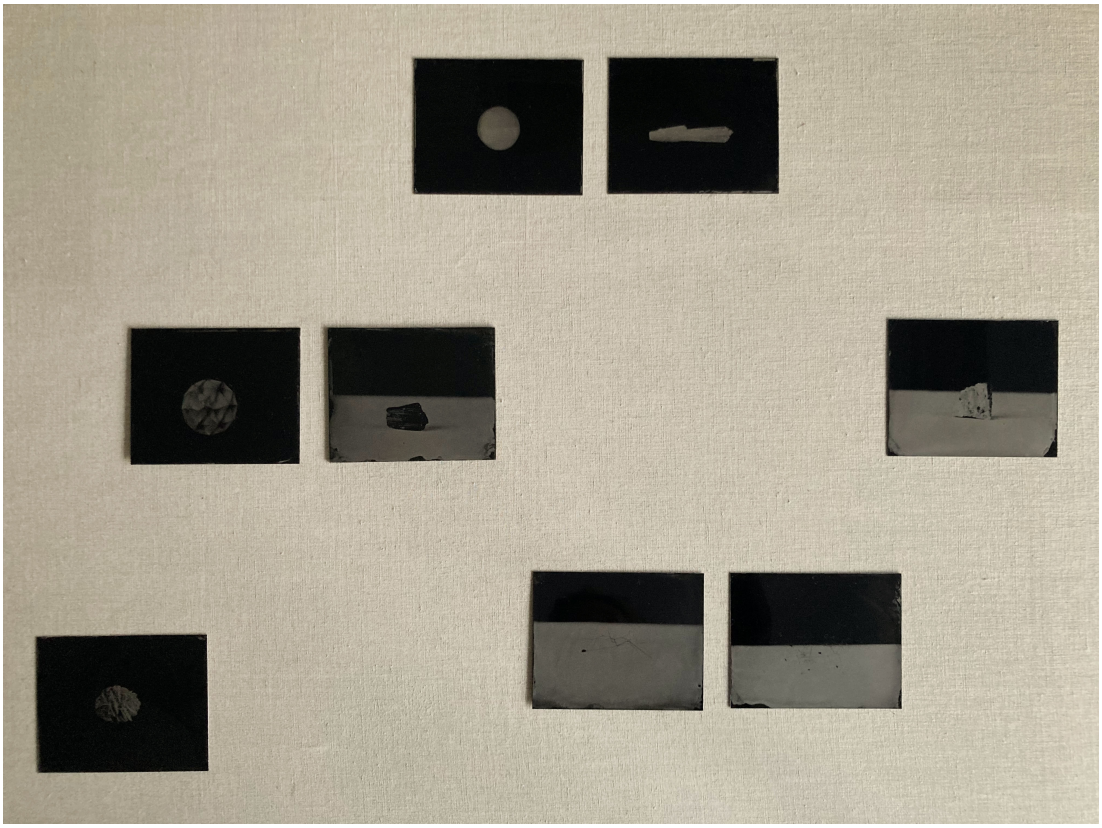

Fig 42. Bridget Smith, *Objects in Space*, 2019.

The scientific definition of a crystal is based on the microscopic arrangement of atoms inside it, called the crystal structure. Equally crystals are ascribed spiritual and psychic meanings: the ability to change negative energy into positive energy; assisting communication with

spirit guides and angels; offering psychic protection. Images then that can be seen to reside in both science *and* spiritualism.

At a right angle to this table and its objects in space, is the second identical table with its display of a pairing of a different object, this time from outer space. We are at my second starting point (there is more than one beginning to this exhibition): the prompt I received from Swedenborg's *Spiritual Diary* – his vision of a barrel-vaulted domestic dwelling/camera obscura with prophetic ways of operating. I return to the nineteenth-century translation where Swedenborg's thumbnail sketch has been visually translated to create two near identical dwellings. He received his vision as an image of light, fixed it as a drawing (of light), until it found its current form as printed matter. I wish to give this now double vision a resurrected presence; to lift it off the page and materialise it (back) into the world – 'bringing it to life' – an animation of sorts.

There is an extant fragment in the archive, from an otherwise lost notebook that contained some of the first entries that eventually made up *The Spiritual Diary.* The fragment has at some point become glued to the verso side of a frontispiece portrait of Swedenborg printed in the first English translation of *Heaven and Hell*. This fragment that now resides in the archive is known as the 'Bath Fragment' having been previously held by the Bath New Church where William Harbutt, a Swedenborgian and art teacher, published a small pamphlet on it.[218] Harbutt was to become famous for his invention of plasticine in 1897, that perpetually malleable, non-drying modelling-clay, still used today the world over. It is this ability of plasticine to endlessly and easily change and morph into multiple forms that makes it particularly suitable today as a material for creating stop-motion animation. I am immediately reminded of the postcard that I picked up as a souvenir when I attended and spoke at an international conference, 'Swedenborg and the Arts', Bryn Athyn College, Pennsylvania, June 2017. Bryn Athyn was founded in the nineteenth century, as a religious community by members of the New Church. A building that dominates the community and the landscape is the castle-like, family home of one of the founder members, Raymond Pitcairn. The postcard (to myself) is a photograph c. 1927, of an early architectural model of the family home/castle (now museum). The model is made out of plasticine. By way of explanation the reverse side of the postcard states: 'Instead of working from predetermined architectural plans, Glencairn evolved organically'. I have found my 'Swedenborgian' material; one with perpetual transformation as part of its being (Fig 43).

[218] Stephen McNeilly, ed., *The Story of Swedenborg in 27 Objects* (London: The Swedenborg Society, 2021), p. 3.

Fig 43. Postcard of plasticine model, Glencairn,
Bryn Athyn, Pennsylvania. Photograph c. 1927.
Credit: Glencairn Museum Archives.

I ask Wilfrid Wood, a model-maker, to make two 3D white plasticine models based on the 2D dwelling drawings from Swedenborg's *Spiritual Diary: Dwelling (facsimile & interpretation)*.[219] The two palm-sized models sit on separate, slightly larger aluminium plates – models of containment. The plate that holds *Proto-Camera (facsimile)* – Fig 44 – has a milled pattern that works its way in from the edges in ever decreasing rectangles which gives it a semblance of a silver envelope; the plate that holds *Proto-Camera (interpretation)* has a milled pattern of parallel lines that follow the length of the plate, giving that a semblance of furrows in a field, albeit a silver field. Both could also be said to be excess fragments from *Thinking Light* reappeared in rectangular form in a new context.

[219] In the writing of this thesis I come to realise that the artwork should bear a new title: moving from *Dwelling (facsimile & interpretation)* – the title as seen in the translated *Spiritual Diary*, IV – to *Proto-Camera (facsimile & translation)*, my own translation/interpretation. From now on that is the title I use for this artwork.

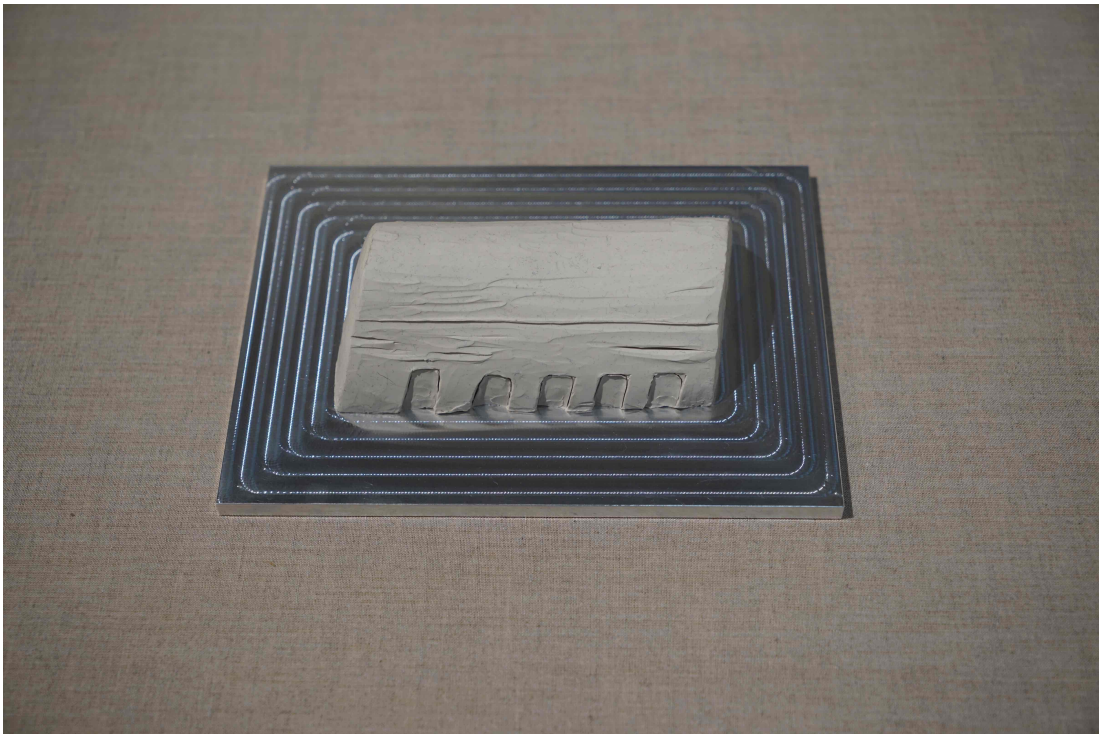

Fig 44. Bridget Smith, *Proto-Camera (facsimile),* 2017,
plasticine model, 5 × 12.5 × 8 cm, aluminium plate, 15 × 20 × 0.8 cm.

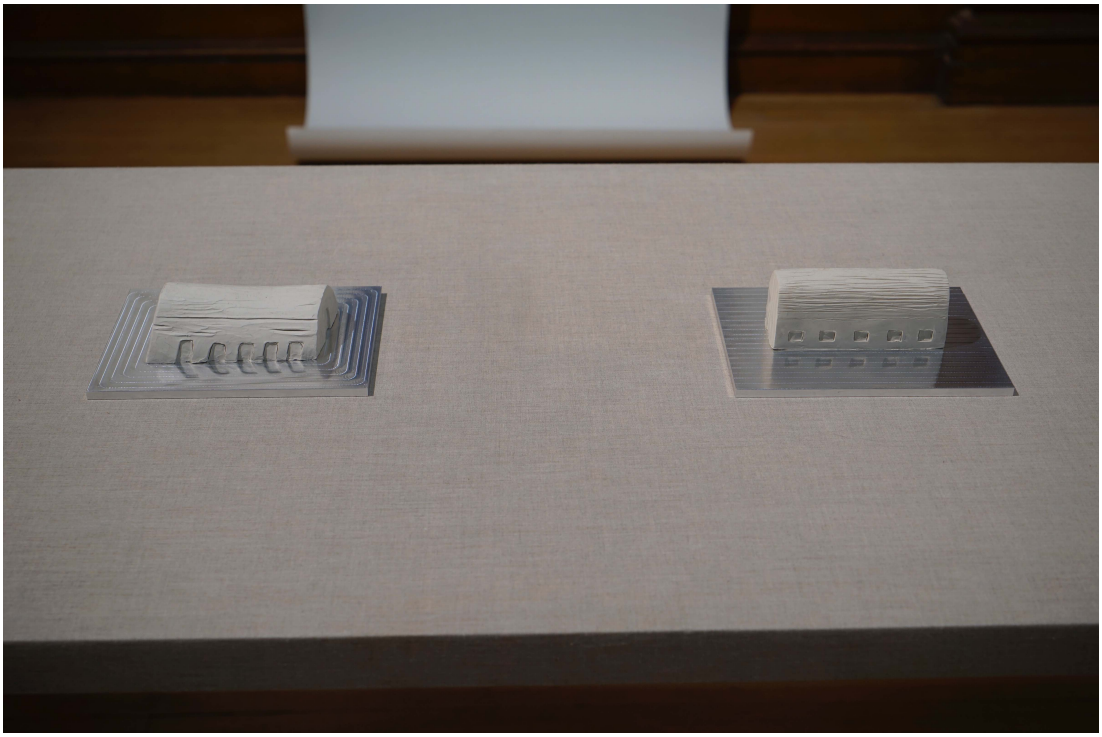

Fig 45. Bridget Smith, *Proto-Camera (facsimile & interpretation)*, 2017.

The metal plates, with their malleable prototype dwellings/camera obscuras, sit on a tabletop covering of light beige linen. A fine-weave of natural flax thread (an artist's portrait linen), not dissimilar in texture to Swedenborg's blotting paper that is a mix of linen and cotton – paper made from wood pulp had yet to be invented. The scale of the table in relation to the scale of the dwellings starts to take on the sense of a landscape; less razed to the ground, more a potential blank canvas. The dwellings do not sit on this 'land' they reside lightly on their silvery plates with radiating lines of light, ready to move elsewhere.

Directly behind the table and acting as backdrop to *Proto-Camera (facsimile & interpretation)* is the artwork *Where Space Begins*, a pigment print paper scroll that hangs from the cornice moulding at the top of the wall, dropping to the floor where it unfurls (Fig 46). It is an abstract image that also represents the colour gradient of the earth's atmosphere as it rises in altitude. Atmospheres have permeated this thesis: the low-lying fog that shrouded photography's beginnings, the paradoxical atmosphere of science and spiritualism that gave birth to photography, the early identification of the aura in photography, and now photography's analogical atmosphere.

Fig 46. Bridget Smith, 'Let Us Record The Atoms As They Fall':
Proto-Camera (facsimile & interpretation), 2017, linen covered table.
Where Space Begins, 2017.

The term *atmosphere* was first used in the seventeenth century to describe the 'gaseous envelope surrounding the earth'. This meteorological meaning was later joined in the eighteenth century by a metaphorical use to denote a mood that was perceived to be 'hanging in the air'. The weather became the mediating factor.

If you were to look back at the earth from the blackness of space you would initially see a 'pale blue dot', as you zoom closer in you will begin to see a planet that is definitely blue, and moving closer still you will see the blue haze of our planet's atmosphere: a very thin layer, as well as enormous filter (against ultraviolet radiation). As you rise from earth the atmosphere is seen to go through a number of colour gradations and layers: marine blue becomes dark blue becomes dark violet becomes dark mauve becomes dark violet grey becomes greyish black becomes black. The troposphere becomes the stratosphere becomes the mesosphere becomes the thermosphere becomes the exosphere. An additional layer known as the ionosphere, extends from the mesosphere to the exosphere. Where the exosphere ends, space begins. There is no atmosphere in space.

> Today atmosphere may be defined briefly as *tuned space*, i.e. a space with a certain mood. From here two more traits of the theory of atmospheres can be advanced: atmospheres are always something spatial, and atmospheres are always something emotional.[220]

I am thinking about the nebulous nature of atmospheres and their mobile, changeable states: photographic, meteorological and those generated by a place, an interior. I am thinking about Swedenborg receiving in outer space and recording in domestic space at one and the same time. I am thinking that in the spirit world space is defined, not through distance, but through emotional states of being.

I intend to make my own 'atmosphere' that can be brought into an interior (domestic) space: an atmosphere that is portable and light, enabling ease of movement and change of location; that will hang in the air, being its own atmosphere as well as affecting any other atmospheres that it encounters.

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[220] Gernot Böhme, *The Aesthetics of Atmospheres,* ed. by Jean-Paul Thibaud (London: Routledge, 2018), p. 2.

I pick up (once more) an analogue camera filter that I have at home,[221] originally used by photographers to create a 'rosy glow' around their subject – an atmospheric effect – before it was superseded by the more nuanced capabilities of digital processes such as Photoshop. I had picked the filter out of a box of 'obsolete' photographic accessories when purchasing the chemicals to fabricate my cyanotype photographs. Up close, it has a pattern that looks like tiny, teeming organisms viewed through a microscope. Its aperture looks like a graphic symbol of the sun (Fig 47). I scan the pattern from the special effect filter. In a guidebook to the weather, bought for me as a child in the 1970s, that I still have in my possession, I find a scaled, colour illustration of the earth's atmosphere as it increases in altitude.[222] I scan the image and apply the filter to my subject.

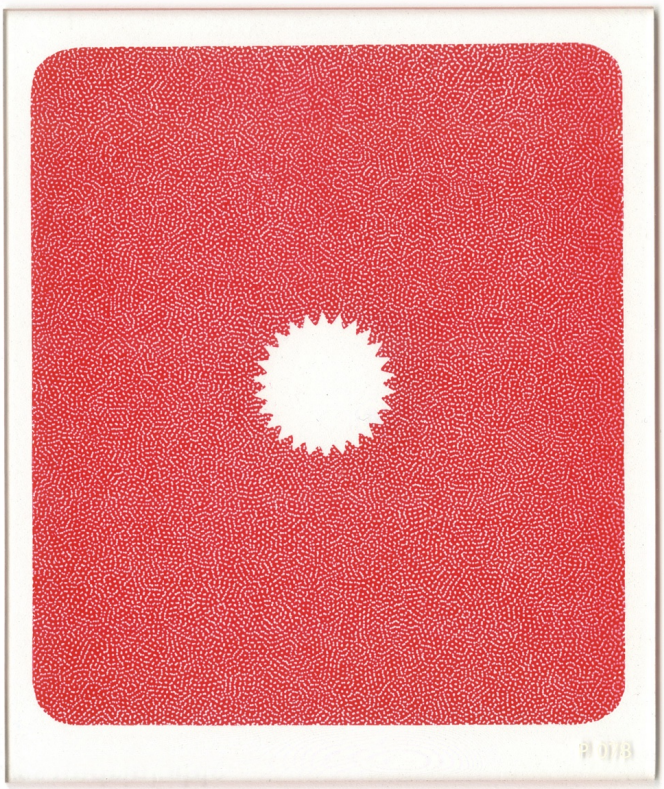

Fig 47. Analogue camera filter, 10 × 8.5 cm (actual size).

Two disparate, 'accidental' objects that reside in my house (that is also my studio) come together through tremulations to create my camera-less photographic-meteorological-interior atmosphere: *Where Space Begins*.

[221] I previously made a replica of this analogue filter that became my invitation card to the exhibition 'If You Want To Talk About Light, You Have To Talk About Waves', Focal Point Gallery, Southend, 2015.

[222] Reginald M. Lester, *The Observer's Book of Weather* (London: Frederick Warne & Co, 1975).

The digital file of this atmosphere is transmitted to an inkjet printer, a machine that uses archival inks containing miniature particles of colour suspended in a carrier liquid, producing a precise, fine mist of droplets onto the paper. The atmosphere (thin layer, also envelope, now narrow paper scroll), hangs in the air, falling to the floor (earth), in the hall with the atmosphere that I previously noted to be heavy. When viewed as the backdrop that it is – here to *Proto-Camera (facsimile & interpretation)* – it offers the potential for the dwelling/camera obscura(s) to rise up to where space begins. An atmosphere then that both falls *and* rises. As a spatial artwork it creates a vertical counterpart to the horizontal trajectory of *Wavering Light* that is on the opposite side of the room.

From afar *Where Space Begins* appears to be a subtle gradation of the range of blues/violets that is infinite space, resulting in blackness at the top and the white of the paper at the bottom. On closer inspection, the hazy but definite colours break down into individual minute shapes of white emerging from an otherwise solid-coloured ground; an inverted pointillism whereby it is the tiny white 'negative' shapes of the paper that appear to jump forward from the photographic ink ground to create the effect; moving from negative space to positive shape. The complex micro-pattern, when enlarged to the scale of one metre wide by three and a half metres long also reveals previously unseen 'fissures' in this photographic-meteorological-interior atmosphere – photography's optical unconscious at work. Random, hidden 'glitches' in the filter's original manufacture are now a visible disruption to the surface of white 'atoms' floating down, creating a glimpse of what appears to be a deep void behind, adding to the mesmerising, spatial disorientation that refuses to settle into a still image (Fig 48).

If there is emotion in this spatial atmosphere it resides in the emotion generated by colour. The 'rosy glow' of the camera filter has turned into the blue/violet hues of infinite space. The blackness of 'outer space' hangs visibly above the viewer's head, a seemingly weighty presence, despite the weightlessness of space. The upper-limit black hovers, framing and containing the blue of our atmosphere; blue hues that here engender hope and uplift. Hope then but a hope that is fragile and mutable.

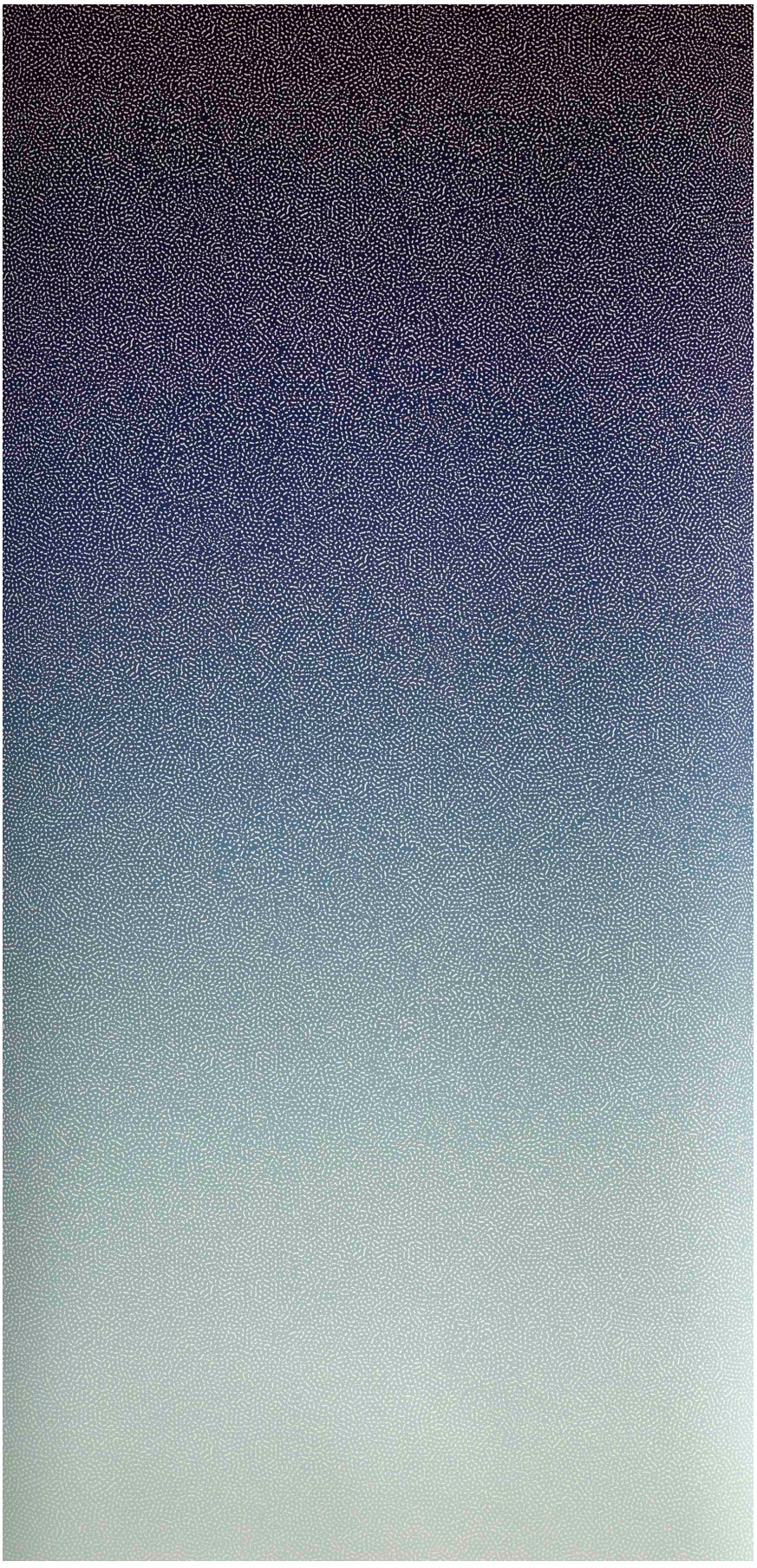

Fig 48. Bridget Smith, *Where Space Begins* (detail).

In the next artwork (as we go around the room following the spiral) the landscape format of the light beam becomes portrait and paired: *Light Beam (double portrait)* – Fig 49. I look back to an early version of the digital files from *Thinking Light* that was superseded during the artwork's progression. This newly resurrected file emphasises the strata in a beam of light and treats it as a solid object in that it appears, like *Wavering Light* and *Where Space Begins* to represent a cross-section, cutting through a volume to see inside. Graphic atoms appear suspended in mid-flight. For this artwork I step back to the eighteenth century, to the invention of lithography into which contemporary analogue and digital processes are interwoven. I choose one image that I turn into two: one violet (selected as the colour at the outer spectrum of visible light), the other monochrome and inverted.

The digital file is converted into a film positive using an 'imagesetter' machine, that exposes the image onto photographic film with laser technology, a chemical process then develops and fixes the film as a positive. The film is exposed onto a thin aluminium sheet to create the lithograph's 'negative'. Each colour has a separate plate, much like early colour photographic processes. I select 'Bible paper' onto which the two lithographs are printed. They are displayed on plywood sheets, approximate in scale to two slightly oversized domestic doors.[223] The plywood sheets are themselves held at an angle by the same steel structure that formed the legs of the two tables, here shaped to mimic a large-scale bookstand. The inversion of one of the images, and the outward direction created by the pairing means that the diptych can be 'read' as two pages of an outsize opened book with a space for the viewer in between the pages of light that are held in place by two magnets apiece.

[223] In September 2021 as part of Open House, London, it becomes possible for the public to visit Pope's grotto once more, to view its ongoing restoration. Standing within the interior of the grotto I am finally able to fully inhabit this up-until-now imaginary camera obscura. I observe the remnants of the wooden doorframe that enabled the transformation from grotto to camera obscura. The two doors are no longer present; they are long gone. A thought-picture occurs (in hindsight): their reappearance in a new form as supports here for the artwork *Light Beam (double portrait)*. I purchase a guidebook on my visit and learn of the taking of pieces of the grotto/camera obscura as relics.

Fig 49. Bridget Smith, *Light Beam (double portrait),* 2019.
Plywood and steel structures, 218 × 99 × 56 cm, globe light.

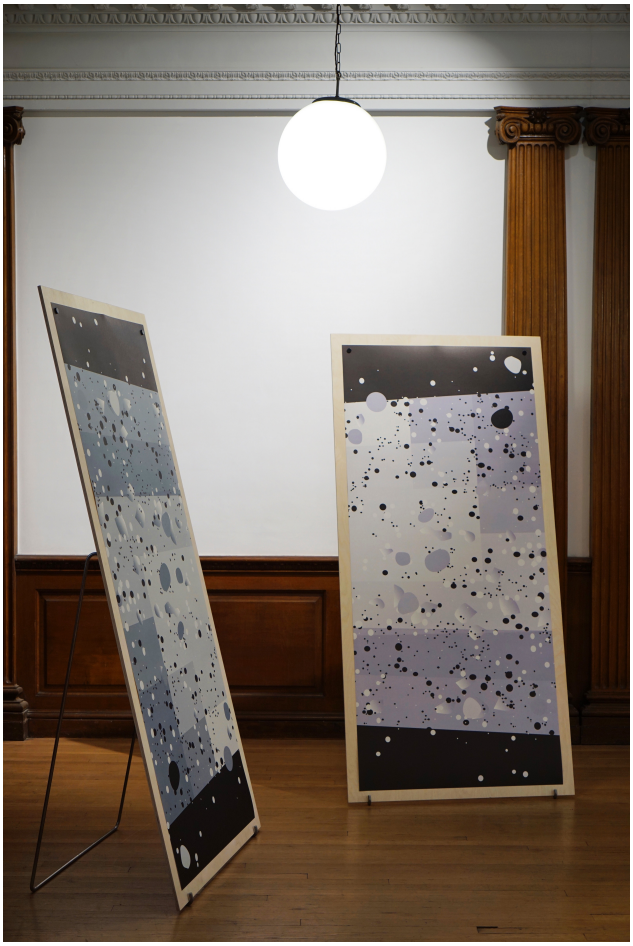

Fig 50. Bridget Smith, *Light Beam (double portrait).*

We move towards the centre of the spiral of artworks, and to a different materialisation of an atmosphere. This time the atmosphere is not rising or falling, it is grounding. It is of the earth and on the earth (floor). The framework to this new domestic camera obscura may be gone and the universe may have taken up occupation, but this is a (photographic) space that is not about shelter or enclosure, but about being open to the elements. It follows then that I need a welcoming artwork made *from* the elements. A point of entry and departure from this diffracted space: *Atmosphere 2019* (Fig 51).

I think back to the drawing of the dwelling seen in a vision, and to the two written descriptions that had become detached from that image.[224] Descriptions of a dwelling constructed out of soil, with windows of interwoven grassy fibres and threads. What was used for the windows will now become the material for my next artwork, the artwork that speaks of home.

It is August 2019 and I am attending a three-day workshop run by Felicity Irons to learn how to weave with freshwater bulrush. The rush we are to use was harvested earlier in the summer from the River Great Ouse. Once cut from the riverbed, the grass-green rush is left outside to dry by the sun and wind. The variation in weather during this drying process changes the uniform green into a multitude of differing shades and tones; prolonged sun creates a more golden/brown rush with windy weather creating vivid green/blue hues. Over time, however, all of the greens and blues will become golden.

I start with a simple vertical-horizontal, under-over weave until I have a small rectangle, then by changing the weaving process to something more akin to knitting, the rectangle slowly becomes circular as the piece expands. *Atmosphere 2019* is the material outcome of a meteorological process, evidencing the part of the earth's atmosphere that produces the weather.

The first published account of Benjamin's notion of the aura is in 'Little History of Photography'. It is a notion that Benjamin goes on to develop and evolve over the next eight years until its meaning coalesces around the famous essay, most often quoted today, 'The Work of Art in the Age of Its Technological Reproducibility', of which there are three versions: German edition, 1935; French edition, 1936; revised German edition, 1939. It is perhaps unsurprising then that it is a notion that has since been criticised for being too ambiguous, as well as too illogical and mystical, yet it is also cited as one of Benjamin's

[224] See p. 101.

most significant contributions to cultural theory. Silverman notes in *The Miracle of Analogy* that the second half of 'Little History' is a 'dry-run' for the 'The Work of Art' wherein Benjamin 'offers a technological account of photography, opposes the medium to art, and associates it with the destruction of the aura'.[225] However, in the first half of 'Little History', he takes a very different view when considering the 'flowering' of photography's first decade. The aura here is not to be dispelled, rather Benjamin appears to yearn for it to reappear in the photograph once more. He reminds the reader that the early portrait photographs possessed 'an aura about them'.[226] It was achieved partly due to the fact that in this first decade 'subject and technique were as exactly congruent' and partly as a result of 'the absolute continuum from brightest light to darkest shadow' held in the image; 'It was this breathy halo that was sometimes captured with delicacy and depth'.[227] Subjects in this early flowering of photography are at 'home' within the image; 'during the considerable period of the exposure, the subject (as it were) grew into the picture'.[228] He goes on to compare these early portraits, with their full and secure gaze, to the rise and prevalence of the studio portrait, a symbol of the industrialisation of the medium. The subject is now no longer at home but placed within the physical and emotional discomfort of the photographer's studio. The resulting photograph destined to reside forever within the photograph album, a closed book.

> They were most at home in the chilliest spots, on occasional tables or little stands in the drawing room—leather-bound tomes with repellant metal hasps and those gilt-edged pages as thick as your finger, where foolishly draped or corseted figures were displayed.[229]

Benjamin's loathing is particularly reserved for the panoply of props that make up this particular photographic experience: 'with their draperies and palm trees, their tapestries and easels',[230] as well as the painted backdrops and elaborate costumes. All of these confer on their subjects a range of sufferance: inauthenticity, absurdity, oppressiveness, stuffiness and humiliation. For Benjamin, photography's subjects became trapped like flies in a web of objects held captive in a perpetual pose. The (bourgeois) attempt to simulate the lost aura by these means is what he finds so very objectionable.

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[225] Silverman, *The Miracle Of Analogy,* p. 140.

[226] Benjamin, p. 515.

[227] Ibid. p. 517.

[228] Ibid. p. 514.

[229] Ibid. p. 515.

[230] Ibid. p. 515.

It is to nature that Benjamin turns in order to help his reader fully understand the premise of the aura:

> What is aura, actually? A strange weave of space and time: the unique appearance or semblance of distance, no matter how close it may be. While at rest on a summer's noon, to trace a range of mountains on the horizon, or a branch that throws its shadow on the observer, until the moment or the hour become part of their appearance—this is what it means to breathe the aura of those mountains, that branch.[231]

It is an evocative imagining: we are in an expansive landscape in the heat of a midday sun, the light of which takes us far into the distant horizon whilst casting a shadow onto our being from a nearby tree. We become one with the landscape, breathing in the far distance and the close to. We are at rest and we are receptive. We do not wish to dispel this moment rather we wish to savour its fragile preciousness for as long as we are able.

Gernot Böhme in *The Aesthetics of Atmospheres* notes an early scientific usage for this 'breathing in of the atmosphere' in Hubert Tellenbach's *Geschmack und Atmosphäre* (*Taste and Atmosphere,* 1968), where the German psychiatrist uses the term in relation to the 'smell of the nest'; 'atmosphere', he asserts 'is what makes you feel at home'.[232]

Fig 51. Bridget Smith, *Atmosphere 2019*, 2019.

[231] Benjamin, p. 518.

[232] Böhme, pp. 2-3.

We are in the centre of the deconstructed, reimagined domestic camera obscura, standing next to *Atmosphere 2019* (Fig 51); an object that is both artwork *and* prop, as are all the other artworks in the exhibition apart from *Objects In Space*, the tintype and ambrotype series of photographs. Hanging overhead, in a new configuration, are four antique opaline glass globe lights from 'The Eye Needs A Horizon', 2016 (relics from the site of a cinema). The glass globes hang at varying heights in relation to the artworks. They can be seen as (for what they are) actual lights: cinematic and now also domestic. As props to the artworks they can begin to take on the look of planets or photons. In both forms of interaction they describe a volume to the installation that is distinct from the volume of the hall.

Like Benjamin, I too am preoccupied with props, and throughout this research project the role that they play within the photographic process. Unlike Benjamin, I do not wish to dispel them from the photograph, but to engage anew with their presence: they have moved from the background to the foreground; have been held alongside, above and below the photograph; and have become the photograph itself. The 'sitter' too has been liberated to become an active participant in this spatially opened up photographic environment (field): asked to look up, down, and sideways; to lean forward and to look behind; perhaps most important of all, invited to move freely within the constructed 'image' – in much the same way that one is able to move within that particular image of light – a vision.

I take Benjamin's original, expansive version of the aura that contains correspondence at its heart, an aura that he had such a longing to see again. I note the congruence of subject and technology, the necessary spectrum of the brightest light to the darkest shadow. I look back to the original camera obscura, a simple domestic room that allows for more than one single person. It becomes a shared space. Enter Swedenborg as I see him – part atmosphere, part prophetic apparatus. Diffraction occurs with the here and now, in the field of expanded photography and this apparatus of vision, what is seen through it and the images it generates become entangled.

We began in the midst of a low-lying fog, at sea level, and from there we kept rising despite our earthly connection. In embarking on this journey that on occasion defied gravity, an invitation is issued – 'Let Us Record The Atoms As They Fall'.

We are ready to step out of this domestic camera obscura and the 'images' that it generates in the expanded field of photography. Despite its open, spiralling form and its loosely interwoven nature, there remains, at its core, the 'still', singular photograph. This past/present/future photograph appears paradoxically to be travelling towards us, beckoning

us even, like Benjamin's early portrait photographs, to see it in a past/present/future light. The still/moving photograph exists amongst other artworks, some of which have travelled far from their original photographic origin.

We are ready also to step out of the hall with the vaulted ceiling, and move towards the exit/entrance (having entered in spectral fashion via the window) and into the lobby where a final/beginning artwork *Blueprint for a Sea (diptych)* resides (Fig 52).

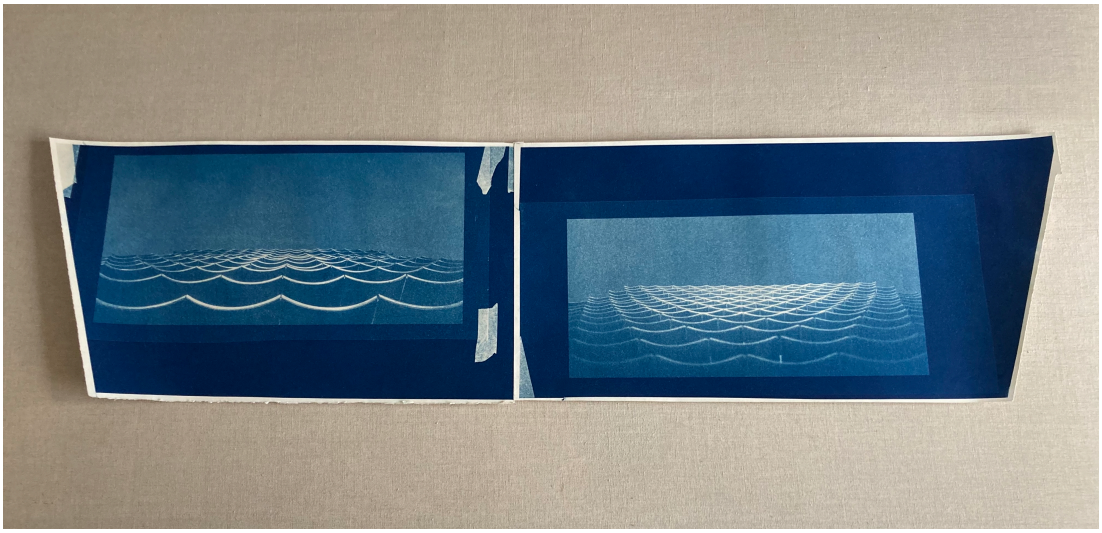


Fig 52. Bridget Smith, *Blueprint for a Sea (diptych),* 2015-19.

Two small working studies, the photographic equivalent of a sketch, originally printed on irregular shaped pieces of paper (off-cuts) that brought together form a diptych and create a boat-like shape. In their joining, the two studies do not sit together in alignment; *Blueprint for a Sea (infinity)* – the verso – appears higher on the now shared paper than *Blueprint for a Sea (rising)* – the recto – as if the image itself was levitating. The 'seascapes' are both framed by deep cyan blues, interrupted by the image of the masking tape that held the paper and the negative together in order to expose to the light – the making of a photograph embedded and visible within the image.

Fig 53. Bridget Smith, 'Let Us Record The Atoms As They Fall' (entrance view):
Blueprint for a Sea (diptych), 2015-19.
Linen covered lectern, 103 × 150 × 63 cm.

The artwork is placed on a low lectern-cum-upturned table that is covered with the same light beige linen, and positioned below a painted portrait of Swedenborg (Fig 53).[233] A piece of furniture that nods to the change of form that occurred when the women mediums of the nineteenth century would upturn tables as part of their communing with the spirit world during a seance, *and* to a lectern that supports a paper that might be spoken to an audience. *Blueprint for a Sea (diptych)*, 2015-19 now appears to be in the far distance compared to their original, singular, large-scale appearance in 'The Eye Needs A Horizon', 2016 – almost as if this double image is now at the end of a very long telescope.

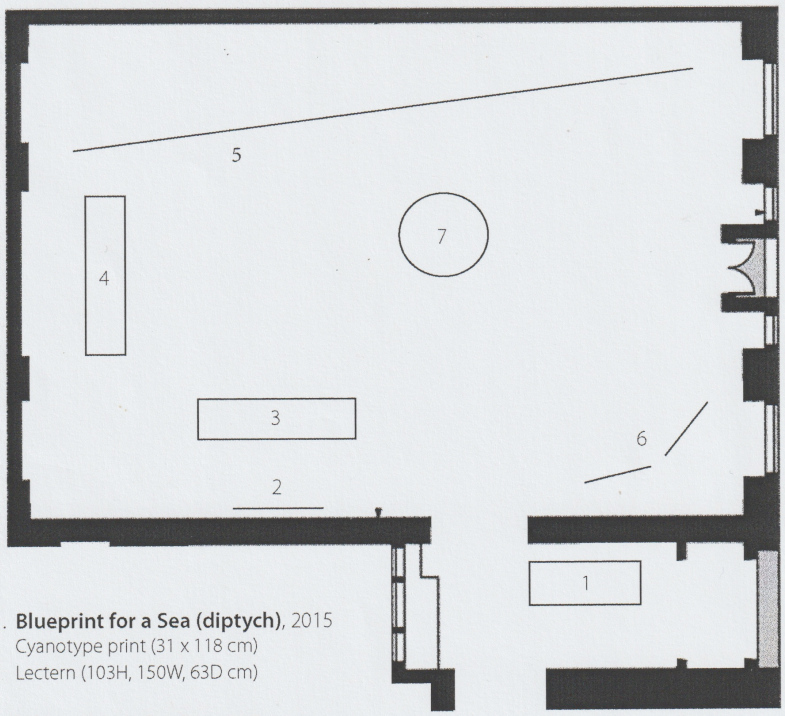
[233] The painting is a copy of an original oil painting by Per Krafft the Elder of Swedenborg that he himself once owned.

BRIDGET SMITH

Let Us Record The Atoms As They Fall

SWEDENBORG HOUSE | 17 - 30 OCTOBER 2019 | 10.00AM - 4.00PM

FLOORPLAN



1. **Blueprint for a Sea (diptych)**, 2015
   Cyanotype print (31 x 118 cm)
   Lectern (103H, 150W, 63D cm)

2. **Where Space Begins**, 2017
   Pigment print (350 x 99.5 cm)

3. **Dwelling (facsimile & interpretation)**, 2017
   Plasticine models on aluminium (7H, 20W, 15D cm)
   Linen covered table (77H, 248W, 65D cm)

4. **Objects in Space**, 2019
   16 Tintypes & 3 Ambrotypes (10 x 12.5 cm)
   Linen covered table (77H, 248W, 65D cm)

5. **Wavering Light**, 2019
   Printed fabric and steel bar (2.5 x 11.2 m)

6. **Light Beam (double portrait)**, 2019
   Lithograph (198 x 98 cm)
   Plywood and steel structure (2018H, 99W, 56D)

7. Circular Handwoven Rush Mat, 2019
   (121 cm diameter)

8. Opaline Glass Globe Lights
   (various dimensions)

Display structures designed by Michael Marriott
With thanks to Nicky Thompson

Fig 54. Exhibition guide, ‘Let Us Record The Atoms As They Fall’, 2019.

Afterword

In chapter 1 of this thesis I sought to establish Swedenborg's presence and influence as part of the atmosphere surrounding (or rather permeating) photography's first 'flowering' decade. Krauss asserts his influence as key to the formulation of a proposition about just what photography was at that time: Balzac's theory of spectres; a theory of photography that may have been accepted by some, but that was not credited with any basis in reality by one of its most famous nineteenth-century practitioners, Nadar. In the twenty-first century Krauss's contemporary Silverman also looks back and sees a counter-history to photography that inverts the established premise of photography as an 'a-relational medium', the camera as the 'great device of separation', and the 'gap' as central to the photograph.[234] Through a combination of the early pioneers (as well as a contemporary artist), Benjamin's first, most extensive statement on photography, and the recent demise of photography as an industrial medium, Silverman is able to assert her theory that photography exists not as index, but as analogy. Silverman's theory, unlike Balzac's, seems to be in accordance with contemporary artists working with photography, Richter and Leonard being two such artists mentioned in this thesis.

I welcome and accept her theory and see that Swedenborg, that distant, forgotten figure from long before photography's beginnings, with his prophetic qualities, his ability 'to picture', and his theory of correspondences, might usefully propose a model for contemporary photographic practice. The artworks produced in this practice-led PhD are intended by way of a demonstration of how that manifests.

In responding to Silverman's invitation to see photography as analogy once again – that necessarily includes Benjamin's analysis of the qualities that photography possessed during its period of flowering – my intention was never to revert solely to preindustrial ways of working. Rather I wished to utilise all and any processes that I deemed necessary to the project: preindustrial, industrial, digital and computational. In addition (and from no one's prompting other than my own) I wished to reclaim for photography, the props and 'paraphernalia' that Benjamin in 'Little History' regarded with such contempt. For him they

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[234] See Baker, 'The Relational Field of Photography' <https://www.fotomuseum.ch/en/2013/05/31/the-relational-field-of-photography/> [accessed 3 September 2018].

were symbols of all that had gone wrong with photography, a painful reminder of photography 'losing its way'. From my position in photography's expanded field with its analogical atmosphere, I saw them in a totally different light.

The thesis contains many beginnings – opening sentences even. I now look to Silverman's final words in *The Miracle of Analogy*, written in response to contemporary artist John Dugdale's cyanotype photograph *Death Mask of John Keats* (the cover to her book) where she concludes: 'the medium becomes again what it was in 1839: the highest form of *poièsis*'.[235] A reference to Martin Heidegger's essay, 'The Question Concerning Technology', whereby he asserts that the essence of technology is nothing technological; it is *poièsis*, a term Silverman has earlier in the book equated to 'revelation'.[236] A concept that speaks of a 'bringing-forth' through two types of action: not just a product of human labour such as handcraft, or an artistic and poetical 'bringing into appearance and concrete imagery'; but also through *physis*, 'the arising of something out of itself […] the bursting open belonging to bringing-forth, e.g., the bursting of a blossom into bloom'.[237]

In looking back at the artworks that make up this practice-led PhD – of camera obscuras that 'blossom' in the light – that I made during my residency in the House on Bloomsbury Way, with Swedenborg as my guide, it strikes me that Balzac's theory of spectres has been reversed, and that what is revealed is not the one spectral layer from the human body, but rather the many spectral layers that constitute the photograph today.

*

The dwelling/camera obscura, seen by Swedenborg in a vision in the eighteenth century, is a structure to be inhabited, with the potential to be adapted according to the amount of people occupying it. The vision was later, in the nineteenth century, translated, becoming two similar forms, held in a closed book, only to reappear in the twenty-first century as two prototype models that can fit (once again) in the palm of one's hand. Both prototypes are now offered to the observer on silver plates. They are malleable models made out of plasticine. As such they can be seen – like the seventeenth-century prism – to reference a child's toy, or a handcrafted object. Hopefully, I have shown, through this thesis, that this

[235] Silverman, p. 159.

[236] Ibid. p. 24.

[237] Martin Heidegger, 'The Question Concerning Technology', in *The Question Concerning Technology and Other Essays*, trans. by William Lovitt (New York: Harper Row, 1977), pp. 3-35 (p. 10).

deceptively simple, two-in-one prototype can also be regarded as a shape-shifting instrument of vision. One that not only is able to see things previously invisible to the eye, but that generates paradoxical images that through analogy and correspondences find a coming-together. This pliant model points to transformation as part of its being (through play). It is its materiality (capable of registering any and all fingerprints) that ensures that it can be perpetually remodelled by anyone receptive to its potential and wishing to pick it up.

Appendix

Now It Is Permitted

'Now It Is Permitted: 24 wayside pulpits', Swedenborg House, 20-29 October 2016, as part of the Bloomsbury Festival. Exhibition co-curated by Bridget Smith and Stephen McNeilly, Director of the Swedenborg Society, London.

This exhibition is included as an appendix to my thesis as despite the fact that it played an important part in formulating and establishing my methods and methodologies within the archive at Swedenborg House – as well as offering a 'snapshot' of a particular moment in time[238] – its outcome is not an examination of photography but rather of text.

The prompt for this exhibition was a set of printed 'wayside pulpits', produced by the New Church[239] in the 1950s. Their original purpose was to be positioned on the street outside the church in the hope of drawing in passersby. The design of the posters was consistent but there were twenty-four different religious messages (Fig 55).

[238] The time frame for the project spanned spring to autumn, 2016: encompassing the run-up to the 2016 referendum vote, the result of the referendum and the closing months of the US presidential election between Hilary Clinton and Donald Trump.

[239] The New Church was set up after Swedenborg's death by his followers in London who base their doctrine on the Bible as described in Swedenborg's writings. The posters were retrieved by Stephen McNeilly from New Church House, Manchester when it closed in 2010 and its contents were either to be disposed of, or donated to the archive at Swedenborg House.

Fig 55. Wayside pulpit, c. 1950s, 76 × 51 cm, Swedenborg Archive.

They can also be seen as another form of 'flyers dropping on the doormat',[240] received from time past. I was drawn to these artefacts as both aesthetic printed ephemera, historic (religious) objects produced in order to both reach out and call in, with the hope of initiating a dialogue and a potential welcoming-in to the fold.

Their presence within the archive led myself, and Stephen McNeilly, to decide to use them as the basis for a group exhibition, thereby initiating our own (secular but visionary) call out and embrace of a different kind of 'broad church'.[241] Our intention was to invite a wide spectrum of artists (visual artists, writers, film-makers, designers, composers, playwrights, theatre directors) to give their 'visionary' message that they would like the public to receive:

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[240] See Silverman reference, p. 30.

[241] Swedenborg's writings set him outside of the established Lutheran church of Sweden.

'We are asking for a sentence, a slogan, a headline, or a manifesto that will act as a wayside pulpit in and around Swedenborg House'.[242] The only criteria was that the text must be the artist's own words rather than a quote from someone else, and the constraints of the physical dimensions of the posters were given (overall size: 76 × 51 cm; space for visionary message: 61 × 35 cm).

During that spring and autumn of 2016 (the time span of the project from inception to exhibition) political slogans were in the air: on placards and banners; t-shirt, hats and badges; as well as on our screens and on the airwaves. On the surface it would appear that we were adding to the overload, however, we had hopes for the visionary messages; that they might be expansive, rise above, or undermine, or maybe even bypass altogether that particular climate. In handing over the content of the exhibition to others we had no way of knowing. What we had determined, however, was that we would accept all the visionary messages we received.

Some time earlier, in one of the many conversations I have had with Stephen McNeilly, he told me about a phrase that appeared to Swedenborg (in written form) during a vision, that is included in the last book he published *The True Christian Religion*: a Latin inscription seen above the entrance to a glass, arched temple – *Nunc Licet* (Now It Is Permitted). A phrase that Swedenborg understood, through its placement, to mean: 'now it is permitted to enter with understanding into the mysteries of faith.'[243] In its succinct form (as witnessed in the vision), however, and now removed from its context, it is a phrase that declares itself to be open, expansive – unbounded even. We already had the form of our group exhibition, now we had found the title: 'Now It Is Permitted: 24 Wayside Pulpits' (referred to in brief as 'Now It Is Permitted'). Fifty-eight artists responded:

Jeremy Akerman, Chloe Aridjis, Homero Aridjis, Fiona Banner, Anna Barham, Rut Blees Luxemburg, Kathrin Böhm, Laurence Crane, Cullinan Richards, Clare Cumberlidge, Eileen Daly, Arnaud Desjardin, Jeremy Deller, Sarah Dobai, Tim Ellis, Simon English, Margarita Gluzberg, David Greig, International Lawns, Melanie Jackson, Sarah Jones, Ben Kelly, Hilary Koob-Sassen, Andrew Kötting, Brighid Lowe, Michael Landy, John Lawrence, Yve Lomax, Melanie Manchot, Michael Marriott, Stephen McNeilly, Andrea Mason, Jason Massot, Jeremy Millar, Fraser Muggeridge, Andrew Munks, Hayley Newman, Sally O'Reilly, Cornelia Parker, Janette Parris, DBC Pierre, Joanna Pocock, Clunie Reid, Olivier Richon, Ian Rickson, Giorgio Sadotti, Aura Satz, Rosalie Schweiker, Ali Smith, Bob and Roberta Smith, Bridget Smith, Barnaby Snow, Polly Stenham, Milly Thompson, Gavin Turk, Jessica Voorsanger, Marina Warner, Ian Whittlesea, Ken Worpole.

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[242] Extract from original email sent to prospective participants, 2016.

[243] Swedenborg, *The True Christian Religion* (Amsterdam: 1771), §508.

All the messages were received, ranging from one word, to filling the entire allotted space. One message comprised musical notes, one artist created a unique split-font, one message contained emojis, and one specified a particular shape for the text.

I worked with Fraser Muggeridge Studio to create a redesign of the 1950s wayside pulpits. I showed them a selection of Swedenborg's sketches from his scientific period (Figs 56 and 57).

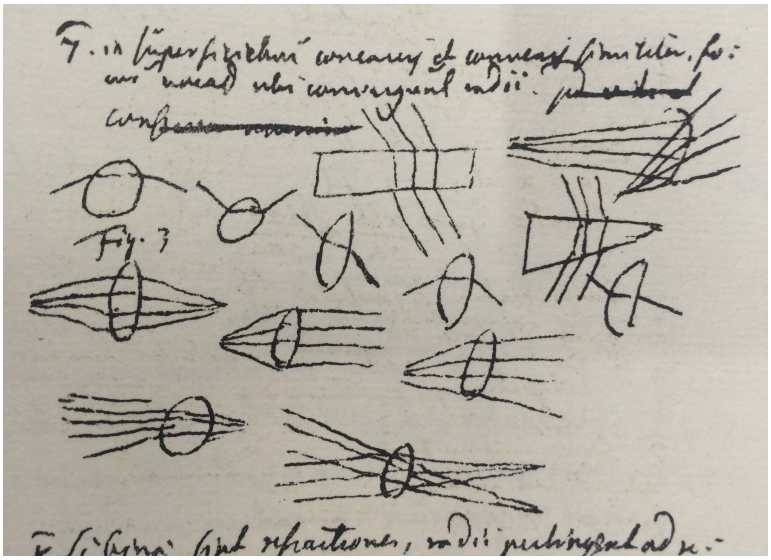

Fig 56. Emanuel Swedenborg, drawings, *Itineraria et Philosophica*, III, p. 179. Swedenborg Archive.

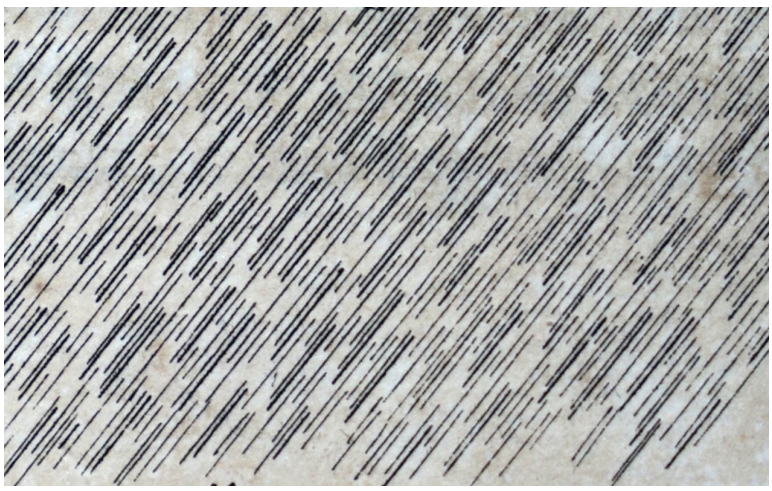

Fig 57. Emanuel Swedenborg, drawing (detail), *Principia*, 1, TAB XVIII, Fig. 3, Swedenborg Archive.

The Studio created numerous designs and I chose one based on the image above, that was to become fine lines drawn by hand with the aid of a ruler to create a border of slightly irregular ‘rays of light’ that emanate outwards beyond the edge of the object. It was important that these ‘flyers’ were simple and effective whilst paying careful attention to detail. Each border was screen printed in six sets of two colourways: dark blue/light blue; cyan/magenta; magenta/yellow; lilac/yellow; lilac/orange; pink/orange. After the screen print process the texts were then digitally printed in black. For the visionary messages Fraser Muggeridge specifically created a ‘revival’ of a do-it-yourself stencil font, whereby each letter is formed by bringing the two halves together, the hand-process remaining perceptible within the digital process. The type for the artist name (placed bottom right) was sans serif, a typeface often used to convey ‘modernity’.

Fig 58. Wayside pulpit, 2016,
designed by Fraser Muggeridge Studio.

All fifty-eight posters/visionary messages were displayed within the hall at Swedenborg House. They were propped on narrow batons of wood (2 × 2 cm), slotted into an angled groove cut into each baton to hold the posters lightly in place. The front of each baton was covered in a fluorescent cloth tape: pink, orange, yellow and green – the colours of highlighter pens and post-it notes. There were eight sections in the hall divided either by the doors or the wooden columns. Each section of wall space had two rows of wayside pulpits, one above the other, containing a total of seven or eight posters apiece (Figs 59 and 60).

The order of messages was determined by the order of the specific spectrum of colours: starting with dark blue/light blue and ending with pink/orange, repeated around the room in a wave like effect. The fluorescent colours of the batons also alternated: pink above orange; yellow above green; orange above pink; green above yellow creating a different 'frequency' of wave tremulations.

In addition a small selection (a doubling of some of the messages) were also displayed a short way further down the road from Swedenborg House, on a busy thoroughfare, seen through the windows of Conway Hall, considered to be the oldest surviving free thought organisation in the world, the last remaining ethical society in the UK and London base for secular humanism.

Fig 59. 'Now It Is Permitted: 24 wayside pulpits', 2016, Swedenborg House.

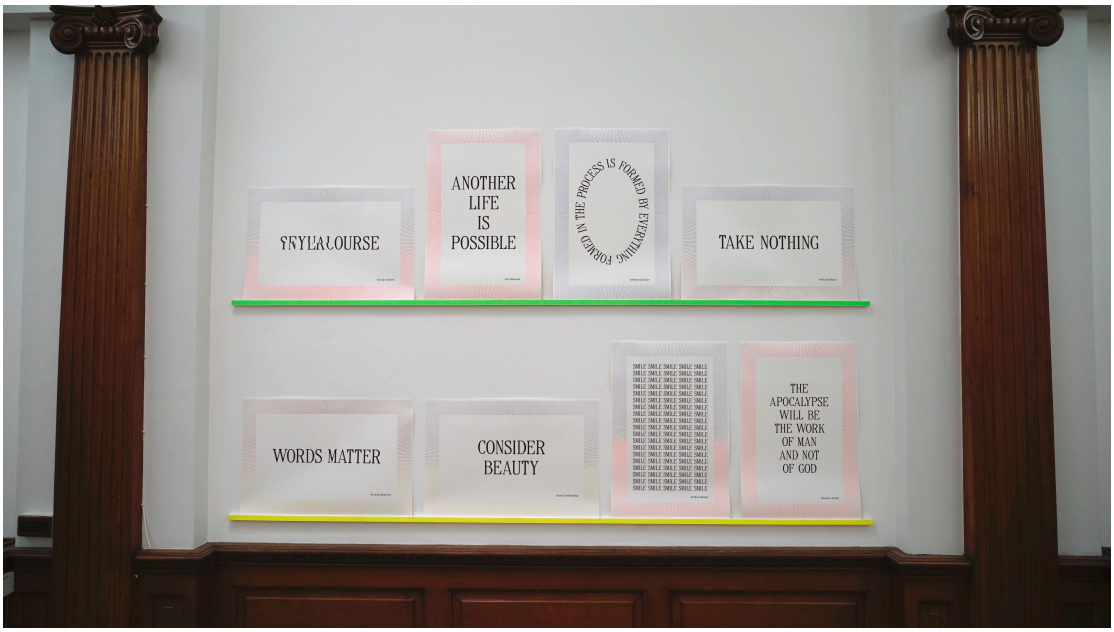

Fig 60. 'Now It Is Permitted: 24 wayside pulpits', 2016, Swedenborg House.

As the messages were placed in a sequence according to the order of the colour-ways, two desired effects were created: patterns of transverse colour waves (tremulations) threaded around the walls of the hall, with the fluorescent colour of their supports acting as a bright ground from which the more delicate colours of the posters seemed to spring; it also created accidental, random, collage-like juxtapositions of the texts to occur. The usual ranks of chairs in the hall, ready for a lecture, had been cleared to create an open floor-space, encouraging free movement without any singular direction or main focus. You read the posters from dark to light, across a colour spectrum, you read around and across the room, from top to bottom and back again. The posters by their display felt both contingent and moveable. The multiple ways of reading them and the connections made were understood as light-hearted, profound, fore-warnings, opaque and humorous by turn. The diverse and disparate voices created new meanings and 'back-and-forth' understandings by their juxtaposition with one another. The 'picture' was of individual visionary messages sharing space (in dialogue) with one another, lightly guided by tremulations moving around the room in waves seeking harmony, points of connection and new meaning despite a complex, sometimes contradictory vision of idealism. A resonant chorus of voices – silent but not unheard – that filled the hall.

Just as my art practice has been changed through the residency and my engagement with the archive, so too has Swedenborg House. There now resides throughout the House a permanent display of five wayside pulpits created for the 2016 exhibition. All fifty-eight pulpits are now part of the Swedenborg Archive.

*

Dialogue as a method and a creative act has been an active part of my research project: Swedenborg's dialogues with the spirit world, my dialogues with the staff at Swedenborg House, and with Swedenborgian experts, as well as my own dialogue (exchange) that I am engaged in with Swedenborg. The wayside pulpits offered a way to create a space for multiple voices to exist and to invite the communal to make a space. The original wayside pulpits were articles of faith from one source, designed to be understood as messages from 'on high' and heeded to by entering into the church. The new 'equivalents' were intended to be more expansive: an invitation to engage, commune and possibly be provoked by unknown sources and their messages. As curators we did not know what response we were to receive and what it might amount to.

'Now It Is Permitted' was a significant project where these actions surfaced: I asked fifty-eight artists to give me their own visionary message to be used as a wayside pulpit, multiple messages were received, they were re-drawn, coloured in and re-presented to the viewer. It was this project that put the action of exchange as a way to create meaning and generate dialogue at its heart. Its intention was to be viewed en masse, as a conversation, whilst also being prone to changeability when considered in relation to a wider social and political context.[244] This action finds its echo in Silverman discussing Merleau-Ponty's key theory of phenomenology in *The Visible and the Invisible*:

> Our perceptions are not hermetically sealed, Merleau-Ponty argues, because language allows us to share them with one another. When I look at a landscape with someone else, and each of us describes what we see to the other, "the individual green of the meadow under my eyes invades his vision without quitting my own", and I "recognize" his green in mine. Our landscapes "interweave", and we realize that "it is not *I* who sees" or "*he* who sees", but rather a "vision in general" that sees, and that "inhabits" both of us.[245]

*

[244] This exhibition utilises artists' messages or slogans in a way that has become familiar through the work of artists such as Jenny Holzer, Jeremy Deller, Bob and Roberta Smith, Nathan Coley and Martin Creed. However, its crucial difference is its intention to exist as a communal dialogue that the viewer is participant in, or witness to, one that offers numerous propositions rather than the one authoritative message to engage with.

[245] Kaja Silverman, *Miracle of Analogy*, p. 126.

Here is an extract of a conversation between Stephen McNeilly, co-curator and myself, recorded on 20 January 2017 by way of a report on the experience after the exhibition had finished:

> SM - There was a kind of joy about asking, there was a joy in the dialogue wasn't there?
>
> BS - Yes definitely. There was an enjoyment in – and a nice position to be in – to ask people to participate. And that what we were asking of them was both something quite light – it was easy for them to do, to give us a phrase, a sentence or a word – and also quite profound. And that we were allowed to transform and shape these words into posters, objects that then could be given back to the artists. There was just a pleasure in that dialogue – you give me words and I will give you back the object representing those words.
>
> SM - So to go back to the original artefact and the way that these organisations were trying to objectify the imaginal. There is something similar going on here, although it was a different set of relationships. There was still an attempt to bring together a series of words. It was always going to be a public statement, that was always intrinsic to the idea but it wasn't didactic. That's the one thing it *wasn't* actually, I don't think it was ever intended as being a series of ethical points, or set of rules, or a kind of moral compass, which the first ones were.
>
> BS - Yes, this was a much broader invitation to interpret in whatever way people wanted.
>
> SM - We probably ought to say something about the timing of it and how this was conceived before Brexit, before Trump. I didn't actually conceive of a situation whereby Brexit would have occurred, for instance. As I'm sure probably most of the people within the framework who had been asked probably felt the same way, although there was this shadow of a political storm brewing.
>
> 'Now it is permitted' was a trigger for lots of artistic historical associations – Baudelaire for one, to go back – so it has a historical resonance as a door opening, it's a kind of portal by which to enter Swedenborg from an artistic point of view. But 'now it is permitted' was a trigger for this referendum too.
>
> BS - Yes, most of the people gave their messages after the referendum result that summer. And then the exhibition opened just before the US election, and Trump won just after the exhibition ended.
>
> I think it had a sort of double effect. At the time of the opening I think people responded to the openness of the exhibition, the openness of the messages, to the variety of messages that ranged from the banal and ridiculous, to abstract philosophical messages – the way it felt like an 'alive' space, in the way that the posters were in dialogue with one another. That's certainly how people reported it to me. But then I think the harsh reality of somebody like Trump being elected president, sort of threw the whole project into a kind of crisis in effect and we asked: is this relevant any more to operate in this way? It became a critical moment for anybody who enjoys ambiguity, complexity and that way of thinking.
>
> SM - Yes, I suppose one way of looking at it is that, religious and political traditions have often employed sloganeering because of their punch like impact. But the whole framing device for the exhibition – the place, your designs and the posters have

> actually quite successfully subverted that, it actually allowed for a different kind of dialogue to take place – in a way it brought into clarity the need for subtlety, even within the realm of the statement. Somehow these voices were different – there is a way that one can enter the public arena with such statements – I mean that's what I enjoyed about it. I didn't realise up until it actually came up. We were at the mercy of whatever came back, and the whole point of it was here's a platform to say something, but once together there was an avoidance of the slogan as a punch in the face, oddly enough. Which when seen in relationship to the other original posters that were also installed throughout the building, became even clearer to me how far the project had moved away from the original premise, in a good way. It had to if it was going to be successful and occupy a completely different space.

*

'Now It Is Permitted, Lincoln', 2018
8 May - October 2018, Lincoln City Centre:
34 Billboards (portrait format)
4 large-scale billboards (landscape format)
Video screen, Lincoln bus station

In 2018 I was invited by Clare Cumberlidge of Thirteen Ways to adapt the project for a public art commission in Lincoln City Centre, as part of a three-year cultural programme, 'Mansions of the Future'. I invited more participants to contribute who had a connection to Lincoln. One posthumous message was included: Alfred, Lord Tennyson and William Allingham (Tennyson was born in Lincoln and his archive resides there); the message was marginalia written in response to Swedenborg's writings found in Tennyson's archive, the marginalia thought to be attributed to the poet, William Allingham, who Tennyson often quoted. Additional artists:

William Allingham with Alfred Lord Tennyson, Alfreda Benge, Rae Earl, Richard Kirwan, Peter Liversidge, Bohan Piasecki, Alicia Rogalska, Bonnie Wright, Robert Wyatt, Benjamin Zephaniah.

The original fifty-eight became sixty-eight messages. Collaborating once more with Fraser Muggeridge Studio we devised a new display format. All messages were displayed on a large-scale rolling video screen in the central bus station. Thirty-four of them were displayed on hoardings and twelve on large-scale billboards.

Fig 61. 'Now It Is Permitted, Lincoln', 2018,
Lincoln City Centre.

Fig 62. 'Now It Is Permitted, Lincoln', 2018,
Lincoln City Centre.

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