Chemical Wedding

Image, matter and the (un)making of synthetic white

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Abstract

In this research project, I rethink image-making processes through the lens of the white substance titanium dioxide. I propose that titanium dioxide is not only a chemical compound, pigment and specific hue (the so-called “whitest” or most “total” white) that often functions as a degree zero of our most common surfaces and images – a material that enables visuality itself – but, through its emergence at the onset of modernism in Northern Europe and its subsequent establishment as one of the most mainstream pigments, it has produced a visual regime that continues to permeate environments and minds today. By combining theory, ethnographic writing, and artistic practice, I engage transversally (Guattari, *The Three Ecologies*, 1989) with titanium dioxide across disparate domains such as extractivism, chemistry and alchemy, mass image circulation, clown and Hollywood cosmetics, the optical unconscious, and the legacies of colonial modernism.

I propose two core methods: sludging and shifting. Through sludging, I reimagine montage to explore how the white substance affects various visual registers while materially constructing white racialised subjects. When employing this method, I focus on incidents where the white pigment fails to perform as expected. With shifting, on the other hand, I study states of in-betweenness. The method emerges from image-making experiments with ilmenite – the shimmering black precursor to titanium dioxide, sourced from Norwegian mines, which holds significance as a portal to other realms. Through sludging and shifting, I seek to locate gaps in titanium dioxide’s visual regime in order to imagine it otherwise.

The study generates knowledge at the threshold between pre-verbal materiality and fully formed images, exploring the moment when an industrial substance becomes an image. In other words, I interrogate the space where perceptions are formed, and I examine how the white material within the Western context has come to operate as both empty yet highly charged, neutral yet saturated with myth. My approach draws on and extends the work of Diane Severin Nguyen and other artists who engage with material exploration to expand image-making. It also builds on the contribution of Richard Dyer (1997) and other critical whiteness scholars in attempting to render “whiteness strange”.

Finally, I present the concept of the *homeorhetic* – referring to processes that adapt in response to deviation and unforeseen events rather than seeking to maintain static states – to frame both the written research and practice. The study’s two components inform and evolve alongside one another, developing through moments of failure and flow to intervene in the visual regime of titanium dioxide, ultimately reimagining both the synthetic substance and image-making.

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In memory of Ingegerd Lehman, who taught me my very first word, *titta* – “to see”.

Contents

Introduction

[I]s it for these reasons that there is such a dumb blankness, full of meaning, in a wide landscape of snows – a colourless, all-colour of atheism from which we shrink?
– Herman Melville, *Moby Dick*, 1851.

[We] must accept the possibility that it is not man but the material that "asks" the questions, that has a story to tell, which one has to learn to unravel.
– Isabelle Stengers, *Power and Invention: Situating Science*, 1997.

White room

Around the year 2000, when I was 10 or 11 and growing up in Norway, I asked my parents for permission to paint my room, which they granted. I insisted on a pure white with a matte finish. I started with the largest surfaces, the obvious targets: the walls. I soon realised that I had the urge to cover everything under two or three thick layers of paint. Chairs, a desk, a wooden bedframe, lamps, various cardboard boxes, a stereo, a computer, a TV set, a DVD player and the controls were all subjected to my whitewashing. The memory of going to sleep in this bedroom, which was now white to the point of having a bluish tinge, with the windows wide-open to air out the overpowering metallic smell, is still vivid. Inevitably, the white film that covered the surfaces and objects started to crack (water-based paint on plastics). Slivers and specks of dried white paint peeled off from the hastily painted objects and collected in the corners of the room, which I found both disturbing and fascinating.

My motivation for researching a white pigment quite possibly originates from this early complicity in desiring an all-covering chromatic whiteness.[1] One might also point out that the painting incident occurred at the close of the century that saw titanium dioxide become mass-produced. This pigment, likely the main component in the paint I chose for my room, is often credited with defining the distinct white hue of modernism – the era of the white built environment. Little did I know at the

[1] I use the term "chromatic" whiteness to refer specifically to the chroma or colour – or *non-colour* – of white, rather than other meanings, such as the politics or identity of whiteness. I will further elaborate on my approach to these categories later on in the Introduction.

time of my bedroom experiment that the invention of the extractive and chemical processes that provide us with this white pigment had taken place in Southwestern Norway in 1908, near the birthplace of my mother, and that this Northern European country had since become a central contributor, not only to a worldwide industry of white pigment, but also to a visual regime of whiteness permeated with contemporary myths. One could speculate that these inheritances had subconsciously manifested in me at this age.

However, despite my initial participation in a pursuit of *total* whiteness, soon enough my attention shifted to the cracks in the painted objects and surfaces in the room. I began collecting the room's sheddings, which perhaps marked the beginning of my interest in what disturbs and unmakes the promise of all-pervasive whiteness.

Image, matter and the (un)making of synthetic white

This study consists of a written thesis and a practice component, both developed to address the question of *how image-making processes can be rethought using theoretical and artistic research on titanium dioxide, with a focus on its material specificity and the Norwegian experience*. Ever since a filmed advertisement for white paint inaugurated the advertising film genre,[2] chemical innovations in white pigment production and image-making technology in the West have been intertwined with each other, as well as with modernist and colonial legacies and remnants of alchemical thought. This historical and ongoing relationship serves as a key departure point for this study.

The reference to the "Norwegian experience" reflects my aim to explore the relationship between (white) materiality and image not as an abstract exercise, but as something situated in lived experience. I achieve this by incorporating field notes from Norwegian titanium extraction sites, alongside a critical examination of my own biography within the context of a nation-state to which I am partially connected. Therefore, in this research project I also engage with the method of ethnographic writing.[3] The emphasis on experience, moreover, reflects my indebtedness to a pragmatist disposition,[4] through which I aim to test the effects and consequences of the materials, images, art, ideas and phenomena I encountered while researching titanium dioxide – including in

[2] I elaborate on this historical connection in Chapter 1. The director of the 1898 paint advertisement was the Algerian filmmaker Félix Mesguich, a protégé of the Lumière brothers. See also "Lectures Pour Tous: Revue Universelle et Populaire Illustrée | 1". Gallica, 1899, 355.

[3] Please note that certain details in these field notes have been modified or omitted to protect the anonymity of the individuals I encountered during my research trips.

[4] Pragmatism is a philosophical tradition that views knowing the world as inseparable from acting within it. This idea has led to various philosophical approaches, the most influential on my thinking being that of William James. For James, pragmatism is an exercise that tests ideas by their consequences and potential, whether in matters of science, religion, social issues, or aesthetics. The key criterion for evaluating their truth and meaning is their practical and applied effects in various *lived* situations. This allows for an open-ended, flexible and multi-faceted engagement with the world. See Chapter 1 for a more detailed discussion of my approach to pragmatism and pluralism. See also: James, William. *What Pragmatism Means*. 1 edition. Volendam: LM Publishers, 1907; James, William. *The Meaning of Truth*. Harvard University Press, 1975; Bella, Michela. "William James, A Pluralistic Universe". Edited by H. G. Callaway. *European Journal of Pragmatism and American Philosophy* IV, no. IV–2 (2012 2008); Savransky, Martin. "The Pluralistic Problematic: William James and the Pragmatics of the Pluriverse". *Theory, Culture & Society* 38, no. 2 (1 March 2021): 141–59.

my own practice – rather than seeking or proposing finite, essential conclusions. In other words, here I explore what image-making processes are *capable of* in relation to how we encounter the white material in the world.

I supplement my overarching research question with four distinct sub-questions, each corresponding to a chapter. The first sub-question, which corresponds to Chapter 2, is: *How might image-making processes be rethought using theoretical and art research on titanium dioxide, with a focus on how the pigment materially constructs white identity in photographic images?* The next sub-question, addressed in Chapter 3, asks: *How might image-making processes be rethought using theoretical and art research on titanium dioxide, with a focus on the synthetic substance's extractive history in the context of the Norwegian experience?* The sub-question for Chapter 4 is: *How might image-making processes be rethought through theoretical and artistic research on titanium dioxide, with a focus on the white material's historical inheritances within the context of the Norwegian experience?*

Last, the final research sub-question, *How might one conceptualise and measure what this research and practice are doing?*, corresponds to Chapter 1, which also serves as a contextual review where I situate my practice and research within relevant fields, and to Chapter 5, where I propose a theoretical and speculative approach to both aspects of the study. This question helps us to conceptualise what the written research and practice components are doing, and it helps us to measure their effects in relation to the field of fine art, as well as the interdisciplinary theoretical fields that I draw on and contribute to with this research project.

The criterion I have established for evaluating all aspects of my study is: *whether the research project makes a novel contribution to the interdisciplinary theoretical fields it engages with, as well as to contemporary art, by rethinking image-making processes in relation to a white substance*. I will refer to this criterion throughout the thesis and especially in the conclusion. Notably, with this research project, I do not attempt to propose a theory that integrates all these elements as a unified whole. Instead, the project helps me to highlight various under-researched connections through a trans-scalar approach, allowing for multiple points of identification. I explore some of these connections through practice methods, and others more deeply in the text, and although the practice and writing components might not be aligned one-to-one, they inform each other throughout the project.

Degree zero of visibility

In many of its manifestations, titanium dioxide is a substance that enables visuality. The art critics John Kelsey and Boris Groys both once declared that whatever image we see is simultaneously a black square, since this is what an erased image looks like, what "automatic" looks like on the digital

screen.[5] I challenge this notion by observing that what we see when an image is erased is, quantitively speaking, usually a white surface. When the networked image breaks down on one of our most popular screens, that of the iPhone, the *white screen of death* appears. In most contexts today, what we see when an image is "removed" – which goes for almost any printed surface, exhibition wall, or projection screen – is still a white, and often a titanium white, surface. Titanium dioxide pigment is the crucial ingredient in our most common "neutral" and "empty" surfaces. One could say that the substance is often treated as a "degree zero" of the image[6], and a starting point for visibility – a role that the white material performs steadily while, most of the time, going completely unnoticed. In other words, whatever image we see is simultaneously a titanium white square. This condition marks a point of departure for this research project. I set out to explore what happens when a material that silently facilitates visuality becomes part of the image.

Also known as the "whitest" white and "total" white, titanium dioxide is often said to have provided the distinctive shade of white that defined the 20th century. Other technical terms for the pigment include "whitening agent" and "opacifier" due to its opaque properties and density. Today, the white material is dispersed globally through an obscure network of multinational extractive companies, and it circulates through almost every fabric of contemporary life[7] – including our bodies – on a scale not easily graspable by human imagination; it is everywhere, yet rarely noticed. Nonetheless, I suggest that tracing this one molecular substance provides a tangible way to comprehend some of the intended and unintended consequences of our synthetic inventions in times of ecological breakdown following colonial modernity and the rise of large-scale extractive capitalism.

For instance, as I learned how our desire for white surfaces drives us to carve into the crust of the earth to extract a white substance, I also learned how this substance now carves into us in return. In August 2022, the European Union banned the use of titanium dioxide as a food additive. Previously deemed nontoxic, so harmless that it was considered for use in experimental

[5] In his writings on Kazimir Malevich's painting *Black Square* (1915) in *The Weak Universalism*, 2010, Boris Groys declares that "whatever image we see is simultaneously a black square", because the image "will look like a black square if it is erased." In an essay on Wade Guyton's black paintings in *Rich Texts*, 2010, John Kelsey also asserts: "On the contemporary screen, where writing, too, finds its image, black is the colour of 'automatic.' It is what 100% looks like." In a digital binary system, where everything is either 0 or 1, black may stand for an optical minimum. Still, from the function of performance, circulation and process, it is also a maximum, Kelsey argues. One could easily reverse Kelsey's argument: white may stand in for an optical maximum, but from the function of performance, circulation and process, it is also a minimum. However, in this study, I am not primarily concerned with how chromatic white operates within the binary RBG system. My focus is on material whiteness out there in the world, CMYK and otherwise – and here, I propose, the whiteness of titanium dioxide dominates and proliferates.

[6] Here I borrow and repurpose Roland Barthes's use of the term in *Writing Degree Zero* (1953). In this book, Barthes critiques the notion of a "degree zero" style of language – a type of writing that aspires to transparency, neutrality and objectivity, free from historical or cultural influence. See Barthes, Roland. *Writing Degree Zero*. London: Cape, 1953.

[7] The chemical compound of titanium dioxide (also known as TiO2) is widely used to produce art materials such as titanium white paint, paper, photographic prints, screens and projection screen paints, in addition to whitening many of our most common everyday objects and surfaces: white foods, skimmed milk, medications, cosmetics, printed matter, white and pastel coloured household paints, electronics, industrial coatings, iPhones, aircraft and car coatings, thin-film optics and, more recently, smog-absorbing and self-cleaning surfaces. Two-thirds of all paints contain titanium dioxide, and for every label or product packaging produced today, the current industry standard requires four times more titanium pigment than any other pigment. This highly refractive substance is also a key ingredient in sun-lotion since it deflects UV rays, and with the increased use of nanoparticles in various products, nanosized titanium dioxide is the most frequently encountered.

stratospheric aerosol injection – that is, to introduce aerosols into the stratosphere to cool down the earth, a form of global dimming (mimicking what is seen naturally in the aftermath of volcanic eruptions) – the substance has since come under scrutiny. Nanosized titanium pigments are suspected to penetrate cell walls in humans and other organisms, but their effects on ecosystems and the scale of their impact are not completely measured nor fully understood.[8]

While titanium dioxide is one of the most pervasive industrial pigments and nanomaterials – arguably one of our most mainstream colour pigments today – in this study, I am primarily interested in how this white material impacts various visual registers in contemporary life. I propose that the white material is not only a modern chemical invention or industrial and artistic material, but that through its emergence in a historical, political and cultural constellation marked by the legacies of colonial modernity in Northern Europe at the onset of modernism, titanium dioxide has contributed to the emergence of a *visual regime*. A visual regime attached to a particular conceptualisation and shade of white – the *whitest* and most "total" of whites.

In *Notes on Fortnightism* (2020), writers Chan Carson and Gustav Düsing state that the principal derivative inherited from modernism is the white built environment, which is still prevalent today.[9] I build upon this observation by suggesting that it is, more specifically, titanium dioxide and the visual regime constituted by this material – which permeates both environments and minds – that serves as a principal derivative of modernism. This is one of the main proposals of this study. In this, I also contribute to Political Aesthetics scholar Esther Leslie's foundational work on the confluence of chemistry, art and the 18th and 19th century pigment and dye trades in her book *Synthetic Worlds* (2005),[10] by exploring a white pigment industry that emerged in Norway in the 20th century, shaped by a distinct set of new influences and meanings.

In contrast to other major and growing mining industries that extract substances to meet human primary needs such as energy or nutrition, titanium dioxide is not extracted for life-sustaining purposes but primarily for aesthetic reasons, which of course also converge with social and political forces and above all the demand to generate profit. Titanium dioxide turns hundreds of commonplace things white and opaque, of which, many do not have to be white out of strict necessity, but they are made so due to an accumulation of conscious and unconscious desires and expectations relating to ideas about hygiene, neutrality, progress, purity, beauty, transcendence, taste, control and absence; absence of temporality, absence of material reality – absence of *anything.*[11] Ever since the invention

[8] Various countries outside of Europe, including the UK, still allow the use of titanium dioxide to whiten food. See Shi, W., Han, Y., Guo, C. et al., 2019; Conference, Goldschmidt, 2021; Tyner, K. M., A. M. Wokovich, D. E. Godar, W. H. Doub, and N. Sadrieh. 2011; Jovanović, Boris, and Héctor Guzmán, June 2014; Larue, Camille, ed. "Ecotoxicity of Titanium Dioxide Nanoparticles". *Nanomaterials MDPI*, no. Special issue (Forthcoming).

[9] Chan, Carson, and Gustav Düsing. "Notes on Fortnightism". *DIS Magazine*, 2020.

[10] See Leslie, Esther. *Synthetic Worlds: Nature, Art and the Chemical Industry*. London: Reaktion Books, 2005.

[11] I have borrowed this phrase from Richard Dyer, who argues that chromatic whiteness in the West is habitually conceptualised as "a lack of materiality". He writes: "[What] is absent from whiteness is *any thing*: in other words, material reality". Dyer's seminal work has greatly influenced this project. However, I aim to contrast my study with Dyer's by focusing on how the invention of titanium pigments has contributed to a specific conceptualisation of chromatic white, which both

of the chemical process for producing titanium dioxide in Norway in 1908, this visual regime of chromatic whiteness has gone under the guise of order and neutrality. However, I propose that it is, in fact, saturated with myth, fantasy and folklore.[12] I consider this observation another central finding in this study.

I am predominantly concerned with the inheritances and effects of the invention of the white material as it relates to a Western tradition.[13] This approach, I acknowledge, risks recentring a Western visual regime of whiteness. Yet, this is a risk I am willing to take as I attempt to intervene in this phenomenon from within, as an implicated subject, and as I attempt to develop strategies and tactics that seek to render the white substance and its associated visual regime *strange* and marked rather than naturalised – in other words, as something that could be otherwise. The task of "rendering whiteness strange" was first proposed by film scholar Richard Dyer, who examined the construction of white identities through image-making technology and Hollywood films in his seminal book *White* (1997).[14] In contrast, I focus on a visual regime that upholds chromatic whiteness as a norm and cultural aspiration more broadly, and which, in some instances, intersects with the material construction of white identity in both still and moving images. For instance, in contemporary promotional imagery for the white material, we are often presented with an upward movement, a desire for the transcendental, and a gaze directed towards the blue sky, the sun and the hands of white people. In such images, titanium dioxide can be seen not only as underpinning a modern obsession with whiteness, but also as contributing to the material construction of white racialised subjects.

In many studies, references to chromatic whiteness and to the politics of whiteness or white identity are used interchangeably. In this project, I distinguish between chromatic whiteness and white identity and politics, in order to arrive at a more nuanced understanding of how these categories and their effects are interrelated. Through constant exposure – what some refer to as the Troxler effect[15] – the white material, its visual regime and its associated politics of whiteness often remain not only conflated but also inconspicuous, as phenomena that have receded into the substrate of the West's visual field, where they remain ubiquitous yet frequently taken for granted. This aspect of the project raised the question of how to build points of passage to what philosopher

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draws on and, in some ways, differs from the more generally established understanding of whiteness in the West. See Dyer, Richard. *White: Essays on Race and Culture*. 1st edition. London; New York: Routledge, 1997, 75.

[12] Here, I adapt a phrase by Leslie to suit the specifics of my research. See Leslie, *Synthetic Worlds*, 2005, 7.

[13] Although highly interesting, an engagement with traditions other than the Western tradition of chromatic whiteness is outside the scope of this project. In the Conclusion, I suggest some potential areas for further research.

[14] Dyer notes that while numerous books have been written on black and non-white identities in his field, few film and media scholars have focused on the category of Caucasian people. Since Dyer published his book, a domain of critical whiteness studies has emerged, although his observation about this discrepancy still holds true. See Dyer, *White*, 1997.

[15] The Troxler effect refers to when "a certain kind of given stimulus that does not change over time eventually [will] be ignored by the neuron that receives the stimulus. […] If one keeps a fixation point steadily under one's gaze without moving it or oneself, eventually an unchanged stimulus close by it will fade and disappear from sight, due to neural adaption in the retina and in the brain." See Troxler in Smith, Shawn Michelle, and Sharon Sliwinski, eds. *Photography and the Optical Unconscious*. Duke University Press, 2017, 265.

and media theorist Walter Benjamin (1931) referred to as the "optical unconscious"[16] – to that which is known yet *unthought* in our collective perceptions.[17]

Methods: sludging and shifting

To undertake this task, I developed a set of research methods that I refer to as *sludging* and *shifting*, in addition to ethnographically informed field notes. While the domains of art and the humanities have long addressed the conditions of extractive capitalism and, more recently, have recognised the need for a sustained confrontation with the politics of whiteness, these activities have taken place within a vast yet unnoticed white interior, as noted by architecture theorist Mark Wigley.[18] I would add that these conversations have also occurred on numerous white surfaces and grounds enabled by the white pigment extraction industry. This study has required me to combine and expand upon these areas of artistic and theoretical activity in novel ways. In my research, I have developed strategies to trace the white substance across various scales: from its appearance on the faces of early 20th century mime clowns and 21st century white Hollywood stars during so-called *photo-flashback malfunctions*, to its manifestation within the image surface itself and its presence in its pre-refined form as shimmering black ilmenite rocks in an open pit mine.

With this project, I aim to generate knowledge at the threshold between pre-verbal materiality and fully formed images. The moment when an industrial substance becomes an image, or rather, the gap between the two, is a key tension around which the methods and practice of this project revolve. My approach draws on the work and writing of artist Diane Severin Nguyen, and in particular her exploration of image and matter through an interest in what lies between a "fully signified ready-made object and something that's pure substance."[19] Here I apply a similar approach to explore a different set of questions and materials. I am particularly interested in examining the transformational point between materiality and image to interrogate how the white material may operate as seen yet *unthought.*[20] My interest in moments of transformation and states of in-betweenness also stems from seeing them as drawing attention to the processes through which "perceptions are formed".[21]

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[16] I discuss the optical unconscious – first associated with Walter Benjamin and later adopted by various theorists and artists interested in images and image-making processes – at length in Chapter 2. See Benjamin, Walter. "Little History of Photography (1931)" in *One-Way Street and Other Writings*. London: Penguin Classics, 2009; Smith and Sliwinski, eds. *Photography and the Optical Unconscious*, 2017.

[17] Bollas in Smith and Sliwinski, eds. *Photography and the Optical Unconscious*, 2017.

[18] Mark Wigley has observed that the current confrontation with white hegemony occurs within an unquestioned and pervasive white built environment (See Wigley, Mark. "Chronic Whiteness". E-Flux, 2020). I extend Wigley's argument by demonstrating that the white built environment is also sustained by an extractive visual regime.

[19] The entire quote by Nguyen: "I am always searching for materials and objects that echo the state of the photograph, that are somehow in-between a fully signified ready-made object and something that's pure substance. It's pretty intuitive – mostly an awareness that certain things are inherently more photographable or photogenic in a way that's unexpected. I'm very interested in the transfiguration of something through the lens". See Melendez, Franklin. "MICRO. DRAMAS. Interview with Diane Severin Nguyen". *Kaleidoscope*, 2020. See also Kunstnernes Hus. "IF REVOLUTION IS A SICKNESS: Special Screening of Trilogy Followed by a Conversation with Artist Diane Severin Nguyen and Marie-Alix Isdahl", 2023.

[20] Phrase repurposed from Bollas in Smith and Sliwinski, eds. *Photography and the Optical Unconscious*, 2017.

[21] I borrow this formulation from Erin Manning. See Manning, Erin. *The Minor Gesture*. Thought in the Act. Durham: Duke University Press, 2016, 85.

In developing my practice, I have therefore looked to theorists and artists who have responded to gaps, spaces and processes of in-betweenness in various ways, including Nguyen as well as art critic and theorist Marina Vishmidt.[22] Vishmidt likens the gap to "a spacing that telescopes in and out of a structure"[23] and, hence, may direct us to connect with what lies beyond that structure. The task I have set for the practice component of this project has often been to locate or generate such transformational gaps.

Figure 1 Diane Severin Nguyen, *Colonizing Hearts* (2019 2018). LightJet C-print, aluminium frame, 38.1 cm × 57.15 cm. Image courtesy of the artist and Bad Reputation, Los Angeles.

As this study centres around a white molecular resource (TiO2), it also contributes to the evolving field of artistic activity that engages in "molecular" practices.[24] I use this term to refer to artistic efforts that emerged in the 2010s in response to the increasingly unpredictable interactions between human activities and matter in a destabilised climate, where new synthetic and chemical inventions abound. These artists, exemplified in this project by contemporary artists such as Dora Budor and Pamela Rosenkranz, often cite molecules and synthetic inventions as materials in their work. My project differs from some of these molecular practices in that I also focus on mass-circulated images,

[22] Vishmidt, Marina. "Basement Jazz". *Mousse Magazine*, 2022.
[23] Vishmidt, "Basement Jazz", 2022.
[24] I discuss so-called molecular practices in Chapter 1. I consider these practices a precursor to artistic practices developed in the 1960s in response to the wealth of synthetic materials invented at that time, such as synthetic mud, latex, vinyl, and polyurethane, in which one began to approach materials as *materiality* – that is, matter as a state that emerges through processes and forces of production. This newfound interest in materiality was also a counterreaction to the modernist privileging of form over matter found in the writing of figures such as Clement Greenberg. It is worth noting that this development – perhaps paradoxically – occurred in parallel with declarations of the dematerialisation of artwork. See Bourriaud, Nicolas. "Materialist Invisibility". *Flash Art*, 14 September 2021; Lange-Berndt, Petra. *Materiality*. Documents of Contemporary Art Series. Cambridge, Mass.: London: The MIT Press; Whitechapel Gallery, 2015; Lippard (1966) in Lange-Berndt, Petra. *Materiality*. 2015; Lippard, Lucy R. *Six Years: The Dematerialization of the Art Object from 1966 to 1972*. Berkeley: University of California Press, 1997.

drawing on and contributing to a different lineage of artists that can be traced back to the Pictures Generation.[25] These fields of artistic activity – though all concerned with image-making, materiality or perception – are often treated as separate. In my project, however, I recompose, synthesise, and contribute to their various concerns and strategies. I have grouped these approaches and experiments under two main research methods: sludging and shifting.

Sludging refers to moving image editing methods that adopt new approaches to montage. Post Hito Steyerl, who shifted investigative attention from the representational function of images to the speed, networks and structures of their circulation,[26] sludging is a method that acknowledges that the mass circulation of images is also part of material and extractive infrastructures, as they are built with minerals and stones. In this project, I use sludging to refer to, but also differentiate from, the so-called TikTok overstimulation "sludge content".[27] The etymology of "sludge" is uncertain, though it may derive from the mid-17th century word "slush", which has Norwegian or Scandinavian origins (*sludd*), referring to melting or dirtied snow. "Sludge" also denotes the waste produced from mining.

By sludging, I bring together various found, seemingly disparate images and materials by way of juxtaposition and compacting to measure how the white material affects various visual registers and becomes recognisable as a phenomenon with ideological significance. In developing this method, I have focused on exploring moments when the white material presents itself in or through images – often in support of white identity or white racialisation – yet it fails to perform as expected; that is, it fails to present itself inconspicuously. The results of this are that the phenomenon – the white material, alongside the images themselves – are rendered *weird*, marked and particular. In using methods of sludging, I am also interested in measuring the affects and subconscious, or optically unconscious, forces at play across various images and materials related to titanium dioxide that I have compiled throughout this research.

I group the second set of practice elements developed as part of this research under the methodological term shifting. In these image-making experiments, I explore states of in-betweenness, the material properties and significances of shimmering and the semi-erasure of an image – efforts that I believe can help me examine the processes through which perceptions are formed. The method of shifting is derived from image-making experiments in which I tested various ways of using the white material and its black precursor, ilmenite, against their intended purposes –

[25] See Chapter 1 for an extended discussion of how my practice and research relate to these artistic practices, as well as other artistic and theoretical contributions.
[26] See Steyerl, Hito. "In Defense of the Poor Image". *E-Flux*, 2009.
[27] Sludge content refers to videos circulated on social media platforms like TikTok, where disparate video content is combined – often featuring "absurd" imagery of material processes, ASMR videos, talking head documentaries, gaming POV footage, and other elements – to gain visibility and engagement through viewer overstimulation. I expand on this in Chapter 2. See also: Ede-Osifo, Uwa. "Sludge Content" Is the Latest Form of Escapism on TikTok". *NBC News*, 26 April 2023; Mattson, Anna. "Sludge Videos Are Taking Over TikTok — And People's Mind". *Scientific American*, 10 January 2024; Barnes, Caspar. "Will "Sludge" Content Stick around or Change Shape?" *Digital Frontier*, 13 June 2024.

an approach I came to think of as *productive failure*.[28] These experiments also engage with the mineral, alchemical and synthetic materialities of the white image surface, as well as the material residues of key historical moments, in what I propose is a modern visual regime that emerged from the invention of titanium dioxide. I designate these approaches under the overarching method of shifting. The etymology of *shift* originates from the Old English *sciftan*, meaning "to arrange, divide, apportion", and it is related to the German *schichten*, meaning "to layer, stratify". Over time, "shift" came to mean changing or moving from one state to another. My approach aligns with this later understanding, relating to that which shapeshifts and oscillates.

The material and visual outputs produced through the methods of sludging and shifting have been presented to the public in a series of installations titled *Chemical Wedding #1–#3* (2022–2024) and *The Opacifier* (2024). These installations were environments in which viewers encountered the video works *The Opacifier (Erased White City)* (2024) and *Chemical Wedding* (2022–2024), along with a selection of related materials and a series of image-based wall works titled *Portal/Terrain* (2024). Documentation of some of these installations and practice experiments is included throughout the following chapters; however, the final exhibition will be available for in-person viewing only during the viva voce.

Towards the homeorhetic: failure and flow

I propose the term homeorhetic to conceptualise the effects of the research and practice components of this study. I have borrowed this term from the fields of ecology and developmental biology, though it was also once used by artist Dora Budor to describe how an artwork can function as a "deviation amplifying system"[29], and thus to generate or facilitate flow rather than maintain homeostasis – that is, to stabilise current conditions. Homeorhetic is the adjectival form of homeorhesis, derived from the Greek for "flow" or "movement". The term refers to systems, processes or states that exhibit dynamic properties, evolving and adjusting along a trajectory of flow while continuously responding to shifts and altering conditions. In contrast, systems that return to a fixed or stable state are described as exhibiting homeostasis. In my adaptation, I use the homeorhetic to conceptualise how this research project and its methods address the effects of the white material across various scales by breaking down established binaries, recognising moments of failure or deviation, and foregrounding both through the methods of sludging and shifting, all the while maintaining a trajectory and direction.

[28] I borrow this phrase from writer Gianmaria Andreetta. See Andreetta, Gianmaria. "Planned Failure". In *OLD WORLD*, 2023.
[29] Filipovic, Elena. "Dora Budor: On Being a 'Deviation Amplifying' System". *Flash Art*, June 2019.

By tracing the white material and measuring its effects across different domains and visual registers, I also take a transversal approach, following philosopher Félix Guattari.[30] Transversality, in Guattari's terms, refers to something that cuts through established and stabilised fields, scales, and binaries. In my framing of the homeorhetic, this approach incorporates a transversal sensibility, with a specific focus on operating within failure and flow. I propose that a homeorhetic approach can intervene in sedimented structures and "unthought" phenomena – such as the white material and its adjacent visual regime – by instigating movement and flow, thus functioning as what Guattari describes as a transversal "tool".[31]

In this study, I use the term homeorhetic to refer not only to the artistic research project in its "final" form, but also to the process of its making. The development of methods in this project has often involved a strong sense of direction – shaped by the evolving research question and its sub-questions – while also embracing open exploration, allowing unexpected elements to become crucial focal points that can redirect the project in new, unforeseen ways. Thus, the homeorhetic frames artistic research practice as a process of ongoing adaptation, where the researcher engages in a practice that strives to produce or locate moments of failure and flow, while maintaining a sense of direction.

[30] See Chapter Five for my discussion of Guattari's ecosophy and transversality, as well as: Guattari, Félix. *The Three Ecologies*. London; New York: Continuum, 1989, 168; MacCormack, Patricia, and Colin Gardner. *Ecosophical Aesthetics: Art, Ethics and Ecology with Guattari*. London: Bloomsbury Academic, 2018, 3.
[31] Guattari, *The Three Ecologies*, 1989, 69.

Figure 2 Still 3 and 4 *The Opacifier (Erased White City)* (2024), 4K video, colour, sound, 06:48 min.

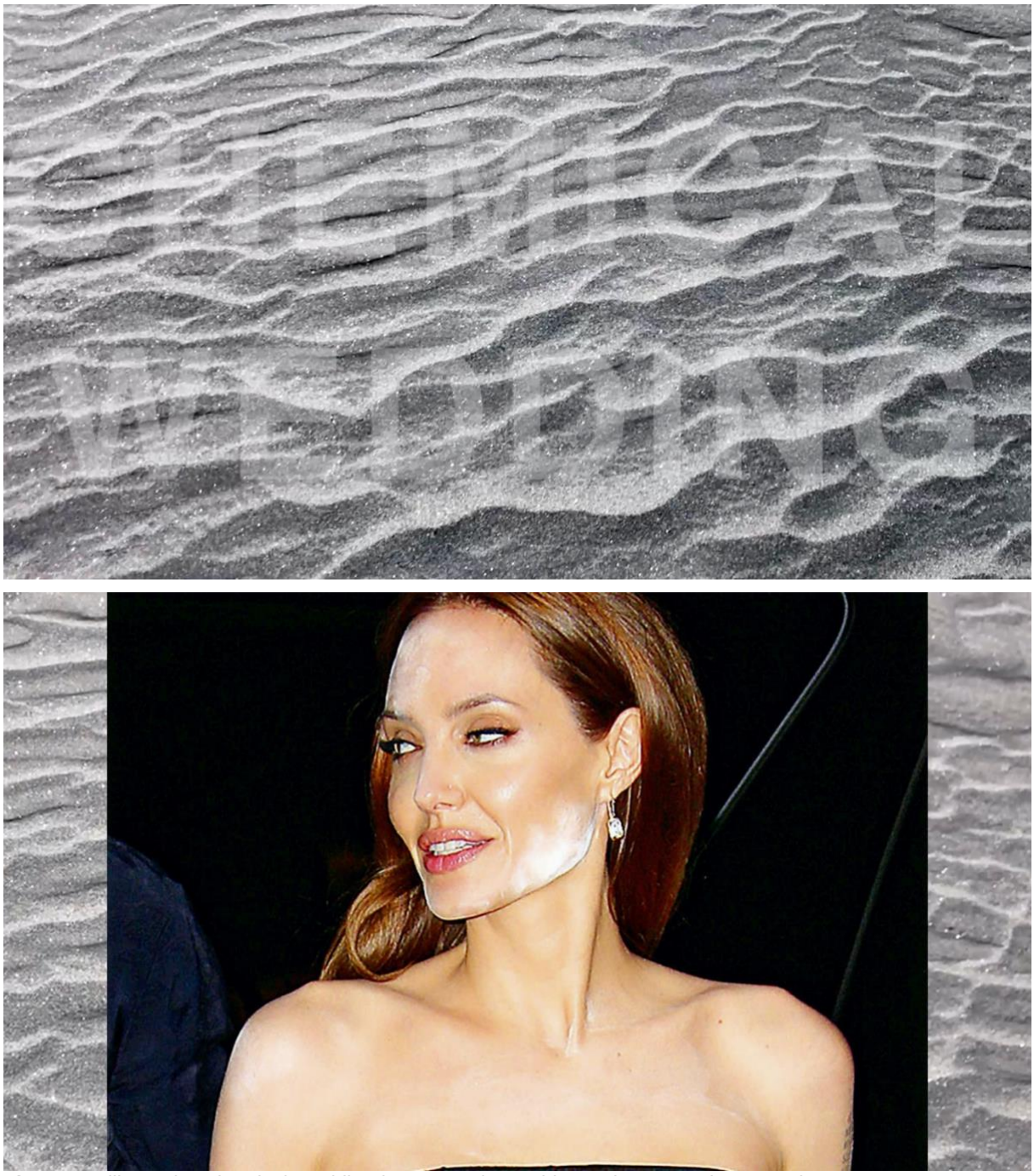

Figure 3 Still 7 and 1 *Chemical Wedding* (2022-2024), 4K video, colour, sound, 05.20 min.

Chapter overview

The structure of the written thesis is as follows:

In Chapter 1, *White material*, I argue that the white substance titanium dioxide and its effects constitute a new visual regime that emerged at the onset of modernism, and that this regime continues to influence many aspects of contemporary life in often unremarked ways. As the chapter also serves as a contextual review, I will outline the artistic and theoretical research to which my project contributes. In my practice, I draw on and contribute to strategies from structuralist and neo-structuralist filmmaking, artistic practices that engage with and respond to photographic images and efforts directed at developing new forms of representation in response to synthetic inventions and the scale and perspective of molecules (which I refer to as "molecular practices"). The written thesis contributes to theoretical domains concerned with the entanglement of matter in a destabilised climate, particularly within new materialism, and to expanded understandings of ecology that include aesthetics and sociality, such as Guattari's threefold ecology (1989). The research also contributes to colour studies, critical whiteness studies and critical visual research concerned with inherent biases in image-making towards various types of whites (so-called "images of whiteness"[32]).

Towards the end of the chapter, I contextualise the iteration of white identity that has developed in Norway, where my research sites are located. The chapter is organised into three main sections: Image, Materiality, and Whites. The project also challenges this division by interrogating and responding to the interrelations between these elements, and by measuring their effects as they collectively form the visual regime of titanium dioxide.

Chapter 2, *Sad clown Angelina*, departs from an engagement in both writing and practice with a selection of found images: two so-called "photo flashback failure" paparazzi images of the white actresses Angelina Jolie and Nicole Kidman, as well as a series of photographs of the stock figure and clown, Pierrot. These found images serve as case studies for what I refer to as "images of whiteness" enabled by the mining site. They are included in a sludge section of the moving image work *Chemical Wedding* (2022-2024). In this chapter, I am concerned with how the white material constructs white identity in photographic moments. In the flashback images, titanium dioxide becomes noticeable when it should have remained invisible as a translucent cosmetic powder. During a flashback failure – a phenomenon caused by a camera flash that is only noticeable in photographs – the white material does not perform as intended; instead, it appears as visible smears on the faces of the two celebrities as they pose on the red carpet. As a result, both the normative white world of Hollywood and the visual regime of titanium dioxide are rendered *strange*.

Conversely, clowns such as Pierrot represent the only truly white faces we encounter, as philosopher Alain Badiou has noted,[33] and their dense whiteness is achieved through titanium

[32] See the anthology edited by Daniel Blight. Blight, Daniel, ed., *The Image of Whiteness: Contemporary Photography and Racialization,* 2019, 11.
[33] Badiou, Alain. *Black: The Brilliance of a Non-Color*. Cambridge: Polity Press, 2017, 102.

pigments – it is the *whitest* white face. In the images featuring Pierrot, the white face is explicit rather than implicit. I approach these clown images as revealing aspects related to the imaginaries, fantasies and ambivalences associated with chromatic whiteness and the white face within a Western optical unconscious. I consider these three "failed" images of whiteness as indicative of gaps within the visual regime of the white material, through which we may imagine it otherwise.

Chapter 3, *Portal/Terrain*, concerns my engagement with the raw material of ilmenite, the shimmering black sand from which white titanium dioxide pigments are derived. In the early days of the visual regime of titanium dioxide, images alluding to or depicting the raw material and the "magical" alchemical processes through which a black substance is transmuted into the whitest white – often via the figure of the titan god Kronos and other references to Greek mythology – were promoted by the pigment industry; however, this is no longer the case. Today, the material history of titanium pigments has disappeared from contemporary promotional imagery. In this chapter, I analyse the shift in the visual regime of titanium dioxide and consider its effects. I propose that the current *dematerialisation* of the white material generates an imaginary that aspires towards the sky and the transcendental, in which the white material appears to emerge from nowhere and as immaterial.

The chapter then explores my encounter with the extractive processes at the titanium mine and the surrounding landscape in Southwestern Norway through a movement in the opposite direction: down towards the ground, into the dark and the shimmering, to what lies below and beyond. Alongside this reversal in direction, there is a parallel development in my studio practice. Initially, I produced a series of works, the *Sunscreen Pictures* (2022), which explored relations between titanium dioxide, the image and imaginaries related to the sky, the skin and the sun. Later, I shifted my approach and began to produce a series of photo paper-based works with ilmenite titled *Portal/Terrain* (2024). In this chapter, I present and evaluate the methods I developed in response to my encounter with the mining site and my experiments with the material properties of ilmenite and its significance as a portal to other realms.

Chapter 4, *The Opacifier (shutdown)*, departs from an incident that occurred during my research, when the charged nature of the white substance surfaced, sparking a viral backlash across alt-right and right-wing social and news media. In response, the pigment company denied me further access to my research sites – the mine and the pigment plant. No longer part of a visual field's optical unconscious, the whiteness of titanium pigments became contested and thus visible, albeit ridiculed. The "empty" surface had become explicitly charged. In this chapter, I address the relations that crystallised during the viral incident – when the *white business* shut down and a company that believed itself to be invisible realised it was not.

I then discuss how this difficulty in conducting my research led me to alter my approaches in both my research and practice. I developed a moving image work in London titled *The Opacifier (Erased White City)* (2024), which explores the (white) material residues of the year 1908, within

both physical sites and the realm of moving images, by employing strategies of shifting. Furthermore, I consider why the Norwegian titanium industry has retreated from public view over the years, all the while still contributing to the emergence of a visual regime of whiteness. Additionally, I explore the relationship between titanium dioxide and modernisation in post-independence Norway – a country often perceived as peripheral to imperialism, yet one that absorbed elements of colonial ideology before the onset of modernism. Finally, the viral incident led me to investigate how the Norwegian titanium industry is positioned within a broader global pigment economy.

In Chapter 5, *Chemical Wedding*, I conduct a walkthrough of the pigment manufacturing plant, where the white material is derived from black sand, "refined" and transformed into a white product for the global pigment market. The facility is divided into a black wing and a white wing, and the chemical processes that occurs between these sections produces a paradoxical material: an immaterial material. I propose that the perceived disembodiment and neutrality of the white material – qualities that contribute to various modern Western myths and imaginaries with real, lived effects – stem from conceptualising the substance as separate from its material entanglements and earthly mineral origin. I argue that this dematerialisation of the substance first occurs in the pigment plant through a chemical and symbolic process known as "washing".

These observations lead to a discussion of how this hybrid research project attempts a cross-scalar approach in its situated engagement with the co-constitutive relationships between materiality, image and meaning within titanium dioxide's visual regime. In other words, I speculate on how to cut through the binary division present in the pigment facility. I draw on ideas from the alchemical dual-nondual tradition and Guattari's threefold ecology and ecosophical aesthetics to explore such a trans-scalar approach to the white material and its visual regime to arrive at the concept of the *homeorhetic*. I then discuss how, with the primary strategies and practice methods I developed as part of this study, I attempt to intervene homeorhetically within the visual regime of titanium dioxide by identifying and creating gaps within its structure. I propose that these methods have the potential to activate awareness of a phenomenon that has receded into the optical unconscious of the West's visual field as something ubiquitous yet taken for granted.

The Conclusion brings together my investigation into the visual regime of the white material, through a review of both the written research and practice. Here I propose a reconsideration of, and a new approach to, the treatment of a white material, whiteness and image-making strategies in fine art, as well as in the interdisciplinary fields this project engages with. I also outline aspects of the project that remain unresolved and identify areas for further research. To end, I reflect on the transformation I have undergone as a researcher and maker while undertaking this project, through the lens of an ethics of "inheritance" and an ethics of "exposure"[34].

[34] Here, I draw on the work of Martin Savransky, *The Adventure of Relevance* (London: Palgrave Macmillan, 2016). When considering inheritance in relation to materials and extractivism, Heather Davis also serves as a key reference; see Heather Davis*, Plastic Matter* (Durham and London: Duke University Press, 2022), alongside Ariella Aisha Azoulay and Max

Undoing the white room

A return to my 2000s bedroom: my gesture of covering everything that otherwise would have a range of colours can be read as an attempt to *generalise*. In an analogy of rounding off rough edges, Gilles Deleuze and Guattari suggest that the removal of colour is an act akin to generalisation.[35] A dull absence of colour is, according to the philosophers, associated with the grand utopian truths – and I would add, myths – of the modern period.[36] Precisely, the idea of a "generalised white" – a universal white, not multiples of whites – is what writer and artist David Batchelor referred to as a "modern problem".[37] The generalised white interior, which was still trending around the new millennia, is a world that does not readily admit that other worlds exist.[38] Considering this perspective, it may seem like I had decided to separate my bedroom from other worlds. What I recall more clearly, however, is that something about the blank, white room promised possibilities. In the presence of the absence that the all-pervasive whiteness suggested, everything was possible.

My painting of the bedroom and its objects could also be read as a gesture of flattening – an attempt to make the room and its contents image-like. If an image is an abstraction, it abstracts as it flattens. And if my white room was like an image, it was an image in black and white. Philosopher Vilém Flusser describes black and white photographs as "theoretical images", as they lack the qualities that form typical vision by removing the noise and colour of life to embody the drab magic of theoretical thought.[39] Yet, such a reading of the painting incident is disturbed by the fact that my white bedroom presented a hint of *blue*. This brings me back to a realisation that I also had at the time: an actual general, universal or total white is unattainable.[40] By claiming that titanium white is the whitest of them all, one promotes an impossible material, which means that it has become a phenomenon rich with folklore.

The urge to whitewash a room also carries with it something sinister, an inheritance I also must have embodied as a young girl. Le Corbusier's comments on the white, built environment and

Liboiron. See Ariella Aisha Azoulay, *Potential History: Unlearning Imperialism,* London: Verso, 2019; *Max Liboiron, Pollution Is Colonialism*, Durham: Duke University Press, 2021.

[35] Deleuze and Guattari write: "We no longer believe in the dull grey outlines of a dreary, colourless dialectic of evolution, aimed at forming a harmonious whole out of heterogeneous bits by rounding off their rough edges. We believe only in totalities that are peripheral". See Deleuze, Gilles, and Félix Guattari. *Anti-Oedipus: Capitalism and Schizophrenia*. Bloomsbury Revelations, 1972, 42.

[36] Deleuze and Guattari. *Anti-Oedipus*, 42.

[37] Batchelor, David. *Chromophobia*. Focus On Contemporary Issues. London: Reaktion, 2000, 7-8.

[38] Batchelor, *Chromophobia*, 10.

[39] "Black-and-white photographs […] are theoretical images", Flusser declares and adds: "Black-and-white photographs embody the magic of theoretical thought since they transform the linear discourse of theory into surfaces". See Flusser, Vilém. *Towards a Philosophy of Photography*. London: Reaktion, 1983, 18-19.

[40] Dyer writes: "Whiteness, really white whiteness, is unattainable. Its ideal forms are impossible. In Shakespeare […], Venus must be a 'whiter shade than white', Cypher in Cymbeline must be 'whiter than the sheets'. The Ku Klux clan must dress in white sheets, because, as Walter Ben Michaels points out, 'their bodies aren't as white as their souls, because no body can be as white as the soul embodied in the white sheets' (1989: 190). The most celebrated blondes (Harlow, Monroe, Bardot) were not true blondes, but peroxided to within an inch of their lives". See Dyer, White, 78.

its effects indicate a desire for mastery and control. On behalf of white Ripolin paint,[41] which he proposed should be implemented by a "law of Ripolin", Le Corbusier declared:

> Imagine the results of the Law of Ripolin. Every citizen is required to replace his hangings, his damasks, his wall-papers, his stencils, with a plain coat of white ripolin. *His home* is made clean. There are no more dirty, dark corners. *Everything is shown as it is.* Then comes *inner* cleanness, for the course adopted leads to a refusal to allow anything at all which is not correct, authorised, intended, desired, thought-out: no action before thought. When you are surrounded with shadows and dark corners you are at home only as far as the hazy edges of the darkness your eyes cannot penetrate. You are not a master in your own house. Once you have put ripolin on your walls, you will be *master of yourself*.[42]

With white walls, you become master of yourself. I recall how my white room evoked sensations far different from the bedroom that I had the year prior, when I had undergone another interior design phase that required me to implement a colour scheme of bright turquoise (the walls) and a deep black, high gloss oil paint (the furniture). This version of my bedroom was intense, vibrant, intimidating and somewhat sticky – the gleaming oil paint seemingly never dried. Yet, as soon as I had finished painting my room, I started fantasising about other colour combinations – it was as if I ventured into colour; they had to always be in flux. As a younger child, I often occupied myself by applying layers of bright-coloured paint to paper in semi-abstract patterns. As the daunting messiness of adulthood and its realisations approached, I stopped painting and instead developed habits of making things that organised my world.

I "redesigned" the globe and the world map with a ruler, giving every country simplified, straight borders – it was a world of red rectangles, blue hexagons and yellow triangles. I painted my room white. While visiting a desert, I looked up at a clear night sky, stared into the Milky Way and had no idea how to organise the infinite, unknowable white haze that presented itself to me; in this case, I had to take it all in. I introduced food restrictions, which eventually, in my late teens, led to a period of anorexia. Later, I realised that the bright, energised yet empty state of an undernourished body, high on noradrenaline and cortisol, might precisely be the feeling of a *generalised white*. This generalised white is perhaps an *anorexic white* (I started eating again when I realised that the disorder made me less of all the things I could be. I also fell in love, which requires a body in colour).

To this day, I am unsure if my gesture of painting everything white promised absolute reduction or expansion. In either case, my preteen whitewashing can be read as the expression of a young girl's state as she is socialised into an adult white, post- and neo-colonial European

[41] It is unknown whether Corbusier was particularly taken with titanium dioxide. The architect was, however, a proponent of Ripolin, the brand name of the lead- and zinc-based "sanitary" paint invented in France at the end of the 19th century. The impermeable enamel paint was promoted for its health-promoting properties.
[42] See Le Corbusier. *The Decorative Art of Today*. First published: Paris: Editions Crès, 1925. Translation of: L'Art décoratif d'aujourd'hui. London: Architectural Press, 1925, 188.

modernist inheritance – drawn between feelings of possibility and openness, anxieties and attempts at control.

With white walls, you become a master of yourself, but also of others. In the 19th and 20th centuries, white became central to sanitation movements that cleansed cities during pandemic outbreaks, as it was easier to detect dirt on white surfaces than on those of other colours. Soon enough, chromatic whiteness took on more symbolic connotations and became a tool for the "cleansing" of the lower classes and populations in colonised territories. By now, it is widely known that Le Corbusier was obsessed with chromatic whiteness, and he sought to "whitewash" Algiers in the style of the Law of Ripolin through architecture and urban planning during the period of French colonial rule in Algeria.[43] While developing his Plan Obus – French for "bullet plan" – Le Corbusier appropriated the whiteness of vernacular Algerian-Arab architecture, along with its "clean" and "measured" qualities, and rebranded it as his own invention. A grainy, high-contrast black-and-white image from 1933 depicts the rendering of Plan Obus, showing a gigantic white, curving viaduct for a motorway that also doubles as a building, imposed on top of the North African city.

The architect believed "his" white, built environment would function as a "disciplining medicine" for people he regarded as having lost touch with their traditional style of building and living, Wigley argues.[44] What Le Corbusier extracted from the Algerian Arabs, who were perceived by the French as people of colour, was also the colour (or non-colour) that marks people as coloured in the first place,[45] Wigley adds.[46] As an image, Plan Obus is a superimposed modernist vision, produced from an encounter with difference and through the appropriation of the customs of the Other.[47] This megalomaniac plan, for which Le Corbusier had not received a formal invitation from French authorities to begin, became the architect's personal crusade for over a decade, although nothing resulted from his efforts. While the proposal and its legacy affected the history of architecture, no part of Plan Obus was ever realised in Algiers. What remains is its image (Le Corbusier had a well-known phobia of the camera).[48] Chromatic white was once again caught between its ideals and its unattainability. Yet, it continued to produce real, lived effects.

Return

I have developed this research project and its methods from my complicit positionality as a white researcher who came of age surrounded by the European inheritances of the visual regime of titanium dioxide, and as someone with roots in the geographical area of titanium mining

[43] Wigley, "Chronic Whiteness", 2020.
[44] Çelik 1992 in Wigley, "Chronic Whiteness", 2020.
[45] See Wigley, "Chronic Whiteness", 2020, 20.
[46] Here, Wigley jumps from a conceptualisation of chromatic whiteness to white identity. As Dyer and others have shown, one of many strategies Caucasians have used to make themselves appear as "neutral" humans, as "the ordinary", is to associate themselves with the colour white. See Dyer, *White*, 42.
[47] See Ackley, Brian. "Le Corbusier's Algerian Fantasy: Blocking the Casbah". *Bidoun*, 2006.
[48] See Colomina, Beatriz. *Privacy and Publicity: Modern Architecture as Mass Media*. Cambridge, Mass.: MIT Press, 1996, 90.

(Southwestern Norway), as well as in France – a country which, alongside Norway, has been a central cultural context for the production of influential modern and contemporary imaginaries concerning chromatic whiteness. In other words, I am fully immersed in the layered socio-cultural, material and aesthetic conditions that have produced the synthetic substance of titanium dioxide, and it is from this all-white yet "dirty" implicated position that I attempt, nonetheless, to imagine this phenomenon otherwise.

In 2020, I felt drawn to return to parts of Norway that I only vaguely knew (though, as I already mentioned, the Norwegian side of my family hails from the area) to develop a research project that questions contemporary Anthropocene[49] aesthetics while visiting places where new mineral economies and extractive activities have been established to replace at some time in the future, but for now supplement, the Norwegian fossil fuel industry.[50] I soon discovered that the largest mine in the region – and the largest in Europe, with another large-scale mine under development – produces titanium dioxide. To my surprise, this site played a key role in the invention of an unusually luminous, dense, stable, resistant, synthetic substance and commercial white pigment.[51] This was a phenomenon completely unknown to me. Although Norway is a major global producer of white titanium dioxide pigments, the industry rarely features in public discourse. When it is discussed, it is often grouped with other mineral economies, and its products and significance receive little attention.[52] Aside from uncovering a vast and under-researched global pigment industry, I realised that several phenomena I had never considered as related – extractivism, the image and a desire

[49] Extractive economies do not affect everyone equally; therefore, all humans should not be held equally accountable. Such economies have been shaped by imperialism and racial capitalism, as Francoise Vergés and other scholars of decolonial ecological thought have stressed, distributing matter, value, and pollution accordingly. Kathryn Yusoff has argued that global "colour lines" of contemporary extractivism are inscribed into planetary history and then erased through their remodelling as "white geology" in much contemporary Anthropocene discourse. The history of whiteness and its colonial extraction of resources from the earth and black and brown people, and the future of whiteness as an object in crisis during times of environmental breakdown, are also built into this perspective. To avoid repeating the Anthropocene perspective and its operations of erasure I will, for the remainder of this thesis, refer to *ecological breakdown following colonial modernity*, which emphasises an economically driven, ecological dismantling in the name of white progress. I believe that our ability to confront the current ecocide and its extractive ideology of whiteness will determine our shared future and thus it should be addressed across various fields. In this research, I will attempt to confront such ideologies within the titanium dioxide visual regime. See Vergés, Francoise. "Racial Capitalocene". In *Futures of Black Radicalism*, edited by Gaye Theresa Johnson and Alex Lubin. London; New York: Verso, 2017; Baldwin, Andrew, and Bruce Erickson. "Introduction: Whiteness, Coloniality, and the Anthropocene". *Environment and Planning D: Society and Space* 38, no. 1 (1 February 2020), 5, 9; Kathryn Yusoff. *A Billion Black Anthropocenes or None*. Minneapolis: University of Minnesota Press, 2018.

[50] The minerals ilmenite and rutile exist in large quantities in as-yet-untouched ore seams on the Atlantic seabed stretching along the Norwegian coastline. The existing Tellnes ore in southwest Norway is estimated to contain 12 per cent of the world's ilmenite resources. See Korneliussen, Suzanne McEnroe, Lars Nilsson, Henrik Schiellerup, Håvard Gautneb, Gurli Meyer, Leif Roger, and Leif Størseth. "An Overview of Titanium Deposits in Norway". *Norwegian Geolog. Survey Bull.* 426 (1 January 2000); Palmer, Kerrie. "Norway's Ilmenite: Where History and Innovation Combine". Norge Mining, 14 September 2022.

[51] In 1908, the Norwegian chemists Dr Peder Farup and Dr Gustav Jebsen developed the first method to produce white titanium dioxide pigments: the so-called sulphate process. See Driel, B. A. van, K. J. van den Berg, J. Gerretzen, and J. Dik. "The White of the 20th Century: An Explorative Survey into Dutch Modern Art Collections". *Heritage Science* 6, no. 1 (29 March 2018), 16; Halland, Ingrid, and Marte Johnslien. "With-On White: Inconspicuous Modernity with and on Aesthetic Surfaces, 1911–1950". *Aggregate* 11 (January 2023); Sandersen, Erik. *Kronos Titan AS 100 År [100 Years of Kronos Titan As]*, 2016.

[52] Although environmental activists protesting fjord deposits have received media coverage, the mining company's endeavours beyond local pollution and the global pigment economy it participates in are rarely scrutinised.

for white things and surfaces – all merged together. The project thus came to encompass one of my recurring interests: images and modes of seeing that are widespread yet taken for granted.

I also discovered that the white pigment is derived from sparkling black sands known as ilmenite, and that the white material is stripped of these geological traces through a chemical process the industry refers to as “washing”. This represents another important finding in this study. I realised that not only material and chemical processes but also highly charged symbolic processes take place in the pigment mine and the accompanying pigment manufacturing plant, which I suspected also influence the conceptualisation of titanium dioxide as a white material. In other words, I found that any image we see is simultaneously a titanium white surface and a *black ilmenite square*.

Figure 4 *Portal/Terrain* (2024), ilmenite on photo paper, detail. The complete series will be presented in the exhibition installed for the viva voce, as specific lighting is essential for fully experiencing the artwork.

Whites

This research project is not a study of the most common conceptualisations of chromatic white as encountered in the West or other parts of the world. Where my project differs from many written contributions on colour[53] is that it focuses on the creation and proliferation of a specific white molecular resource and how it relates to image-making processes, rather than on white hue as a broader concept. My research examines how the invention and production of a pigment in Northern Europe, particularly in Norway, has shaped the conceptualisation of a modern synthetic white substance and its role in the emergence of a visual regime. This focus frames the project within a specific period (mainly 1908-2024) and region (primarily Northern Europe, though considered in the context of the global pigment market), and it is guided by particular scientific parameters, such as chemical composition, with a focus on titanium dioxide rather than, for example, lead white or zinc white.

It is also important to note that I refer to different *kinds of whites* in this research. When I say titanium dioxide, titanium white or TiO2, I refer to the specific properties of this widespread but rarely remarked molecular substance that, most of the time, but not always, manifests as the colour white.[54] With "chromatic whiteness", I refer to a more general idea of white as a colour or hue. With "whiteness", on the other hand, I refer to the term used to describe the identity of Caucasian people who have sought to associate themselves with the symbolic properties of the colour white.[55] With whiteness, I also refer to a politics of whiteness and the social, ideological, economic and subjugating structures that make up the expansive system underpinning white, Western culture. Emerging from the context of Norway, this study will primarily address the distinctive Norwegian constructions and experiences of white identity, which differ from how white identity manifests in, for example, North America and other countries founded on settler colonialism (as I discuss further in the contextual review in the following chapter).

A politics of whiteness is frequently accompanied by what several theorists and practitioners refer to as *images of whiteness.*[56] These images are often "looked at but rarely seen"[57]. While they depict and imagine white people, they sometimes also forge connections between the optical and material properties of chromatic whiteness and the identity of whiteness – and this is the focus of my research. On the connection between chromatic whiteness and white identity in images, Dyer states:

> the photographic media are centrepieces in a whole culture of light that is founded on two particular notions, namely that reality can be represented as being on a ground of white, and that light comes from above; these

[53] Such as Dyer's *White* (1997), Batchelor's *Chromophobia* (2000), William H. Gass' *On Being Blue: A Philosophical Inquiry* (1976), Derek Jarman's *Chroma* (1994), Maggie Nelson's *Bluets* (2009), and Alain Badiou's *Black – The Brilliance of a Non-Colour* (2017). Batchelor and Jarman, as artists, both exhibit a sensitivity to the materiality of colour.
[54] Depending on its application and usage, it can also be transparent or pastel-coloured.
[55] Dyer, *White*, 1997.
[56] Blight, ed., *The Image of Whiteness*, 11.
[57] Blight, ed., *The Image of Whiteness*, 16.

> notions have the effect not only of advantaging white people in representation and of discrimination between and within them but also suggesting a special affinity between them and the light.[58]

Titanium dioxide appears on this white image surface as the most commonly used "whitening agent" in photo paper but also, as explored in Chapter 2, the element that supports the white face in various mass-circulated images. The project thus encompasses various types of whites manifesting across different materials, discourses and images, each with distinct yet also overlapping effects.

Finally, I want to address the challenges of universalising the experience of colour, which is inherently complex, deeply personal, emotive and often beyond language – naturally a subject of interest to numerous artists. The multiplicities of whites we encounter in the paintings of someone like Robert Ryman are, according to Batchelor, empirical and material whites.[59] For many, including artist and writer Derek Jarman, writing with colour as a prism has been a starting point for exploring the relationship between subjective and general aesthetic experiences and the limits of what can be universalised.[60] In the remainder of this Introduction, I outline some personal histories that inform my colour study.

My whiteness

While pursuing this research project, I asked myself when was it that I first realised I was white. I am a white person of Norwegian, French,[61] and Jewish descent, and I have enjoyed the privilege of attending several European educational institutions; although, at many points in my life, I have not actively contemplated this privilege. One of the earliest incidents that made me question my whiteness occurred in a French preschool playground, when I, together with a group of four-year-old girls of different origins, secretly passed a large, pink, saccharine chewing gum between us (chewing gum was not allowed) until it no longer had any flavour. The intimate gesture made me ponder why some of the girls had darker skin than mine and why they looked different from me. I had made myself the norm. At age 5, I moved to Norway. Suburban Oslo is a place with more oppressive ethnic and cultural homogeneity than the equivalent in Paris – and being half Norwegian immediately gave me the smallest of insights into how it feels to be Othered in this small Northern European country. In school, I would often be asked "where I was *really* from" due to my dark hair and a hard French

[58] Dyer, White, 84.
[59] Batchelor, *Chromophobia*, 2000, 7, 8.
[60] Parsons, Alexandra. "A Meditation on Color and the Body in Derek Jarman's *Chroma* and Maggie Nelson's *Bluets*". *A/b: Auto/Biography Studies* 33, no. 2 (4 May 2018), 379.
[61] On my father's side, an estranged biological grandfather, whose identity was disclosed to me while I was undertaking this research, is a *Pied-Noir* – the dated, somewhat disparaging French term used to describe a settler of French ancestry born and raised in Algeria during colonial rule. For my entire life, this grandfather was never spoken of – my grandmother had a relationship with him while they were young students of ecology in Paris in the 1960s, after which he returned "home" – but subtle comments were made about his politics differing from the rest of our left-leaning French-Jewish family. This personal narrative, in a way, echoes France's abnegating engagement with its colonial past and ties me to imaginaries of colonial whitewashing in Algeria by Le Corbusier in a way I was not aware of at the beginning of this research project.

“r” that I could not unlearn, although my mum had taught me to respond that I was as Norwegian as any of my classmates.

No one really believed this cover-story. A group of boys, however, welcomed me as a “princess”, and they built a personal wooden hut for me in the woods outside the primary school. Another gang of boys were less pleased with my arrival, and they insisted that I should return to Pakistan, which they seemed to believe is where anyone who does not look stereotypically Norwegian belongs (Norway has a large Pakistani community). I was cast as the “evil” dark-haired Lussi in the school play about Saint Lucia, whilst the girl with the longest, blondest hair in class would be given the role of the goodhearted saint (Lussi would be dressed in all-black, Lucia in all-white). Black and brown friends can recount many more painful and enraging stories about growing up in Norway.

In parallel to Norway’s geopolitical position, thanks to which the country benefits from post-colonial flows of power and wealth whilst retaining a public image of benevolence towards the Global South, sociological studies have shown that white majority Norwegians hold strong explicit, discursive egalitarian attitudes towards those who are considered the Other. However, these same studies indicate that Norwegians simultaneously exhibit xenophobic and racist affective behaviours towards the very same people when tested for different types of social cognition.[62] In other words: white identity in Norway is one of outward civility, strong humanitarian ideals and a self-image of virtuousness; positive attributes that disguise an affective collective subconscious marked by xenophobia and racism.[63]

As I became older, my accent softened, and my peers became more acquainted with the ethnic differences of brown hair. I blended in, and I largely forgot about my partial foreignness. And about my whiteness too. It was not until I moved to London in my twenties that I started to question and challenge my whiteness more actively. I would sometimes find myself in nightclubs and restaurants as the only one or one of a few white people, and although at times I had been invited, I questioned whether I belonged there or not. I knew I wanted to, but I was not sure how I could. This research project has been an occasion to expand this questioning further.

My Norwegian background might explain why I was initially unable to recognise how white racialisation was reproduced in the Norwegian titanium industry. In the titanium pigment business archive, I immediately located a few explicitly racist adverts for titanium dioxide in which the depicted subjects are racialised as black or people of colour. However, if I were to see whiteness only in images and materials where non-white people are also present, I would be reproducing the relegation of non-white people to the function of enabling me to understand myself, as Dyer has

[62] See Høy-Petersen, Nina. “Civility and Rejection: The Contextuality of Cosmopolitan and Racist Behaviours”. *Sociology (Oxford)* 55, no. 6 (2021): 1191–1210.
[63] See Høy-Petersen. “Civility and Rejection”, 2021; Gunaratnam explains how the “physic machinery” of whiteness is always marked by doubleness: “It must go through all sorts of manoeuvring to wriggle out of self-recognition and therefore accountability.”, in Blight, Daniel, ed. *The Image of Whiteness*, 2019, 166.

pointed out.[64] It took me some time to realise how the meanings attached to the white pigment and its refinement process are ripe with associations that contribute to the symbolic construction of white people too.

Questioning one's privilege and neutrality as a white person requires continuous vigilance and effort in searching for new ways of perceiving, being and knowing.[65] During my research, I have had to transform my ways of seeing to recognise that the politics of whiteness is pervasive in the visual regime of the white material. Challenging my whiteness also meant challenging myself to look at familiar sites in Norway as if arriving from the outside, while still acknowledging that I am deeply embedded within this cultural context.

Paradoxical form

My study explores how artistic practice may be employed in a research project, not as a discrete topic or empirical "methodology",[66] but as something that produces capacities for sensing, engaging and responding. Bringing together seemingly disparate elements and exploring their connections is what art practice as research can allow for that other fields often cannot. In this way, art practice methods may formulate and develop research problems.[67]

In presenting my findings generated through practice, I will attempt to avoid a vocabulary of transparency (the artist as "examining", "uncovering", "unmasking", "exposing", "revealing", "reflecting" or "illustrating", etc.) which so often translates the work of art into an aesthetic of allegory.[68] If an artwork produces knowledge or meaning, it is often implicit rather than explicit, immersive and complex rather than distanced and generalising, and generated through the creation of open-ended systems and objects that are subject to interpretation and re-interpretation.[69] As Fisher has remarked, engaging with the unknown is central to making.[70] This also applies to the artwork in its "final form" – many will retain a degree of openness, with something yet to be discovered.[71]

The interplay between knowledge gained through testing, inventing and exploring connections – which forms the basis of this written thesis – and the knowledge derived from tactics and strategies developed in my studio practice is a key tension this project revolves around, and it is reflecting its nature as a hybrid theory and practice research project. The two components are the same, yet also not: I often imagine one mode of making (the written thesis) as the roots of a tree, and the other (the practice) as its leaves, or vice versa – they are different, yet also the same thing.

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[64] Dyer, *White*, 4.
[65] George Yancy in Blight ed., *The Image of Whiteness*, 2019, 15.
[66] Wakeford, Nina. "When Do We Know Our Problems?" Lecture, Goldsmiths, University of London, 2020.
[67] Wakeford, "When Do We Know Our Problems?", 2020.
[68] Loock, Ulrich. "Opacity". *Frieze*, 2012.
[69] Price, Elisabeth, and Mary Anne Francis. "Art of Research: Research Narratives". *International Symposium at Chelsea College of Art & Design in October 2008*, 2009.
[70] Fisher, Elizabeth. *On Not Knowing: How Artists Think*. London: Black Dog Publishing, 2013.
[71] Fisher, *On Not Knowing*, 2013.

I consider this the productive complex that drives this study. Ultimately, the art research PhD form sits in a paradox of different modes of making and thinking, which here I will attempt to keep in generative tension rather than resolve.

Chapter 1:
White material

Materials and bodies slip in and out of contexts, permeable to the elements but also political contexts. I try to echo materially what I find unstable about images, and I try to observe how materials are photographically disfigured, alienated from "native" environments. I try not to rest in the place of sculptural object-making for this reason. A moment of re-birth relies on the possibility of everything shifting at once.
– Diane Severin Nguyen, *ANIMAL, VEGETABLE, MATERIAL*, Objektiv, 2020.

We can think of the gap as the errancy of a system – the negativity at the core of its positive appearance or structural integrity in the world. This negativity can be thought of as primarily terminal, as in the death or deprivation enabling any project of plenitude or development, or as speculative, as a space incubating possible forms in all their virtual actuality.
– Marina Vishmidt, "*Basement Jazz*", Mousse, 2022.

On the gap

In my attempts to respond to and intervene within a visual regime centred around a white material, I aim to avoid replicating this phenomenon by unintentionally recentring and thereby reaffirming it. Instead, I seek to measure the phenomenon's effects and identify potential gaps, ambivalences and unconscious forces within it, which may point to a way beyond it. In this chapter, I first outline my proposal for approaching the white synthetic pigment as a modern and contemporary visual regime that upholds chromatic whiteness as both a norm and a cultural aspiration. As this chapter serves as a contextual review, I also delineate the artistic and theoretical research to which my project contributes. The chapter is formulated as a response to my fourth research sub-question of *how one might conceptualise and measure what my research and practice are doing*. It is organised into three main sections: Image, Materiality and Whites. However, in this research I am interested in exploring the interrelations between these three categories as they relate to the substance of titanium dioxide.

The project's interdisciplinarity reflects my academic background and the multiple influences that have shaped me as someone who trained in sociology and critical theory, and interested in

inventive methods and image-making within the social sciences, before transitioning formally into the domain of fine art with this study.[72] The written thesis primarily contributes to artistic research, which borders on various areas of theoretical activity: art writing, visual culture studies and critical theory, amongst others. The practice component contributes to both contemporary art and artistic research. While they do not map onto each other directly, the written thesis and the practice inform one another.

When researching titanium dioxide, I identified theorists and artists whose work could help me develop conceptual frameworks and methodologies to engage with the white material and intervene in its visual regime. Aside from an ongoing research study initiated by two Norwegian researchers,[73] no artistic research projects or investigations into the extraction and dispersion of titanium dioxide within the arts or the humanities have been undertaken in the UK, Norway or beyond. This is surprising, considering titanium dioxide's defining role in 20th century modernism and as one of today's most frequently utilised synthetic pigments.[74]

Instead, I have drawn on theoretical and artistic practices that focus on the conditions of extractivism, materiality and synthetic inventions more broadly within the context of global ecological destabilisation and colonial modernity. I have engaged with colour studies, particularly critical whiteness studies, and explored artistic engagements with image-making processes as these relate to a time when most of us live and perform "under the image".[75] This may appear to encompass a set of unrelated fields. Below, I provide the historical and genealogical background to my decision to bring pigment and image-making together in my research question. I will demonstrate why an interdisciplinary approach has been necessary. My research concern of how a hybrid theory and art practice may explore a white material in relation to image-making processes has necessitated such an approach, and this is something which I could not have anticipated in advance.[76]

This study contributes to the aforementioned fields by combining and expanding on them in novel ways, addressing extractive capitalism alongside an interrogation of the aesthetics and politics of whiteness as they relate to the mass-circulated image. I consider this a transversal approach, in

[72] Outside of academia, I have been involved in the art world in various capacities: as a writer, editor, occasional curator and organiser. I also developed an image-making practice that later evolved into an art research practice.
[73] Halland and Johnslien's research project, "TiO2: How Norway Made the World Whiter (NorWhite)", received extensive research funding from the Norwegian government in 2022. Their research interrogates the material history of the pigment. See Endal, Ingrid. "Millions Granted to Humanities Research, How Norway Made the World Whiter". University of Bergen. Accessed 13 October 2022; Halland, Ingrid, and Marte Johnslien. "With-On White: Inconspicuous Modernity with and on Aesthetic Surfaces, 1910–1950". Aggregate 11 (January 2023).
[74] The exception is the field of Fine Art Conservation, where, for instance, the unstable photocatalytic properties of early anatase titanium dioxide pigments in 20th century paintings, which causes paintings to self-destruct when exposed to light, have been explored. See Driel, B. A. van. "White, Friend or Foe?: Understanding and Predicting Photocatalytic Degradation of Modern Oil Paintings". PhD Thesis, Delft University of Technology, 2018.
[75] Harbison, Isobel. *Performing Image*. Cambridge, Massachusetts: MIT Press, The MIT Press, (2019), 15.
[76] As Lury and Wakeford have remarked, "inventiveness is not intrinsic to methods; it is something that emerges in relation to the purposes to which they are put", and thus cannot be anticipated in advance. Lury, Celia, and Nina Wakeford. *Inventive Methods: The Happening of The Social*. Culture, Economy and the Social. London: Routledge, 2012, 2.

which I trace the white substance and its visual regime across different scales.[77] The result is a study that remains open to multiple points of identification.

More specifically, the project aims to generate knowledge at the threshold between pre-verbal materiality and fully formed images. The moment when an industrial substance becomes an image, or rather, the gap between the two, is a key tension around which the methods and practice of this thesis revolve. This transformational point, I propose, is where something can operate as visible yet *unthought*.[78] I have therefore looked to theorists and artists who, in different ways, have produced work or thinking in response to states of in-betweenness and gaps, such as art critic and theorist Marina Vishmidt, quoted in this chapter's epigraph.

We often approach metamorphosis as a driving principle for art, Vishmidt proposes. Metamorphosis can occur in the transformation of one form into another, in the division and multiplication of forms, or in strategic displacements between the fields in which objects and art objects reside. Vishmidt refers to these relations within art making as "manifest images", which function as both points of departure and misdirections – or in other words, to what we think of before we start thinking. Vishmidt argues that the framework of the manifest image for "the longest time" was underpinned by a matter-form or form-content split, which since has given way to other approaches, for instance the generative gap.

The choice of "gap" rather than "void" points to an important distinction; as Vishmidt remarks, the notion of a void may propose emptiness as completeness, while a gap, on the other hand, resides in the relational. A void aspires to the status of an object, while the gap does not. The gap is in time, and the gap is in language; Vishmidt likens the gap to "a spacing that telescopes in and out of a structure"[79] and, hence, a gap may direct us to connect with what lies beyond that structure. Here is where the gap becomes transformational. In the case of the visual regime of the white material, we can think of the gap as pointing to "the errancy of its system" and to "the negativity at the core of its positive appearance or structural integrity in the world".[80] In the gap lies the means to move beyond the white material and its visual regime. The task I have set for the practice developed as part of this project has often been to locate or generate such transformative gaps.

Open pit

June 2022, Southwestern Norway: I am with the clients. We are enroute to the mine, driving through the desaturated landscape of Dalane. Dark grey hills, softened by prehistoric glaciers, stretch out before us. Except for occasional small patches of vegetation, the landscape appears lunar. Only on the moon and in this province will you find a piece of land consisting of large quantities of anorthosite,

[77] The topic of Chapter Five. See also Guattari. *The Three Ecologies*, 1989.
[78] Phrase repurposed from Bollas in Smith and Sliwinski, eds. *Photography and the Optical Unconscious*, 2017.
[79] Vishmidt, "Basement Jazz", 2022.
[80] Vishmidt, "Basement Jazz", 2022.

which is the substance that gives the moon its pale appearance. Astronauts sometimes visit. This land also holds one of earth's largest reserves of another common lunar mineral, ilmenite – which is why I am here – sparkling, black rocks from which white titanium dioxide is derived. While gazing out the car window, I imagine that the harvest of this black mineral can only occur at night when the moonlight is sufficiently bright. I note that I should return to this area to film if I can break free from my company (I never do).

As we get closer to the ilmenite quarry, large boulders start to appear. At first, I take them for ancient bauta stones, a recurring sight on the Southwestern coast of Norway. The word bauta is derived from bautaðr*, the Norse verb for striking someone down, and refers to stones serving as memorials or grave markers, the literal translation is "kill stones" or "death stones". Without imagery or inscription, these sacred boulders can sometimes evoke a stone version of Stanley Kubrick's "Dawn of Man" monolith. Yet, the boulders that we pass seem somehow freshly cut. Our host, who represents the Norwegian branch of the multinational pigment manufacturer Kronos Worldwide, Inc., informs us that these are rocks displaced from the mine, taken out of the way of the extractive activities undertaken in the pit. New stones. The clients and I are told they are disposed of throughout the land because the pigment company is yet unable to convert them into a financially viable biproduct. However, such plans are still in the making, we are assured. While we are taking turns on narrow coastal roads, one client turns to me and ask how I have ended up in the "white business".*

The honest answer is that I am surprised to find myself in this situation, travelling with a group of international pigment clients and being hosted as one myself. If anything, I feel like a spy. The clients are from France, Germany, Dallas, Texas, Switzerland and South Africa. They are chemists, paint professionals, product packaging and cigarette pigment specialists and sales representatives with positions such as "Head of Global Pigment Category Management" and "Senior Category Manager of Titanium Dioxide". Many have doctorates, according to their business cards. I shape a short, comprehensible version of my research project, or at least I think I do. The client smiles and does not pose any more questions, which could mean that I succeeded or, perhaps more likely, failed. I told the client that I write and make videos and that I am interested in how the white material is produced, both materially and symbolically, as well as why the pigment is ubiquitous yet rarely noticed. Like the bauta stones, which at first glance may be hard to differentiate from a landscape consisting of similar rocks despite the fact they carry significant meanings, the white substance is at once empty yet highly charged. I do not say this out loud, but these thoughts fleetingly cross my mind as the clients and I approach the quarry.

White material: a visual regime

When rethinking image-making processes in relation to titanium dioxide within the Norwegian context, I approach my research problem as a continuous convergence of material entanglements, image and vision within a political, cultural and extractive context, all of which together produce a

visual regime. Terms like “optical regime” and “visual regime” are frequently utilised in art writing without further definition (the exhibition press release is a repeat offender). My use of the term is intended to be more specific, or perhaps more open: with this study, I ask what may happen if we think of the white material as a visual regime, and what a practice responding to such a visual regime *can do*. Here, I follow philosopher William James’s pragmatic[81] engagement with problems by intending to test the effects of the ideas and phenomena I have encountered while researching titanium dioxide, including my own practice, rather than seeking or proposing finite or essential conclusions.

Pragmatism is a philosophical tradition that views knowing the world as inseparable from acting within it. This idea has led to various philosophical approaches, the most influential on my thinking being that of James. For James, pragmatism is an exercise that tests ideas by their consequences and potential, whether in matters of science, religion, social issues or aesthetics. The key criterion for evaluating their truth and meaning is their practical and applied effects in various *lived* situations. This allows for an open-ended, flexible and multifaceted engagement with the world.

James proposed that the question of “the one and the many” – or of monism and pluralism – is the most central of all philosophical problems. James engages with the latter. Philosopher and social theorist Martin Savransky characterises James’s approach to “the pluralistic problematic” as a concern with problems that generate divergent thoughts and worlds by asking *what reality could become capable of*.[82] I ask what might happen if we approach titanium dioxide as a visual regime and develop methods to measure its effects, while also attempting to identify gaps within it that may lead us to consider or speculate on what other visual modes, worlds or colour regimes might be like.

By “visual”,[83] I refer to the processes through which matter interacts with the human eye and is consciously and unconsciously filtered through social, political and cultural scripts, as well as physical and affective registers,[84] to produce a visual image as meaning. In other words, I approach vision as personal but always interfaced with other perceptions[85] and material phenomena. There are instances when something is registered by our optical apparatus – such as the widespread, uniform whiteness of titanium dioxide – but it is not consciously interpreted as anything other than neutral or invisible. In such cases, this material might remain within the optical unconscious, as an “unthought known”, a term psychoanalyst Christopher Bollas uses in *Photography and The Optical*

[81] See James. *What Pragmatism Means*, 1907; James. *The Meaning of Truth*, 1975; Bella. “William James, A Pluralistic Universe”, 2008.
[82] See Savransky, “The Pluralistic Problematic”, 2021, 141–59.
[83] The term “visual” originated in late Middle English, initially referring to a beam of light thought to emanate from the eye, enabling vision, according to Oxford English Dictionary. It derives from the late Latin word *visualis*, which in turn comes from the Latin *visus* meaning “sight”, based on the verb *videre*, “to see”. The use of “visual” as a noun, in its current form, began in the 1950s.
[84] Neuroscience tells us that the eye takes in the visual world in highly partial ways, leaving much of our realities to be filled in by our minds, which are shaped by material, social, and emotional conditioning. See Smith and Sliwinski, eds. *Photography and the Optical Unconscious*, 177.
[85] Mirzoeff, Nicholas. *White Sight*. MIT Press, 2023, 4.

Unconscious (2017).[86] Or perhaps, I would suggest, an *unthought seen*. The unthought known or seen can be understood as referring to objects or materials that are either emotionally undigested or excluded from consciousness. As Bollas explains, this "unthought" is, nonetheless, an integral part of knowledge. Then there is the case when one is overtly familiar with the critique of a certain aesthetic condition – the white cube has, for instance, been problematised since its inception.[87] Yet, although this critical awareness exists, the phenomenon remains unchanged (we have then firmly entered the double territory of ideology). Lastly, if we speak of the mass-circulated image, so much of what this image does remains *invisible*.[88]

"Visuality" carries a more specific genealogy than "vision" or the "visual". Coined by the historian Thomas Carlyle in his lectures *On Heroes* (1841), the contradictory source of the appeal of the term visuality, visual culture theorist Nicholas Mirzoeff argues, lies in its history as functioning both as a mode of representing colonial modernity and a "means of resisting it by means of reverse appropriation".[89] In other words, visuality implies that colonial modernity is inherent to it, and the emphasis on the visual as a sense cannot be separated from the historical period of colonial modernity and its inheritances. Vision and visual metaphors have been fundamental to both Western science and philosophy since the advent of the En*light*enment,[90] and within said visuality, there will be forces that seek to resist it (if not, there could, of course, be no change).

I use the term "visual regime" to propose that an era marked by a certain constellation of political power, inventions in chemistry and capitalist accumulation has given rise to extractive activities that produce a (relatively) new visuality centred around the "whitest" of white material. Through the establishment of this titanium industry, as it became entangled with practices of producing visuality (as well as the opaque and unseen), I speculate that a new visual regime[91] emerged in the 20th century. Just as thinkers like Roland Barthes, Jean Baudrillard and Henri Lefebvre analysed how social reality was produced through mundane objects such as soap, bleach and detergent in the post-war years,[92] I explore what happens when we consider one of today's most

[86] Bollas in Smith and Sliwinski, eds. *Photography and the Optical Unconscious*, 4.
[87] O'Doherty, Brian. "Inside the White Cube: Notes on The Gallery Space". Artforum, 1976.
[88] Cubitt in Mirzoeff, *White Sight*, 10.
[89] Mirzoeff, Nicholas. "On Visuality". *Journal of Visual Culture* 5, no. 1 (1 April 2006): 53–79.
[90] Many have noted that visual and photographic metaphors permeate Western thought (see Laruelle, 2011; Sloterdijk and Canguilhem in Jay, 1993: 21, 388, 389), while others have argued that the entire history of science could be written as a "visual history" (Wise, 2006). See Jay, Martin. *Downcast Eyes: The Denigration of Vision in Twentieth-Century French Thought*. Berkeley; London: University of California Press, 1993; Laruelle, François. *Le Concept de Non-photographie = The Concept Of Non-photography*. Falmouth, UK: New York: Urbanomic; Sequence Press, 2011; Wise, M. Norton. "Making Visible". *Isis* 97, no. 1 (2006): 75–82.
[91] If the term "regime" is colloquially used to refer to the realm of politics and a specific formation of political power and ideology at a given time, in theoretical circles, the term regime is most closely associated with Michael Foucault (1975). Foucault's notion of the "regime of truth" is central to his study of how a body of knowledge, techniques and "scientific" discourses are entangled with the practice of the power to punish. Although foundational to sociology and other disciplines, Foucault's contribution is not a direct reference for this thesis. See Foucault, Michel. *Discipline and Punish: The Birth of the Prison*. London: Penguin Books, 1975.
[92] Ross, Kristin. *Fast Cars, Clean Bodies: Decolonisation and the Reordering of French Culture*. Cambridge, Mass: MIT Press, 1996, 73.

ubiquitous colour pigments and nanomaterials as shaping a modern and contemporary visual regime. I see this proposition as central to the written component of this research project.

I also suggest that this visual regime reflects the conditions that gave rise to it and, therefore, that it contains the tensions and gaps that may allow it to be challenged from within. This is where the practice component comes in. I have engaged with the proposed visual regime of titanium dioxide through my image-making and studio practice to see what this can generate in response. Through the practice component, I present a challenge to artists who position themselves as working from an imagined critical outside. In contrast, I attempt to work from within, seeking to inhabit and activate the "other" natures of circulated images within the visual regime of titanium dioxide, while recognising how these images are both subsumed in and subject to the conditions to which they also speak back.

White image

1898, France: A man is observed directing a group of actors for the camera on a Parisian boulevard. The men are wearing painter's coats and are stood in a line, one behind the other. They are applying white paint to the wall and each other, which leads to a slapstick style scuffle between them. The advert is simple; it is more akin to an animated poster than a narrative film – a breathing image – with several frames within the frame depicting the action. Inventions in white paint products and the technology of image-making merged in what later would be known as the first-ever moving image advert. The director behind the film is Félix Mesguich, a protégé of the Lumiére brothers. Mesguich was born in Algiers and was a Zouave – a term given to Kabyle Berbers recruited for French service during the colonial rule in Algeria – before he moved into cinematography. Mesguich was one of the operators later sent by the Lumières to launch the *cinématographe* in the United States, initially to great success until the company could no longer keep up with American competition. The second film Mesguich directed was one about "phantom" train rides.[93]

It is well established that early cinema held a fascination with the train, as in train technology, cinema could mirror an admiration for its own technological advancements. Far less, if anything at all, has been noted about the relationship between white paint and image-making. The advertisement that inaugurated the advertising film genre described above may indicate that chemical inventions in white pigment production and the technology of image-making coincided and crystallised certain social, aesthetic and political relations at the end of the 19th century and the dawn of the 20th century. Chemically unrelated but aesthetically a forerunner to titanium white, Ripolin paint – the brand featured in Mesguich's film – was promoted through new imaginaries concerning hygiene, purity, class and cleanliness.[94] These ideas shaped not only the later modernist white

[93] See "Lectures Pour Tous: Revue Universelle et Populaire Illustrée | 1". Gallica, 1899, 355.
[94] Wigley, "Chronic Whiteness", 2020.

environment (as it was also appropriated from vernacular Algerian-Arabic architecture in the case of Le Corbusier, as we saw in the Introduction and will revisit in Chapter 4), but also approaches to chromatic white that are still prevalent today. This historical convergence forms the genealogical motivation for my main research question: rethinking image-making processes in relation to a white material. In addition, I am interested in the mainstreamness of both the white substance and image-making, which I consider the most mainstream of art forms.

Figure 5 Diane Severin Nguyen, *Thirst for Love* (2024). Lightjet c-print in custom steel frame, 51 × 64 cm. Image courtesy Matthew Marks Gallery, New York.

Making with images

In the practice component of this thesis, I engage with various strategies for image-making to respond to the visual regime of titanium dioxide. In the following section, I will outline the areas of artistic activity and inheritances to which my thesis contributes. Moreover, my writing and theoretical practice have often involved thinking with both still and moving images.

When rethinking image-making processes in relation to the white substance, I have been interested in exploring the processes through which a material, or materiality, becomes an image – a process that I propose may draw attention to *perception in its forming.*[95] In this study, I thus

[95] Manning, *The Minor Gesture*, 85.

approach the photographic moment as one of transformation.[96] I treat the image neither as a self-sufficient material totality, nor as a mode of documentation of an outside reality. Rather, I consider images to be and do both through processes of mediation, where, following philosopher Henri Bergson, the image is less than a thing but more than a representation.[97] To put it differently, I approach the image as a set of conditions shaped by technology, desire, speculation, fantasy, materiality and political and cultural imaginaries[98] with real, lived effects. Only by positing the image as a moment of transformation can one engage with it as a method that allows for productive displacements.

Post Hito Steyerl, who shifted investigative attention from the representational function of images to the speed, networks and structures of their circulation,[99] I am concerned with the mass circulation of images understood as part of *material* networks, as these are built with minerals and stones. The so-called dematerialised, networked image is still material (for instance, when it is projected through a titanium white-coloured screen) and engaged with by different bodies and entities. Following and building on Steyerl's contribution, one of the tasks I set about in this thesis is to develop strategies for approaching image-making not as a form of representation or as a remedy from an imagined critical outside, but as a means of inhabiting and activating the various natures of the circulated images themselves within the visual and extractive regime of titanium dioxide, all the while recognising that these images are subsumed in and subject to the very conditions to which they respond.

I often return to this quote by Diane Severin Nguyen – whom I consider a contemporary – from 2020 (also cited in the epigraph to this chapter), to think through the relationship between materiality, image and flow:

> I think it's a lot about the provisional – almost like a material or bodily extension of 'the poor image' as proposed by Hito Steyerl, but actually enacting that in all of its precarity. Materials and bodies slip in and out of contexts, permeable to the elements but also political contexts. I try to echo materially what I find unstable about images, and I try to observe how materials are photographically disfigured, alienated from 'native' environments. I try not

[96] Here, I draw on but also add to a formulation by artist Diane Severin Nguyen. See Kunstnernes Hus. "IF REVOLUTION IS A SICKNESS: Special Screening of Trilogy Followed by a Conversation with Artist Diane Severin Nguyen and Marie-Alix Isdahl", 2023.

[97] Although I draw on this turn of phrase, I do not engage directly with Bergsonian ontology. Philosopher Henri Bergson positioned perception and images *in the world*, locating the human brain as an interface that interrupts the unmodulated flow of perception and images for the purpose of a body's actions. See Bergson, Henri. *Matter And Memory*. New York: Zone Books, 1896.

[98] Here, I draw on but also add to a formulation by Nguyen. See Kunstnernes Hus, "IF REVOLUTION IS A SICKNESS", 2023.

[99] Artist and theorist Hito Steyerl stated in 2009 that poor images are not those that the art world considers high value or belonging to pristine frameworks. Instead, they are low-resolution JPEGs that have been copied many times, degraded through circulation, and distributed across various platforms and media communities. These images gain speed, visibility, and impact by losing quality and definition. According to Steyerl, the poor image cannot be defined as either a compromised corporate tool or an independent artistic medium; these images resist fixed definitions and hence allow space for intervention within image economies. See Steyerl, Hito. "In Defense of the Poor Image". *E-Flux*, 2009.

> to rest in the place of sculptural object-making for this reason. A moment of re-birth relies on the possibility of everything shifting at once.[100]

I understand this quote as establishing a concern for the various forces that shape and are shaped by images, bodies and materials as they move through not only networked, but also ecological, social and political contexts.[101]

In her practice, Nguyen creates camera-based works that intentionally decentre Western image languages and that often remain within the realm of the sensed yet not fully known. She thus infuses a concern for the image as a moment of transformation with a sense of the unknown.[102] Or, in other words, a concern for the gap between image, material and their linguistic counterparts. Nguyen seems to suggest that the image may offer more transversal "potential" than the mere sculptural object; in the image, shifts may occur all at once, a statement that reflects how, in her artistic practice, materiality sometimes appears as a second-hand concern, functioning as an allegory for the photographic moment. If we suppose the image is Nguyen's primary material, one could say that my primary material is a white substance, as *questioned through image-making*, which, together, I propose, may say something about both.

The question of image and matter cannot be discussed without referring to an early proponent of this concern: artist and photographer Wolfgang Tillmans and his seminal Tate Britain exhibition, *if one thing matters, everything matters* (2003). Comprising two series of works, titled the *Silver* and *Arctic* photograph series, the exhibition, art historian Sara Yazdani proposes,[103] is an "early" example of attention to the image as something that emerges through mediation processes that are entangled with ecologies. Tillmans combined this approach with more formal concerns of the historical avant-garde, particularly those relating to colour and light. The *Artic* photographs depict melting white icebergs in the Arctic, and the abstract images in *Silver* are created by Tillmans applying salts, silver derivatives, chalk and algae to the image surface as it develops. If Tillmans is concerned with representation, he is more interested in what the abstract, material image and the figurative image have in common rather than what separates them, Yazdani asserts.[104]

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[100] Nguyen, Diane Severin. "ANIMAL, VEGETABLE, MATERIAL". Objektiv, 2020.

[101] Another significant response to Steyerl came from artist and writer Aria Dean, who argues that such a networked dematerialisation did not originate in the Western avantgarde but in the Middle Passage (and here she makes a conceptual leap from image circulation to sociality more broadly). Dean writes: "The [black] diaspora is a precursor to the post-industrial drive toward fluxes and deterritorialisation, as British Afrofuturists claim, meaning that blackness was always ahead of its time, always already a networked culture and always already dematerialised, thanks to the Middle Passage". See Dean, Aria. "Poor Meme, Rich Meme". *Real Life*, 2016.

[102] Nguyen creates photographic semi-abstractions (a photograph can never be truly abstract, she would say) that operate in the space between nameless materiality and the fully formed, signified image. She rarely names her materials, but she has admitted to making photographs with burning napalm in her studio (a chemical invention introduced in Vietnam by Americans, alongside the cameras of photojournalism, during the Vietnam War). Her film work contextualises and narrativises the tensions she explores in the still images by examining the "histories of power, victimhood, and forms of propaganda" that underpin both mass-produced and personal forms of image-making. See Kunstnernes Hus, "IF REVOLUTION IS A SICKNESS", 2023.

[103] Yazdani, Sara R. "Wolfgang Tillmans's Abstract Mediations and Other Ecologies". *Afterimage* 48, no. 2 (2021): 109–30.

[104] Yazdani, "Tillmans's Abstract Mediations", (2021): 109–30.

I share an affinity with Tillmans's interests, but here I repurpose them to question what happens if a material that is used to enable visuality becomes part of the image itself (for instance, by applying "found" titanium dioxide pigments collected from various surfaces and objects to a camera lens). I use such strategies in response to the visual regime of titanium dioxide, while not letting the image entirely close in on itself as a self-referential entity. Instead, I aim to remain open to an engagement with the outside by developing image-based works that consider not only the materiality but also the meanings and allure of the image.

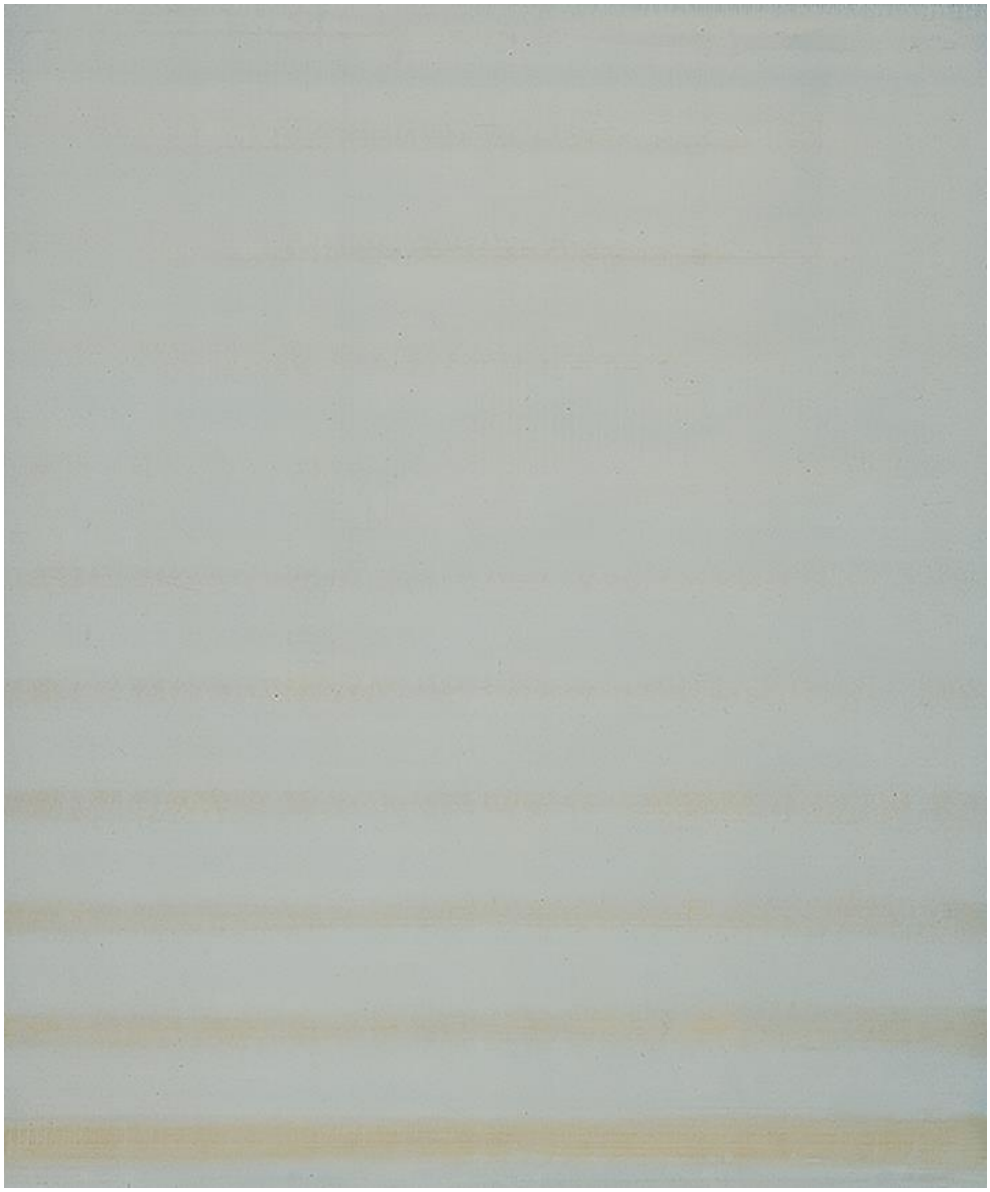

Figure 6 Wolfgang Tillmans, *Silver* 22 (2003). Image courtesy Galerie Buchholz, Berlin/Cologne.

One might question whether Tillmans's efforts to "document" a scene of environmental destruction and combine such images with image surfaces created from marine substances, while directing us to how image, representation and matter (and everything else, as the title suggests) are interrelated, may risk aestheticising a landscape that speaks to climate breakdown, rather than interrogating the

reasons for how we arrived at this condition. In short, the works in Tillmans's exhibition may dissolve material/image and culture/nature binaries, yet they appear unconcerned with further politics. My practice departs from Tillmans's contribution in that it also attends to the social, cultural *and* ecological effects of a white material as it manifests in images within a visual regime. This is an unresolved issue within Tillmans's legacy, and something that I attempt to address with this project.

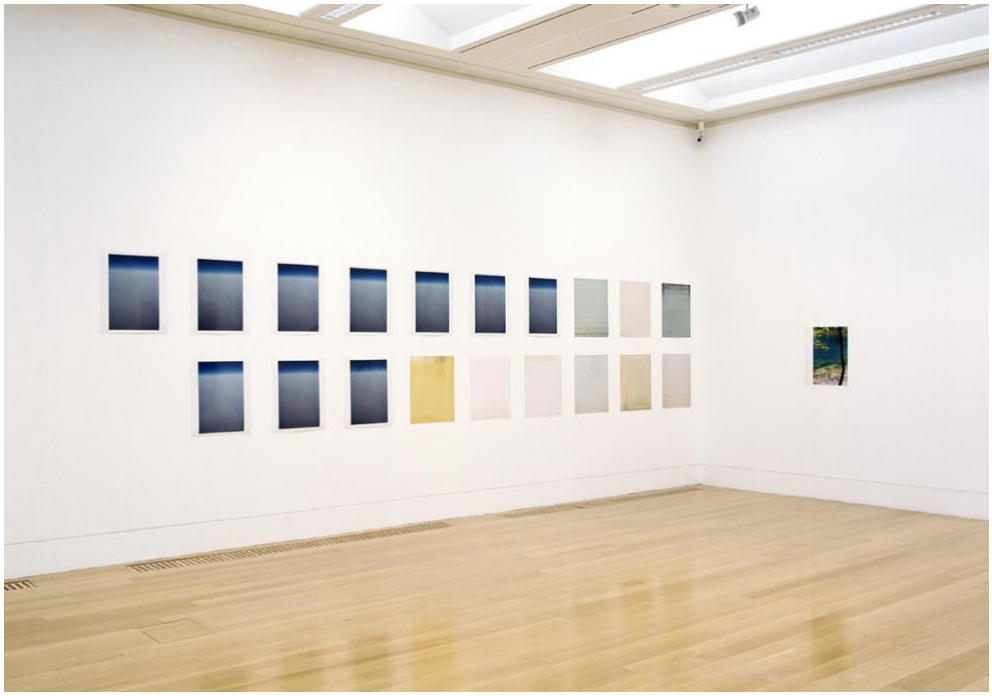

Figure 7 Wolfgang Tillmans, *if one thing matters, everything matters* (2003). Installation view. Tate Britain. Image courtesy Galerie Buchholz, Berlin/Cologne.

The large-scale exhibition *Re/Sisters – A Lens on Gender and Ecology* (2023)[105] at the Barbican Centre in London surveyed a range of artworks in photography and film, dating from the 1960s up until today, that in various ways relate ecological concerns to social justice through ecofeminism. The exhibition demonstrated how women and gender non-conforming artists have developed image-making practices that resist the logic of extractive industries, colonialism, sexism and indigenous repression, as these overlap. In *Re/Sisters*, a concern for climate breakdown and social justice are made inseparable. Unlike Wolfgang Tillmans's Tate exhibition, these art practices consider the politics of climate destruction through questions of choice and exclusion: which connections and entanglements are foregrounded, which are erased, to what effect and why?[106]

Several of the artworks in *Re/Sisters* do, however, rely on image-making as a form of documentation. Artist and researcher Oraib Toukan cautions against the unintended effects of

[105] Pardo, Alona, Barbican Art Gallery, and Museum voor Fotografie. *Re/Sisters: A Lens on Gender and Ecology*. Munich: Prestel, 2023.
[106] Here, I draw on perspectives proposed by critical theorist and media scholar Eva Giraud. See Giraud, Eva Haifa. *What Comes after Entanglement? Activism, Anthropocentrism, and an Ethics of Exclusion*. Durham, North Carolina: Duke University Press, 2019.

documentational image strategies. Toukan asserts that the ever-extending circulation of images of destruction and crisis may counterintuitively "undermine their rhetorical capacity and affective flow".[107] Toukan argues that the impulse to *expose* is no longer sufficient. The "evidentiary" image does not give one the power to predict a viewer's response, and in many cases, it may instead reduce the image's affective and rhetorical effects.

A central task for this thesis has been to produce connections and make visible aspects of the visual regime of the white material that often go unnoticed. However, I came to realise that simply documenting the activities in the pigment factory or the landscapes of the open pit mine was not sufficient. My research project is informed by a concern for the numerous effects of an extracted white material and its associated visual regime, while I also attempt to employ reflexive strategies that engage with and question the image forms themselves. The documentational is occasionally present in my practice, not by way of professional documentary equipment, but rather a handheld iPhone camera. Then perhaps it is no longer a question of dealing with the documentational in its "pure" form, but rather of engaging with the documentational via the networked, circulated *prosumer* social media image.[108] I also move away from the documentational by focusing on the gap between materiality and image, through which I have sought methods that may question image and perception processes themselves.

After an initial period of producing work with still images, I shifted my approach and began working with moving images. I found this method more generative in responding to my research question of rethinking image-making processes through an engagement with the white substance: it extended the temporal engagement with the image, which I believed could create a heightened awareness around its functions,[109] and it helped me explore perception in its formation.[110] In my experiments with using "found" titanium pigments while producing moving images, as a modified camera lens or as a material "filter" for an iPhone camera – which I used to film specific sites – I consider this a strategy first developed within the structural genre of filmmaking.[111] I discuss the video work that materialised from these efforts, *The Opacifier (Erased White City)* (2024), at length in Chapter 4. This approach brings attention to the material conditions of the production of moving images (as previously mentioned, titanium dioxide is the pigment most commonly used for projection

[107] See Toukan, Oraib. "Cruel Images". E-Flux Journal #96 - April 2019, 2019.
[108] Art historian Isobel Harbison refers to images that have emerged through new digital technologies and social media as *prosumer* images, where the user is both a producer and a consumer. See Harbison, *Performing Image*, 12.
[109] Lury and Wakeford, 2013, 17.
[110] Manning, *Minor Gesture*, 2016.
[111] In 1975, Peter Gidal wrote the following on structural film: "An avantgarde film defined by its development towards increased materialism and materialist function does not represent, or document, anything. The film produces certain relations between segments, between what the camera is aimed at and how the 'image' is presented. The dialectic of the film is established in that space of tension between materialist flatness, grain, light, movement, and the supposed reality that is represented. Consequently, a continual attempt to destroy the illusion is necessary." See Peter Gidal's introductory essay to the *Structural Film Anthology*, published by the BFI in 1976. Structural film was an avantgarde experimental film movement that developed in the United States in the 1960s with artists such as Tony Conrad and Michael Snow. A related movement developed in the UK in the 1970s with artists like Peter Gidal. Later, Leslie Thornton combined structural filmmaking with concerns from the feminist avantgarde.

screens, and it is also present in various camera devices I have used for filming, such as an iPhone). I draw on the inheritance from structural film while still being concerned with the representational image.

In other words, I am interested in not only the filmic event, but also how the sites were produced through the images. With this part of my practice, I attempt to arrive at something which resides between concept and percept, interrogating the gap between the disembodied, representational image and physicality. *The Opacifier* is about the material conditions of the production of images, but it is also about something more.[112] While developing this aspect of my practice, I focused on how a composition within a moving image work could foreground the relationships between the temporal, the material and the fantastic while also addressing the extractive conditions and colonial, historical inheritances of the pigment industry. This project hence contributes to the field of fine art by employing what I would describe as post-structuralist tactics.

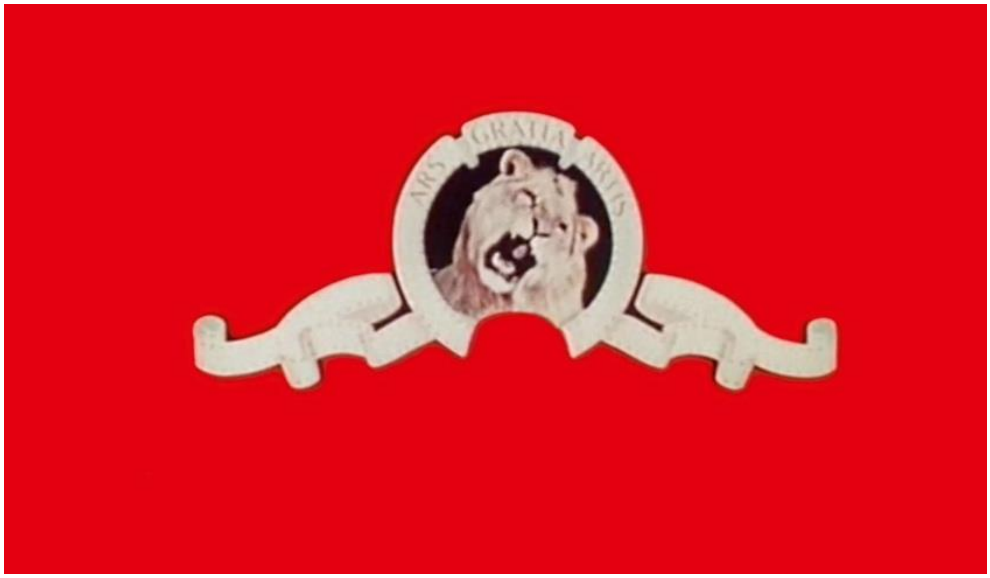

Figure 8 Jack Goldstein. *Metro-Goldwyn-Mayer* (1975). 16mm film, colour, sound, 2 min. Image courtesy the estate of Jack Goldstein and Galerie Buchholz, Berlin/Cologne.

In the aspects of my practice that comprise sludge sections made from found images that in various ways speak to the impact of the white material on visual registers, I have not only been concerned with the circulation of images, but also their appeal. This approach can be traced to The Pictures Generation.[113] Artist Jack Goldstein, often associated with this art movement, challenged the idea that the appropriation of images involves a so-called "erasure of subjectivity". On the contrary, Goldstein argued that there is a highly subjective quality to the process of choosing and selecting

[112] In this section, I draw on ideas from writer Gianmaria Andreetta. See Andreetta, Gianmaria. "Planned Failure". In *OLD WORLD*, 2023.
[113] The Pictures Generation refers to a group of American artists who produced work, often in photography and film, in the 1970s, through a critical engagement with popular culture and mass media. These artists were concerned with how images represent and shape how we perceive the world and ourselves. See Douglas Eklund, *The Pictures Generation, 1974-1984*, New Haven: Yale University Press, 2009.

images to include or reference in a work of art.[114] While selecting found images, I have worked with two criteria. First, I work with images that are made with titanium pigment in various ways, either what I refer to as "proto-versions" of titanium whiteness (which predate the invention of the synthetic substance) or directly with titanium dioxide. The second is a more intuitive approach, where I have chosen images that I believe speak to the unconscious forces, desires and fantasies at play within Western imaginaries around chromatic whiteness and titanium dioxide specifically. I find these images evoke affects ranging from the seductive to the uncanny, or they possess an unnameable allure.

In the era of the Pictures Generation, the image became the object of complex analysis through critical theory, cultural studies, appropriation and postmodernist thinking. My interest in the unnameable within images is where my practice departs from the more enclosed theoretical and analytical approaches of the Pictures Generation. With this focus, I also position this study as a contribution to artistic activity that seeks to operate within or on the boundaries of gaps and the space of the unnamed.

Two artists who work within the intersection of conceptual art and filmmaking to produce work that operates on the edge of meaning include Bruce Nauman[115] and Lutz Bacher (1943–2019). Bacher often created artwork with fragments of found imagery and sound. In a body of work that engages both the visceral and the conceptual, Bacher's methods of editing and her use of fragments and repetition foreground the ineffable, physical sensation of being affected by sound and image.[116] Experimental filmmaker Leslie Thornton, whose work comprises found footage, montage and a range of editing methods,[117] likewise creates artworks with a concern for what lies at the edge of meaning. Thornton states:

> I am concerned with meaning, playing on the edge of it, finding an edge that is closer to oblivion and can be transformative. I use narrative-like strategies of manipulation to generate and play across a vertically stacked field of possibilities. […]. It is a hard thing to do – to locate the ineffable and, upon finding it, to let it be. […] And then there is a perfection that settles in, like in nature. One does not start there; you start in the ordinariness of the world and its imagery. Then you compile, and you erase until the whole of it is untouchable.[118]

[114] Fogle, Douglas. "Jack Goldstein". *Frieze*, 2012.
[115] Bruce Nauman's video works have provided reference points for some of my own ideas, in particular *Mapping the Studio II with color shift, flip, flop & flip/flop (Fat Chance John Cage)* (2001). I revisit this work and *Clown Torture* (1987) in Chapter 2 and 4.
[116] Lutz Bacher often arranged seemingly disparate entities (sand, screens, extracts from the live-streamed footage of Princess Diana's funeral procession, foam, instruments, and images of her late astronomer husband) and allowed them to interact in new and surprising ways, often evoking both the trivial and the cosmic, the serious and tongue-in-cheek. I revisit Bacher's work in Chapter 2 and 3.
[117] See the video works *Novel City* (2008) and *Photography is Easy - Version 2* (2010) by Leslie Thornton.
[118] Kidner, Dan. "Leslie Thornton's 35 Years of Radical Filmmaking". *Frieze*, 2018.

Figure 9 Leslie Thornton, *HANDMADE* (2023). 8K video, colour, silent, 11.34 min. Image courtesy the artist and Rodeo, London/Piraeus.

Thornton's aim with her artworks is not to arrive at a product – a complete, packaged vessel for meaning – but rather at an entity that may prompt shared thought.[119] Such a work presupposes an active reader, not a consumer, she adds. For shared thought to occur, I believe there must be gaps. Through my experiments with image-making processes and titanium dioxide, I attempt to contribute a critical study that operates between the production of conceptual and theoretical knowledge and a more unnameable, visceral knowledge. This approach addresses the varied and unpredictable influences of images and materials on viewers and their bodies.

Art practices that reside in or explore states of in-betweenness – as I attempt to do in my own practice – can be understood through Vishmidt's understanding of the gap as discussed earlier in this chapter.[120] On this note, I would also like to point out that what lies beyond words – the excess produced by the work of art that goes beyond the social and historical conditions within which it was

[119] "Leslie Thornton: Photography Is Easy". Electronic Arts Intermix, 2008.
[120] Marina Vishmidt, "Basement Jazz", 2022.

made – does not carry a guarantee that it will create space for what has escaped from current forms of dominance. It can also be the place where something is made unseen or dehumanised.[121] A gap is not normative; it can be as progressive as it can be regressive; it is relational. Therefore, understanding how the gap relates to a context or a structure is crucial.

Making, responding to and thinking with images is, lastly, something that helps me practice an "art of noticing", in anthropologist Anna Tsing's sense of the word.[122] Here, I refer to "art" in a wider sense, beyond fine art, to include an anthropological perspective. Image-making may be a medium of distance, but through its connection by disconnection, I find image-making to offer an entry point to what is known yet taken for granted in our ways of seeing, which can make what appears natural or accepted seem strange, and thus something that could have been otherwise. While conducting my research into the white material, I often asked myself what an alien arriving on earth would think of the white substance and its usage by the creatures who extract and refine it, what purposes could it serve and what patterns could be observed (I picture this alien, not as a little green humanoid, but rather like the shimmering ocean of *Solaris* (1972)).

Experimental structuralist filmmaker Stan Brakhage (1933–2003) expressed a similar perspective and asked a related question in relation to his art practice, not through the image of the alien but that of an infant. He sought to reach a state of mind where he could create still and moving images that were "pre-cognitive", as if seeing the world for the first time, like a child – a "looking without knowledge".[123] This approach produces knowledge too, but possibly a phenomenological one, which is not a primary concern of this thesis.[124] I have attempted to create a productive estrangement while also acknowledging my complete immersion and complicity within the visual regime of titanium white. I do not seek a position of privileged exclusion but rather an implicated position from which to carve out or locate gaps, question what is largely taken for granted, and test its effects.

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[121] The notion of "zero degree of social conceptualisation" that feminist scholar Hortense Spillers describes as having emerged during slavery could be seen as a gap. In this gap in the category of the human, "flesh" is the human form divested of gender and moral subjecthood that ideology cannot acknowledge or that ideology actively refuses but that is struggling against those "divestitures". Yusoff argues that black poetics positions itself against "the grammar of the inhuman in White geology" by embracing the category of the inhuman and intensifying the bond to the inhuman as "a release from its bondage to redefine both black subjectivity and 'inert' materiality". In these writings, gaps are identified and reclaimed. See Spillers, Hortense J. 'Mama's Baby, Papa's Maybe: An American Grammar Book". Diacritics 17, no. 2 (1987): 65–81; See Chapter on the "inhumanities" in Yusoff, *A Billion Black Anthropocenes or None*, 2018.

[122] Here, I repurpose the words of Anna Tsing. Tsing, Anna Lowenhaupt. *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins*. Princeton, NJ: Princeton University Press, 2015.

[123] See Camper, Fred. "Article on Stan Brakhage's 'The Art of Vision' by Fred Camper". Film Culture 46, Autumn 1967, which appeared in 1968., 68 1967; Miller, Michael F. "Stan Brakhage's Autopsy: The Act of Seeing with One's Own Eyes". *Journal of Film and Video* 70, no. 2 (1 July 2018): 46–55; Mooney, Tim, and Dermot Moran. *The Phenomenology Reader*. London: Routledge, 2002.

[124] Phenomenology is a philosophical movement that originated in the 20th century and whose primary objective was the direct investigation and description of phenomena as consciously experienced, free from unexamined preconceptions and presuppositions. The movement has been criticised for, among many issues, lacking attention to the broader social context in which experience occurs.

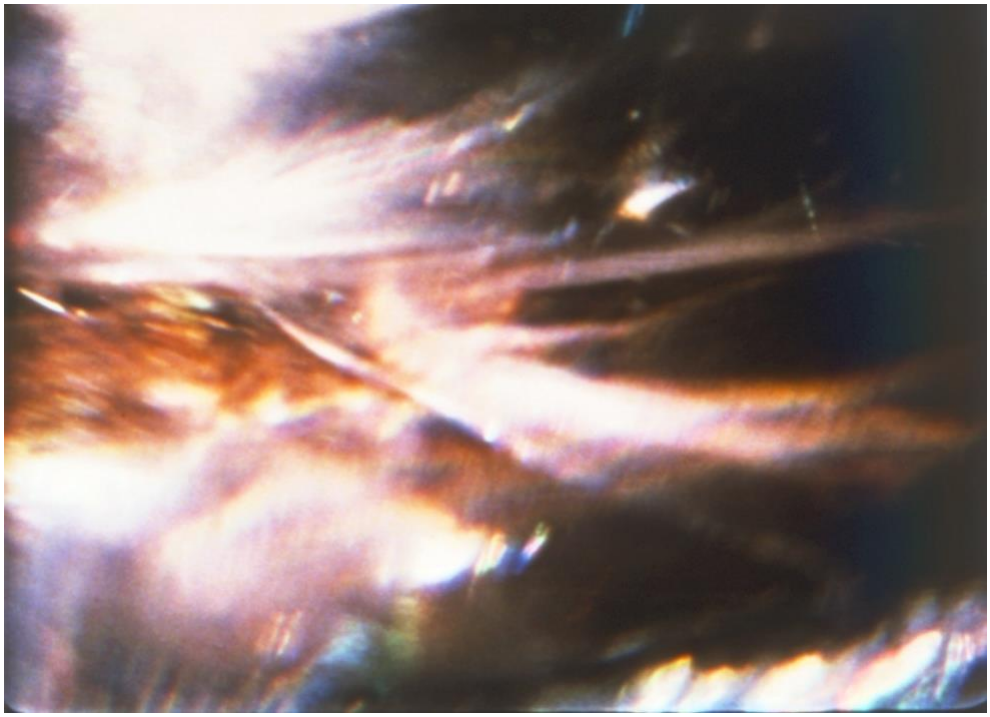

Figure 10 Stan Brakhage, *Text of Light* (1974). 16mm, colour, silent, 70 mins. Image: LUX.

In summary, in this project I explore the complex interplay between materiality, image circulation, fantasy, desire and the extractive visual regime dominated by titanium dioxide. Building on the foundational work of Hito Steyerl, artists like Diane Severin Nguyen and Wolfgang Tillmans and movements such as structural and post-structural filmmaking, my practice seeks a nuanced engagement that considers the impacts of image-making processes in relation to the white material within a broader cultural and mediated cultural context. In the next section, I will situate my contribution within the domain of theorists and artists concerned with materiality and the molecular.

Cross-scalar whites

This study contributes to theoretical domains concerned with the entanglement of matter and culture, and expanded understandings of ecology that include aesthetics and sociality – the latter a position associated with Guattari.[125] My thesis offers new insights by testing and reworking these foundational works and their ideas in the context of the specific case study of the visual regime of titanium dioxide. In the following section, I will also present how my thesis contributes to art activity concerned with the synthetic substances and molecular processes of the Anthropocene – what I refer to as "molecular practices".

In my approach to materiality within the visual regime of titanium dioxide, I draw on and contribute to inheritances from new materialism.[126] Feminist theorist and physicist Karen Barad's

[125] Guattari, *The Three Ecologies*, 1989.

[126] New materialism is an interdisciplinary field of research that emerged with thinkers such as Bennett, 2010 Chen, 2012 Barad, 2006 Braidotti, 2002 and DeLanda, 2001. In these contributions, meaning and matter are approached as constituting each other through interrelations, offering a perspective that cuts through established nature/culture,

agential realism was a foundational contribution to new materialism, especially in its proposal of how material and meaning are co-produced by situated subjects.[127] Barad's notion of the "material-discursive", drawn from their theory of agential realism, has helped me approach how materiality and images interrelate within the visual regime of the white material.[128] In this thesis, I emphasise the visual rather than the discursive due to my focus on a material circulated primarily in view of its optically aesthetic qualities. What follows from Barad's premise is a need to reconfigure notions of matter and image so that neither is seen to precede the other, but instead both exist in a mutually constitutive becoming.

Yet, a visual regime is not only made up of meaning and matter that abstractly flow between each other and various *interactants*; it is also "raw material, product and labour too", as cultural theorists Fred Moten and Stefano Harney remind us.[129] The latter is something I attend to in my research by bringing attention to the material history of the raw material (ilmenite) and the sites of extraction and labour that are involved in the production of a "neutral" substance. In developing my project, I have also considered Anthropologist Marilyn Strathern's work, which states that any relation simultaneously connects as much as it divides.[130] Suppose one approaches everything as connected in endless complexity. In that case, there is still a question of how we are to account for and build awareness towards that which is excluded – in politics, in aesthetics and in visual regimes. Exclusions that, according to cultural theorist Eva Giraud, "play an equally constitutive role in materialising particular realities at the expense of others".[131] When researching how invisibility and neutrality are produced as material and meaning within a visual regime, I am interested in locating

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human/nonhuman, animate/inanimate, agency/structure and mind/matter binaries. The movement is also referred to as the material turn, and it was largely developed in response to the linguistic turn and postmodern constructivism, which dominated the humanities in the 1980s and 1990s. It draws on and develops Deleuze's early elaborations on materialism in his 1960s writings on Spinoza. There has been extensive criticism of how new materialist perspectives may marginalise issues of race, gender and colonialism if not inflected by decolonial, Indigenous, feminist, queer and critical race theories. See Yusoff, 2018; Ravenscroft, 2018; Shomura, 2017; Zakiyyah Iman Jackson, 2016. Ecofeminists have foregrounded understandings of bodily vulnerability in relation to materialism; see, for instance, Stacey Alaimo's *Bodily Natures: Science, Environment, and the Material Self*. Bloomington: Indiana University Press, 2010.

[127] In indigenous scholarship, nonhuman agency is rarely presented as a general concept; it is taken as a given. Instead, there is an emphasis on the specificity of the formation of relations with other-than-human agents. An aspect of vital and new materialism that is criticised by indigenous scholarship is, namely, thinking matter without giving attention to embodiment and reshaping the human subject through an abstract, conceptual displacement of subjectivity. What at first may seem like a productive displacement of the thinker or maker sounds, in the next instance may seem a lot like someone taking up the position of Haraway's scientific gaze, the conquering gaze from nowhere. Consequently, we may end up with a "reinscription of an unchanged enlightenment spectator", where the object of inquiry may have changed, but the subject remains the same. I include this critique here to highlight potential risks associated with the notion of a situated subject in new materialism. See Rosiek et al., 2020; Todd, 2016; Green, 2018.

[128] See Barad, Karen. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Durham: Duke University Press, 2007.

[129] Moten and Harney in Mirzoeff, *White Sight*, 9.

[130] Strathern, Marilyn. "Cutting the Network". *The Journal of the Royal Anthropological Institute* 2, no. 3 (1996): 517–35.

[131] The full quote reads: "Perhaps, then, asking what sort of ethics and politics can emerge from entanglement is the wrong framing of the question. Although some things are impossible to disentangle, recognition of this complexity does not capture everything about material reality, and, as such, this emphasis does not offer as helpful a foundation for ethics and politics as it might seem. Instead, more concerted efforts need to be made to render visible — and assume ethical responsibility for – the exclusions that play an equally constitutive role in materialising realities at the expense of others." Giraud, *What Comes after Entanglement?*, 19-20.

exclusions and absences. My thesis marks a contribution to the field of entanglement theory in that it considers exclusions as well as entanglements.

In the written thesis, I rework ideas from Guattari's writings on ecology[132] by approaching the visual regime of the white material *transversally*. Compared to colloquial usages of the term, Guattari's understanding of ecology is expanded and includes the social, the neoliberal and the aesthetic in addition to the environmental. This perspective allows me to trace the white material across different scales and domains, while also considering the exclusions and stabilisations that arise. Moreover, I provide new insights by testing perspectives from artist-researcher Susan Schuppli's work on material witnessing[133] and transdisciplinary geographer Kathryn Yusoff's writing on White Geology[134] in relation to the specifics of the visual regime of titanium dioxide, to question where my case study differs and requires an altered approach.

Finally, with this thesis I contribute to the theoretical work on mining, pigment industries, art and chemistry that Leslie offers in *Synthetic Worlds* (2005).[135] Whilst Leslie approaches the emergence of mining and the invention of synthetic pigment and dyes in 18th and 19th century Germany as interconnected with artistic movements like Romanticism, my study is focused on how the invention of a new synthetic white pigment at the onset of modernism formed and was formed by a new set of imaginaries.

Molecular practices

This research project revolves around the code for a (fairly) recent invention: TiO2, the chemical compound of titanium dioxide. It may thus be seen to contribute to artistic activity concerned with the molecular materials and products of the Anthropocene;[136] efforts that are often directed at developing new forms of representation in response to the scale and perspective of molecules. I refer to these practices as "molecular practices".[137] Such so-called molecular practices refer to artistic efforts that emerged in the 2010s in response to the increasingly unpredictable interactions between human activities and matter in a destabilised climate in which new synthetic and chemical inventions

[132] Guattari. *The Three Ecologies*, 1989.
[133] Schuppli has advanced a notion of materials as expressive rather than inert, capable of archiving their complex interactions with the world that later can be decoded and reassembled back into histories. Schuppli, Susan. *MATERIAL WITNESS: Media, Forensics, Evidence*. Cambridge, MA: The MIT Press, 2020.
[134] Yusoff argues that the semiotics of White Geology disassociate matter from time and place and its local languages of description, social relations, and historical contingencies. Yusoff. *A Billion Black Anthropocenes or None*, 2018.
[135] See Leslie, *Synthetic Worlds*, 2005.
[136] Several scholars have suggested alternative terms to the "Anthropocene" to more precisely address how the geohistorical event of our current ecological breakdown is coupled with histories of extractive capitalism, racial capitalism and European imperialism. Some of these concepts include Malm and Moore's *Capitalocene* (2009/2016); Donna Haraway's (2015) *plantationocene*; Francoise Verges' (2017) *racial capitalocene*; Nick Mirzoeff's (2018) *white-supremacy-scene*; Kathryn Yusoff's (2018) *billion black Anthropocenes*. In 2024, after 15 years of debate, it was decided that the term Anthropocene – generally understood as the era of irreversible impact by humans on earth – will not become an official epoch in geology. See Witze, Alexandra. "It's Final: The Anthropocene Is Not an Epoch, despite Protest over Vote". *Nature*, 2024.
[137] Here, I draw on a piece by Nicolas Bourriaud. See Bourriaud, Nicolas. "Materialist Invisibility: Art As Organic Development In Pamela Rosenkranz's Work". *Flash Art*, 14 September 2021.

abound. I consider these practices a descendent to artistic practices that developed in the 1960s in response to the wealth of synthetic materials invented at that time, such as synthetic mud, latex, vinyl and polyurethane, and through which artists began to approach materials as *materiality*[138] – that is, matter as a state that emerges through processes and forces of production.[139]

At the start of 2022, climate scientists stated that we have exceeded a critical planetary boundary concerning the flooding of the environment with new synthetic substances and nanomaterials, many of which are profitable yet not fully understood.[140] Although titanium dioxide is one of the most widely used industrial pigments and nanomaterials[141] today, the ecological impact of the extractive activities needed to produce the pigment and the consequences of its dispersion are barely measured nor fully understood. Registering some of the unknown processes that go into the making, as well as the unintended consequences of the dispersion of titanium dioxide, appeared to me as another way to locate gaps within the visual regime of the white material. In my practice, I have thus focused on sites of extraction and waste, as well as materials used in titanium dioxide production – such as ilmenite, the shimmering black precursor to the white pigment – which represent unknown aspects of the titanium industry.

The curator and art critic Nicolas Bourriaud contends that, by observing the world at the molecular level, a new generation of artists reinvented representational formats in the 2010s by "translating the political and social world into particles and atoms".[142] Bourriaud proposes that molecular art practices and their action on states of matter "overtake" the use of labels and classifications whereby the capitalist system distributes objects in social space. Moreover, with the help of visible elements, the artist constructs points of passage to a "molecular level of reality", "which, today, might quite simply be that of the real".[143] I will not problematise Bourriaud's usage of "the real" here, but rather draw attention to how the re-imagination of representation through this reduction of scale to that of molecules and particles may also be approached as upholding the "chemical gaze".[144]

The chemical gaze evolved through a logic of productivity and progress, and not in opposition to it, as sociologist Hannah Landecker asserts. Hence, it is implicated in a capitalist system of

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[138] The newfound interest in materiality was also a counterreaction to the modernist privileging of form over matter found in the writing of figures such as Clement Greenberg. Lange-Berndt, Petra. *Materiality*. Documents of Contemporary Art Series. Cambridge, Mass.: London: The MIT Press; Whitechapel Gallery, 2015.

[139] It is worth noting that this development – perhaps paradoxically – occurred in parallel with declarations of the dematerialisation of the artwork. See Lippard (1966) in Lange-Berndt, Petra. *Materiality*. 2015; Lippard, Lucy R. *Six Years: The Dematerialization of the Art Object from 1966 to 1972*. Berkeley: University of California Press, 1997.

[140] Persson, Linn, Bethanie M. Carney Almroth, Christopher D. Collins, Sarah Cornell, Cynthia A. de Wit, Miriam L. Diamond, Peter Fantke, et al. "Outside the Safe Operating Space of the Planetary Boundary for Novel Entities". *Environmental Science & Technology*, 18 January 2022.

[141] The number of everyday products containing nanomaterials has increased from 54 in 2005 to 3,639 in 2020, and titanium dioxide nanoparticles appear in about 25 per cent of these. See Larue, Camille, ed. "Ecotoxicity of Titanium Dioxide Nanoparticles". *Nanomaterials*. Special issue (Forthcoming).

[142] Bourriaud. "Materialist Invisibility", 2021.

[143] Bourriaud. "Materialist Invisibility", 2021.

[144] Landecker demonstrates that the cultivation of the chemical gaze developed in the 20th century agricultural industry to increase productivity. She writes: "Where the naturalist might see species and kingdoms […] the chemical gaze traced a

extraction-production. Bourriaud fails to recognise that the circulation of services, objects and products under neoliberalism is underpinned by a vast, material network of multinational companies occupied with extraction, what Conway referred to as the most important companies "you have never heard of".[145] Accordingly, this thesis addresses how the underbelly of extractive capitalism shapes a visual regime.

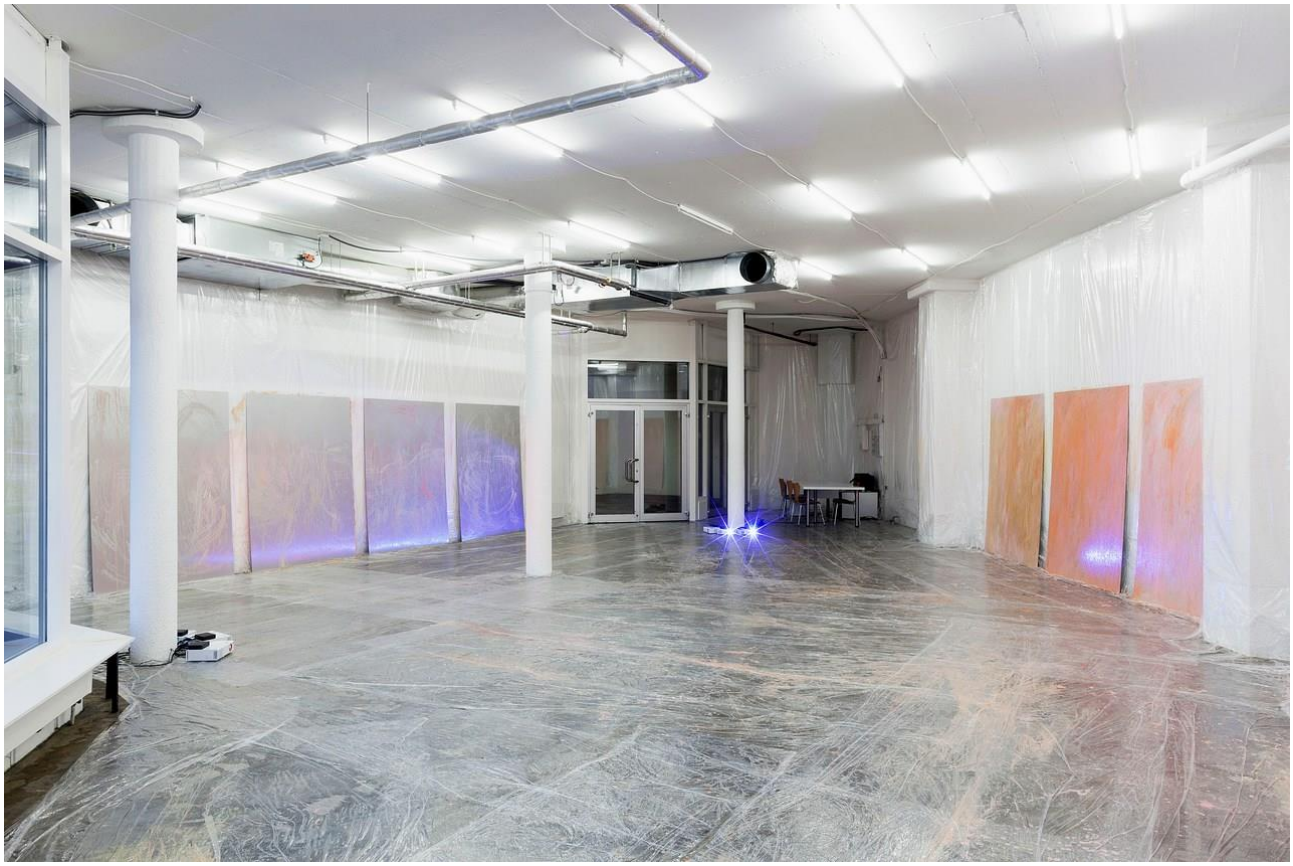

Figure 11 Pamela Rosenkranz, *My Sexuality* (Exhibition), *Viagra Paintings*, 2014. Installation view. Karma International, Zürich. Image courtesy Karma International, Zürich.

Pamela Rosenkranz is an artist who can be grouped under the molecular practices "school", as she was one of the first artists in the 2010s to cite chemicals and molecular resources as art materials.[146] Rosenkranz is a conceptual artist who works with pigments, photography, moving image and a range of other materials and installation strategies to explore new *capitalocene* aesthetics, while also making interventions directed at canonised male figures from the historical avantgarde. Rosenkranz's works, seemingly informed by a vital and new materialist sensibility, often rely on a

metabolic map of enzymatic and energetic conversions between different kinds of matter connecting one body to another across taxonomic boundaries. The lineaments of the chemical gaze were simultaneously economic and scientific, native to the practical character of agricultural and industrial chemistry and microbiology". See Landecker, Hannah. "A Metabolic History of Manufacturing Waste: Food Commodities and Their Outsides". *Food, Culture & Society* 22, no. 5 (20 October 2019): 531).

[145] Conway, Ed. *Material World – A Substantial Story of Our Past and Future*. New York City: Knopf Publishing Group, 2023.

[146] Bourriaud. "Materialist Invisibility," 2021.

Western, scientific worldview without drawing attention to how these are shaped by colonialism or racialisation, which I find to be missing in her otherwise compelling, if somewhat slick, approach to examining molecular processes and consumerism in times of climate breakdown.

In 2023, the research-based conceptual artist Sung Tieu created a work in which she tracked the thousands of hazardous chemicals involved in fracking, some of which are new chemical inventions unknown to even experienced chemists, since they have been classified in the category of "confidential business information".[147] Her work attempts to make these new synthetic inventions visible and known. In contrast to molecular art practices that aim to make the invisible visible and known by primarily engaging with a Western scientific vocabulary, I seek to also move beyond the scientific register to explore the mythical appeal of a synthetic invention and its related images, as these are also part of material movements and flows.

More recently, artists have employed an attention to the molecular to attempt to decolonise the molecular, in which artists explore how white ideology, neocolonial dynamics and racialisation shape the flows of even the smallest entities and processes in matter and life.[148] My thesis contributes to this latter domain of artistic activity by questioning how the white molecular resource relates to visual registers that also materially produce racialised white subjects.

Dora Budor is another artist who emerged in the latter half of the 2010s and who engages with the molecular through the inheritances of German conceptual art in a body of work that is not easily reducible to the scientific. Budor explores perception and reality by focusing on the increasing hybridisation between ecological and human-made processes and materials, examining how the organic interfaces with the cinematic, science fiction, modernist design and the psychosocial effects of contemporary urban development.[149] The artist once referred to her artworks as facilitating a "homeorhetic" flow,[150] a term I take up and develop in Chapter 5. Although Budor's own subjectivity sometimes remains obscured in her work, which could be a point of criticism, I find her facilitation of interactions between image, objects, built environment and the synthetic, and her exploration of how these relate to a larger structure, to be compelling.

To summarise, this research project contributes to artistic activity in which artmakers engage with molecular processes and perception. I contribute to this field by providing a study of a unique molecular material that is particularly symbolically charged, and by drawing on but also resisting a scientific approach to matter and reality. In my engagement with certain mass-circulated images, my interest lies in how the white substance manifests within these images through observable effects

[147] Packard, Cassie. "Sung Tieu: Not Fracking Around". *ArtReview*, 2023.
[148] An exhibition representative of this approach took place at Nicoletti Contemporary in 2022. See essay: Houzé, Camille, and Estelle Marois. "Total Climate Part 1: The Infinitesimal and the Mobile". Nicoletti Contemporary, 2022.
[149] Often through incongruous elements such as cinematic ash, prop frogs, 1973 Terrazza couches, dust chambers in the colours of a J.M.W. Turner painting, Beethoven's 9th Symphony, sandpaper with remnants of "surfaces of a city" and various moving image strategies. Budor creates complex systems in which these components collide and become interdependent, forming a whole that reflects and explores the broader conditions of its making.
[150] Filipovic, Elena. "Dora Budor: On Being a "Deviation Amplifying' System". *Flash Art*, June 2019.

that also play into contemporary fantasies, desires and folklore. My thesis contributes to efforts to decolonise the molecular by questioning when and how this molecular substance also contributes to white racialisation. In the last section of this chapter, I outline how my study relates to the field of colour studies, and critical whiteness studies in particular.

Figure 12 Dora Budor and Noah Barker, *Orange Film I* (2023). HD video, colour, sound 6 minutes 42 seconds. Image courtesy Galerie Molitor, Berlin.

Total white

In my questioning and measuring of the effects of the white material, my thesis contributes to the fields of colour studies, critical whiteness studies and critical visual research concerned with the inbuilt biases in image-making towards chromatic whiteness and white identity – so-called "images of whiteness".[151]

On a more general level, this study contributes to the literary and theoretical tradition concerned with writing on colour. For writers, artists and philosophers in various eras – Goethe, Ludwig Wittgenstein, William H. Gass, Derek Jarman, Maggie Nelson, Alain Badiou[152] – writing with colour as a prism has allowed for an exploration of the relationship between subjective and general

[151] Gunaratnam and Yancy in *The Image of Whiteness* (2019); Dyer, *White* (1997); Nicolas Mirzoeff, *White Sight* (2023).
[152] Goethe, Johann Wolfgang von. *Goethe's Theory of Colours*. Project Gutenberg, 1810/1840; Wittgenstein, Ludwig. *Remarks on Colour*. Berkeley: University of California Press, 1977; Gass, William H. *On Being Blue: A Philosophical Inquiry*. Boston, Mass.: David R. Godine, 1976: Jarman, Derek. *Chroma: A Book of Colour*. London: Vintage, 1994; Nelson, Maggie. *Bluets*. Seattle: Wave Books, 2009; Badiou. *Black: The Brilliance of a Non-Color*, 2017.

aesthetic experiences and the limits to what can be universalised. Wittgenstein observed and was interested in the fact that some colour-based propositions are neither empirical nor a priori, but something in between.[153] The topic of colour may thus be seen to invite an interest in states of in-betweenness. The question of how to universalise the experience of colour, while it is also deeply personal and emotional, is present in the writing of artist and writer Derek Jarman. Parsons writes the following on Jarman's book on colour, *Chroma* (1994):

> Although Jarman calls the hue "the universal love in which man bathes" (Chroma 108), he immediately undoes a sense of the universal by adding alternative, often contradictory meanings. Colour provides a distilled demonstration of our inability to share an exact understanding of the world with others.[154]

At the beginning of this thesis, I discussed my initial attachment to and conflicted relationship with chromatic white as a young girl. In addition to my practical experiments and more critical and theoretical concerns, this personal history infuses the thesis with a subjective, affective layer – one that may be unique to me, but one that I hope resonates with others.

To narrow the focus, this study more specifically contributes to the field of critical whiteness studies. Several studies have analysed the effects and significance of the modern Western conceptualisation of whiteness. Others have focused on how whiteness appears in and has shaped imaging technologies. Such contributions, which have all informed my thesis, include Dyer's *White* (1997), a seminal book on white identity as reproduced and produced through Hollywood films and image-making technologies; Wigley's writings on the white interior within a wider socio-historical context, such as his article *Chronic Whiteness* (2020); Sociologist Yasmin Gunaratnam's and Philosopher George Yancy's writings on images of whiteness in *The Image of Whiteness* (2019); Nicolas Mirzoeff's recent research into the perspective and history of "white sight" and others.[155] Despite the breadth of these studies, I have not identified any research that investigates the cultural and material extractive processes involved in the making of a white material, or any study that questions how these processes shape modern and contemporary conceptualisations of a white hue.

Neither have I encountered attempts to question chromatic whiteness as an extracted material, as this manifests in relation to image-processes. With this thesis, I attend to both. This is the unresolved area my research attempts to address. For me, the question remains: how can we understand and engage with the processes that occur in between black rocks being extracted from a pit and crushed into a powder – at which point it is largely considered an empty (not of matter but of meaning) material – and a white substance that emerges from the pigment factory that, through

[153] McGinn, Marie. "Wittgenstein's Remarks on Colour". *Philosophy* 66, no. 258 (October 1991): 435–53.
[154] Parsons, Alexandra. "A Meditation on Color and the Body in Derek Jarman's *Chroma* and Maggie Nelson's *Bluets*". *A/b: Auto/Biography Studies* 33, no. 2 (4 May 2018): 375–93, 379.
[155] Dyer, *White*, 1997; Blight, *The Image of Whiteness*, 2019; Wigley, "Chronic Whiteness", 2020; Mirzoeff, Nicholas. *White Sight*. MIT Press, 2023.

surfaces and mass circulated images, produces a visual regime centred around notions of neutrality, invisibility, desirability, emptiness and absence. A visual regime attached to a particular conceptualisation and shade of white – the whitest and most total of whites.

Critical studies concerned with images of whiteness focus on the production of white racialisation: how white identity is produced and imagined consciously or unconsciously through images as something neutral, supreme or desirable. Camera-based still and moving images become images of whiteness when they encompass whiteness as a "form of imagination" and as "literal picture", according to visual scholar Daniel Blight.[156] From early colonial photography to present-day image-making, the medium of photography has played an integral role in maintaining a social hegemony of white identity. In these accounts, the notion of white identity may, but does not have to be, related to chromatic whiteness. Dyer's study is concerned with how Western imaginaries around chromatic whiteness more broadly, as well as within the technologies of image-making, have contributed to the racialisation of white people. Dyer questions what occurs when people associate themselves with a colour or (non)colour that thrives on notions of neutrality and absence.[157] Dyer also analyses how chromatic whiteness has become associated with ideas relating to light and the sun, Christianity, beauty and death, to name a few. This important analytical work informs my research.

My project adds to the field of critical whiteness studies by taking up and building on Dyer's ideas and existing analysis of images of whiteness as I engage with the specific ways these operate within the visual regime of titanium dioxide. In my practice, for instance, I make use of found, mass-circulated images in which the white material manifests as a material construction or support for white identity, albeit in ways where I find it fails to do so inconspicuously, hence making the phenomena visible and noticeable as an ideological construct.

With the legacies and histories of the white tradition of photography in mind, a double task for this thesis appears: first, there is the task of "making with"[158] the problematic inheritances of camera technology; second, there is the task of applying image-making to attempt to question the visual regime of titanium dioxide (and white identity, where they overlap) to reveal the set of "representational fictions" that comprise it.[159]

To summarise, my study focuses on the emergence of a visual regime that upholds whiteness as a norm and broader cultural aspiration, in which I also attempt to locate moments when the white material becomes – and fails to become – a construction for white racialisation. In the next

[156] Blight, *The Image of Whiteness*, 22-24.
[157] Dyer, Richard. *White,* 1997.
[158] Science and technology studies scholar Donna Haraway proposes to "make-with" problematic inheritances as a making through "sympoesis". This "enlarges and displaces autopoesis and all other self-forming and self-sustaining system fantasies. Sympoesis is a carrier bag for ongoingness, a yoke for becoming-with, for staying with the trouble of inheriting the damages and achievements of colonial and postcolonial nature cultural histories in telling the tale of still possible recuperation." Haraway, Donna. *Staying with the Trouble: Making Kin in the Chthulucene*. Durham: Duke University Press, 2016, 125.
[159] Blight, *The Image of Whiteness*, 24.

section, I comment on the specific variant and experience of white identity that has developed in Norway.

The doubleness of Norwegian whiteness

W.E.B Du Bois dates the creation of "personal whiteness" to the 1660s, when settler colonialism and slavery formed white identity in the American colonies.[160] White identity has since developed localised forms and appears differently in Britain and Scandinavia than in the US and other countries founded on white supremacy. Nevertheless, what those white identities have in common is that they often operate as "unseeing fictions".[161] White identity is often looked at, yet rarely seen.[162]

Under the rule of neighbouring Scandinavian countries for centuries, and not financially prosperous enough to engage in colonial expansion, Norway, first an independent country in 1905, was not directly involved in settler imperialism abroad at the height of European colonial rule. Norway's wealth was built in the 1970s following the discovery of oil and gas reserves in the North Sea, and most of its extractive activities have involved mining its own territory for fossil fuels and exporting these carbon-emitting energy sources abroad, while relying mostly on clean hydropower at home (hence its outward appearance as one of the most sustainable countries in the world).

Likewise, in the titanium industry, there is no extraction in foreign lands; the extractive activities remain locally within the nation-state, and the value chain is intact from pit to plant – something of a privileged exception in the global mineral economies, where the norm is for raw materials to be bloodily extracted in the Global South and refined in the Global North, where most of the value addition happens.

"Norwegian exceptionalism", the notion that Norway (and other Nordic countries) is a uniquely humanitarian and a peace-promoting force in the formerly colonised, developing parts of the world, has, at this point, been thoroughly challenged.[163] While Norway was peripheral to the major imperial forces of Europe, the country has profited greatly from Europe's position as a global centre, and it has actively contributed to the production of colonial discourse.[164] The Norwegian Petroleum Fund's strategic investments are certainly not devoid of colonial logic, and neither are some of its state-owned oil company's projects in regions outside of Europe. Norway's late, relatively

[160] W.E.B Du Bois in Blight, *The Image of Whiteness*, 158.
[161] Yancy writes about white identity as an "unseeing fiction": "The concept of whiteness as an unseeing fiction points to whiteness as a site of white opacity and as a site of prevarication. On this score, whiteness is both a conscious and unconscious site of obfuscation. […]. Hence, what we need to do is to de-mask whiteness, to un-conceal the ways in which it is morphologically a lie and the ways in which whites lie to themselves. An aspect of this lie is that whiteness is, as it were, born ex nihilo". When I am examining the relationship between titanium dioxide and white racialisation in this thesis, which, in different ways, often operate as *unseen,* I have attempted to locate when these two overlap. See Yancy in Blight, *The Image of Whiteness*, 192-193.
[162] Yancy in Blight, *The Image of Whiteness*, 192, 193.
[163] See Loftsdóttir, Kristín, and Lars Jensen, eds. *Whiteness and Postcolonialism in the Nordic Region: Exceptionalism, Migrant Others and National Identities*. Routledge, 2016; Bøstein Myhr, Annika. "Challenging Nordic Exceptionalism: Norway in Literature by and about Irregular Migrants". *Law and Literature*: 1–30.
[164] See Loftsdóttir and Jensen, eds. *Whiteness and Postcolonialism in the Nordic Region,* 2016; Bøstein Myhr, Annika. "Challenging Nordic Exceptionalism", *Law and Literature*: 1–30.

solitary industrial history makes for a unique extractive landscape, which also affects the formation of its local white identities.

While Norwegian identity is associated with being white, the lack of a direct colonial presence or settler history in the Global South may have nonetheless contributed, historically, to an absence of an explicit discourse about race.[165] To analyse racialisation in Norway through frameworks developed in critical race theory in the American context would be imprecise. Until the 1960s, when the first wave of immigrants arrived – oil workers from Pakistan and Turkey – Norway was a predominantly homogenously white country. Discrimination and racial violence in Norway will often appear under the guise of a language referring to culture and ethnicity, drawing on notions of nativism,[166] rather than through explicit references to race or white supremacy, as is often seen in the United States. For a long time, "race" was a term mostly associated with Nazism and World War II, and it is rarely used in vernacular Norwegian.[167] However, it has become more prevalent due to the influence of American identity politics. Norway has been, and still is, a colonial force in Sápmi, the territory of the Sámi indigenous people in the north of the country. The Sámi people are, however, considered white, and discrimination and violence against them has been and is still rather driven by xenophobia rather than notions of white supremacy. To say that explicit references to race and skin colour do not often feature in Norwegian public discourse does, of course, not mean that an ideology of whiteness and racism does not exist.

Some of the most violent terror attacks motivated by far-right Ethno-nationalist, anti-Islamist ideology on European soil during the past decades have taken place in Norway.[168] In parallel to Norway's geopolitical position, which has meant the country has benefitted from post-imperialist flows of power and wealth whilst retaining a public image of benevolence towards the Global South, sociological studies have shown that white majority Norwegians hold strong discursive egalitarian attitudes towards those who are considered the Other, and they simultaneously exhibit xenophobic, racist affective behaviours towards the very same people when tested for different types of social cognition.[169] White identity in Norway is one of outward civility, strong humanitarian ideals and a self-

[165] Dankertsen, Astri, and Tone Gunn Stene Kristiansen. "'Whiteness Isn't about Skin Color.' Challenges to Analysing Racial Practices in a Norwegian Context". *Societies (Basel, Switzerland)* 11, no. 2 (2021): 46.
[166] Loftsdóttir and Jensen, eds. *Whiteness and Postcolonialism in the Nordic Region,* 2016.
[167] Bangstad, Sindre. "The Racism That Dares Not Speak Its Name: Rethinking Neo-Nationalism and Neo-Racism in Norway". *Intersections* 1, no. 1 (2015).
[168] In the case of the mass murderer Breivik, the violence was directed towards 70 young labour party members in 2011, a diverse group of Norwegian teenagers who he accused of treason against "their kind". In 2019, Manshaus murdered his adopted stepsister while she was sleeping and attempted a gun attack in a Mosque, but he was subdued before killing anyone. See Fangen, Katrine, and Maria Reite Nilsen. "Variations Within the Norwegian Far Right: From Neo-Nazism to Anti-Islamism". *Journal of Political Ideologies* 26, no. 3 (2021): 278–97.
[169] Høy-Petersen, Nina. "Civility and Rejection: The Contextuality of Cosmopolitan and Racist Behaviours". *Sociology (Oxford)* 55, no. 6 (2021): 1191–1210.

image of virtuousness; positive attributes that disguise an affective collective subconscious marked by xenophobia and racism that occasionally erupts with serious violence.[170]

This Norwegian version of white identity, though distinct, does not, of course, operate in total seclusion. Since my focus here is the Norwegian titanium industry, which has had ties to both the US and Germany since the 1920s, it will become evident throughout this thesis that notions around chromatic whiteness, titanium dioxide and personal whiteness have travelled between these locations. I do however find it important to offer some historical and sociocultural contextualisation for my primary research sites. Given that I also engage with found and mass-circulated images, these belong to a popular image culture that is, if not global, at least Western, and thus not only confined to the nation-state of Norway or the Nordic region.

Closed pit

June 2022, Southwestern Norway: The quarry appears as a grey gash in the ground. Its scale is difficult to grasp, even when facing it – appearing at once small and enormous. Excavators and earth-moving machinery down in the deep move around like slow ants. This great wound, which I am told is two kilometres long, has provided "neutral" and "hygienic" whiteness for over 60 years. The open pit mine is expected to supply the raw material of ilmenite for an estimated 50 more years before the miners must go underground. A young chemist, the type of person who genuinely loves her job, takes us on a tour of the facilities. She proclaims that ilmenite reserves in Norway are expected to hold enough titanium for 200-300 years of extraction. Her estimate seems a rough figure. Even for competent scientists, planning beyond one's lifespan can be an abstract mental exercise.

I ask if the company predicts that the demand will remain the same in the coming years. She responds that the global titanium dioxide market is expected to expand at an annual rate of 6 per cent due to increased demands from new mineral and solar-based industries. The chemist goes on to explain how the company strives to make its operations more circular. Wind turbines enclose the pit, and we are told they power Google's search engines – they are painted titanium white. I spend some time filming the pit and the giant, rocky steps that descend into its middle. I ask if I am allowed to venture down to the bottom, and the answer is no, even though activities in the mine have been paused for maintenance on the day of our visit and it is eerily silent – no blasts, no blunt metallic sounds, just the sound of the persistent North Sea wind. I am unaware that it will be the first and last time I am allowed to visit the mine.

[170] Gunaratnam explains how the "physic machinery" of white identity is always marked by doubleness: "It must go through all sorts of manoeuvring to wriggle out of self-recognition and therefore accountability" in Blight, eds.,*The Image of Whiteness*, 166.

Chapter 2:

Sad clown Angelina

Photography brought the stars down to earth, then posed in the guise of Hitler and Hollywood's charmers.
– Walter Benjamin as formulated by Esther Leslie, *Synthetic Worlds: Nature, Art and the Chemical Industry*, 2005.

They think we can't see behind the makeup.
– Lutz Bacher, *Open the Kimono*, 2018.

Flashback failure

Lit up by a flash, titanium dioxide makes an appearance on the face of white Hollywood actress Angelina Jolie, captured in a photo as she poses for the camera on the red carpet. In the moment of a so-called *photo flashback makeup malfunction*[171] – a phenomenon caused by the flash of a camera and only perceptible in images – titanium dioxide reflects light as a nanosized component in translucent cosmetic powder, when it should have remained invisible. This powder, known as "setting" or "fixing" powder, is applied to prevent makeup from bleeding or smudging. Appearing as smears of dense white on Jolie's jawline, chin and forehead, the material extracted from a Norwegian titanium mine makes itself known to us through a mistake. The pigment is also noticeable on Jolie's collarbones and shoulders in a layer of less dense, transparent white. The actress' eyes are turned away, her pupils disappearing into the white sclera. Overall, the scenario is comic, but even more so, uncanny. The camera intrudes, and it evokes the feeling that we are intruding, too, as onlookers. Jolie's body language appears assured, yet the American actress is unaware of the phenomena to which she is subjected. We can see how the face of the movie star – her most valuable asset – does not perform as expected.

In an image of Nicole Kidman that documents another flashback malfunction incident, we observe white residue across the actress' fair features, concentrated under her eyes. Kidman is holding an index finger in front of her lips, as if making a "shushing" sound. Her version of a gesture used to demand or request silence is coy, as if she is urging someone to keep a little secret. Yet, Kidman herself is not aware of the secret that is revealed in the moment of the photograph's making:

[171] See Wong, M. "Why Makeup Flashback Happens and How to Avoid It". *Lab Muffin Beauty Science*, 2016; A Makeup Scientist. "Avoiding Photo Flashback". *A Makeup Scientist* (blog), 2017; L'Oréal Paris. "How To Prevent Makeup Flashback". L'Oréal Paris Beauty Magazine, 2019.

the white powder on her skin, her face – usually so skilfully acting, her career marked above all by *controlled presence* – did not perform as anticipated.

Figure 13 Angelina Jolie/photo flashback failure. Still 1 from *Chemical Wedding* (2022–2024), 4K video, colour, sound, 05:20 min.

The photographs of Jolie and Kidman have the particular image texture and crispness of a low-resolution JPEG that has been sharpened. Extensively shared and reproduced, the digital photographs of the star's makeup failures, produced by a paparazzi or a celebrity photographer, are what Steyerl would refer to as "poor images".[172] The movement and speed of the circulation of the flashback images are relevant, yet it is how the material performs in the photographic moment that is of primary concern to me in this chapter. Through the material's malfunction, we are presented with moments when not only the normative white world of Hollywood, but also the visual regime of titanium dioxide, has been rendered *strange.*[173]

Clown white

Sarah Bernhardt's Pierrot was photographed in black and white by Nadar in 1883. The JPEG I have collected is grainy; it is a digital reproduction of a silver gelatin print (see Figure 15). The clown's eyes are directed towards the camera. Her look is confrontational, intermixed with melancholia. The stark lighting and high contrasts in the image, caused by a poor scan or degraded low-resolution file

[172] Steyerl, "In Defense of the Poor Image", 2009.
[173] An example of a strategy for "rendering whiteness strange" that has influenced my approach in this project is one that Yancy describes: an artwork where the text has been removed from a 1930s advert featuring a white woman and a product. This alteration causes the woman to appear as though she is gazing at herself, rather than the product, as if for the first time. As a result, Yancy argues, "the normative white world has been rendered strange." See Yancy in Blight, *Image of Whiteness*, 196-198. Dyer was the first to refer to the tactic or task of "making whiteness strange," see Dyer, *White*, 13.

(I have seen versions of the image with a more balanced exposure), nearly blacks out Pierrot's eyes. The light hue of her irises is still noticeable.

The stock character Pierrot has taken on various meanings in different epochs,[174] though the clown's tragic element and unbridled desires have remained consistent features. The clown's silence is also a key element of their character. Pierrot expresses themselves in a space beyond language, where words are either unavailable or have failed, and the figure has been described as operating through a poetics of "productive failure".[175] The Bernhardt image was taken on the occasion of the premiere of the play *Pierrot Assassin*, in which the character of Pierrot took a macabre turn and, for the first time, was impersonated by a woman. "[The performance] disturbed profoundly the nervous system of her public",[176] the symbolist poet Jean Lorrain wrote of Bernhardt's Pierrot. In addition to a succession of backstage affairs, one of Bernhardt's many talents was simulating blindness by rolling her eyes into her head, showing only their whites, for up to half an hour.[177]

Figure 14 Nicole Kidman/photo flashback failure. Still 2 from *Chemical Wedding* (2022–2024), 4K video, colour, sound, 05:20 min.

Later, modernists would approach the figure of Pierrot as an alienated observer of modernity, often associated with the night and the moon. If Pierrot had become the sad white face of the 20th century, this face was made possible by the white substance. After its introduction onto the global market,

[174] Although the exact origins are unclear, the stock character Pierrot originated in the Italian *commedia dell'arte* in the late 16th century and became distinctive after being adapted by French playwright Molière. See Storey, Robert F. *Pierrot: A Critical History of a Mask*. Princeton University Press, 1978.
[175] Beré, Marcelo. "Misfitness: The Hermeneutics of Failure and the Poetics of the Clown - Heidegger and Clowns". *Revista Brasileira de Estudos Da Presença* 10, no. 1 (2020).
[176] Labarge, Emily. "Pierrot Assassin". Seventeen Gallery, 2020.
[177] Labarge, "Pierrot Assassin", 2020.

dense titanium dioxide pigments quickly became the preferred ingredient in *clown white.* Bernhardt's killer Pierrot is, however, a pre-titanium era clown. I propose that her clown nonetheless casts some premonitory shadows – in many ways, Bernhardt was ahead of her time – towards later iterations of the stock character, which today circulate on TikTok. I will return to this point later in the chapter.

The image of Bernhardt's Pierrot operates differently to the photo flashback failure images within the visual regime of titanium dioxide. The clown's face is the only *actual* chromatic white face that we encounter.[178] In the case of Pierrot, I speculate that otherwise optically unconscious imaginaries, fantasies and ambivalences related to chromatic whiteness and the white face become explicit rather than implicit, and these are made manifest through affects such as the alienating and the uncanny, with an underlying sense of horror.

Figure 15 Sarah Bernhardt's Pierrot. Still 3 from *Chemical Wedding* (2022–2024), 4K video, colour, sound, 05:20 min.

Demasking

This chapter answers the research sub-question: *how might image-making processes be rethought using theoretical and artistic research on titanium dioxide, with a focus on how the pigment materially constructs white identity in photographic images?* In rethinking image-making processes in relation to the white substance, one strand of my research and practice has focused on images of whiteness, and specifically on how imaginaries and mythologies surrounding titanium whiteness intersect with images and their inherent technological biases towards both chromatic whiteness and white identity.

[178] Badiou, *Black*, 2017.

In short, I am concerned with how the white material constructs white identity, particularly the white face, in photographic moments.

I consider the aforementioned images – the flashback images of Angelina Jolie and Nicole Kidman and that of Pierrot – as images of whiteness made possible by the mining site in southwestern Norway. The images present us with examples of photographic moments when the white substance contributes to the material construction of white faces, but also when it fails to do so inconspicuously. I thus view these images as representing gaps that invite us to "telescope out" – to use Vishmidt's term[179] – from the structure of the visual regime of titanium dioxide, which typically operates smoothly and unnoticed. By rendering both the face, the image and the substance *strange*, these gaps may, in turn, encourage us to find ways of moving beyond it.

The first part of the chapter examines the methods I developed that initially directed my focus to the flashback failure images. I then discuss how these images can be approached as failed images of whiteness. The second part of the chapter addresses images of Pierrot, which I argue may reveal latent images of the Western optical unconscious in relation to chromatic whiteness and the white face. I then explore ideas from political and cultural theorist Mark Fisher on the weird and the eerie (2016) to discuss how I have approached these effects and affects as they surface in images of whiteness. The final part of the chapter considers Walter Benjamin's notion of the "optical unconscious", which I apply and adapt to the visual regime of the white material.

Critical discourse around 19th-century "black face" theatre[180] is well established, though considerably less literature focuses on the white face of the clown, or Pierrot in particular – a character who gained popularity in the same era. I acknowledge that a critical engagement with the white face and images of whiteness more broadly runs the risk of recentring whiteness. I also believe such a strategy can contribute to making this often "unseen" face remarked.[181] Moreover, I want to avoid presenting white as only "white" when set against the non-white. As Dyer has pointed out, whiteness reproduces itself continually, irrespective of such a binary.[182] I have attempted to generate methods that locate and seek moments when the often unseen and taken-for-granted whiteness of both titanium dioxide and the white face make themselves noticeable through moments of failure and "strangeness". I apply such strategies in studying a visual regime of chromatic whiteness to locate moments when this material and phenomenon intersect with the production of white identity. I try not to conflate the two, but instead I seek to be precise in how they intersect while acknowledging

[179] Vishmidt, "Basement Jazz", 2022.
[180] Minstrelsy is a form of theatre developed in the US in the early 19th century. The shows were performed by mostly white actors wearing "blackface" makeup to comically portray racial stereotypes of African Americans.
[181] Yancy refers to white identity as an "unseeing fiction" and urges us to "demask" it: "The concept of whiteness as an unseeing fiction points to whiteness as a site of white opacity and as a site of prevarication. On this score, whiteness is both a conscious and unconscious site of obfuscation. […]. Hence, what we need to do is to de-mask whiteness, to un-conceal the ways in which it is morphologically a lie and the ways in which whites lie to themselves. An aspect of this lie is that whiteness is, as it were, born ex nihilo". See Yancy in Blight, *The Image of Whiteness*, 192-193.
[182] Dyer, *White*, 13.

that this is complex territory, as white identity has often symbolically established itself through the association with common Western conceptualisations of chromatic whiteness.

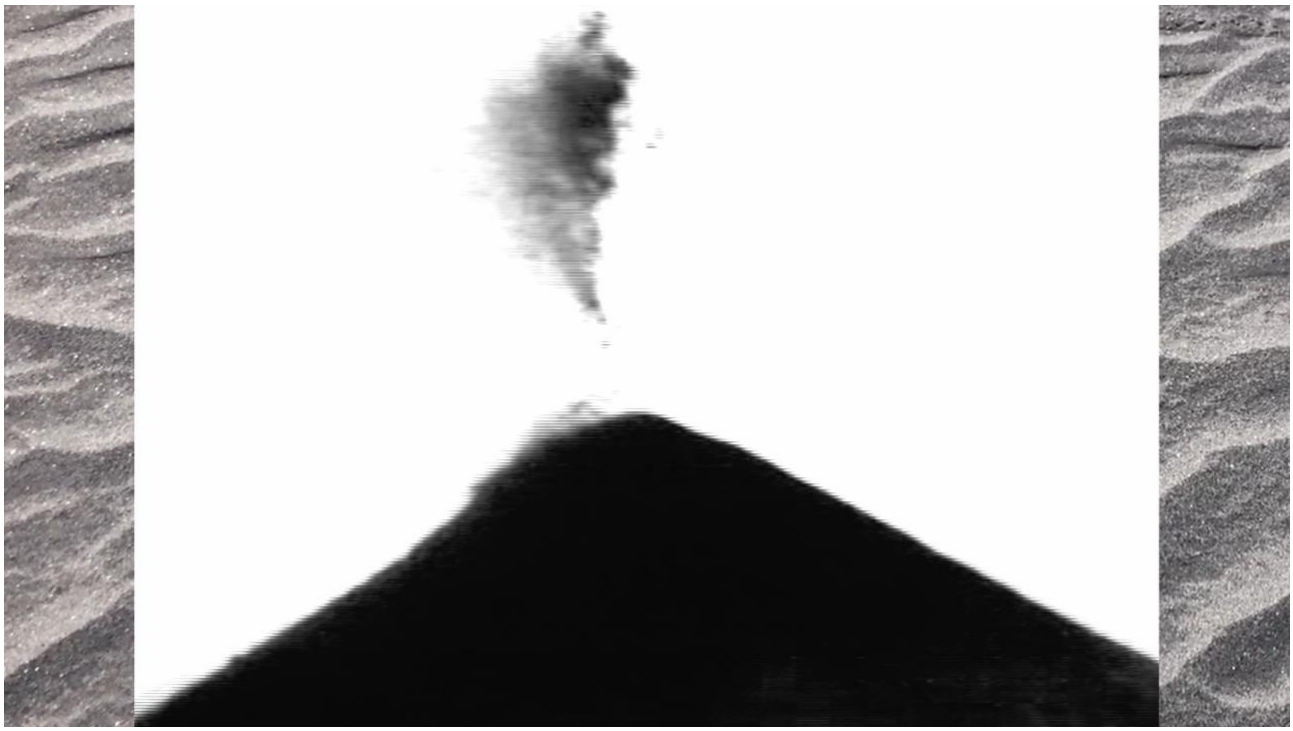

Figure 16 Still 4 from *Chemical Wedding* (2022–2024), 4K video, colour, sound, 05:20 min.

Sludging

My interest in the three found images – the photo flashbacks and the Pierrot images – originates in a piece that I produced as part of this research project titled *Chemical Wedding* (2022-2024). In various iterations of this video, I created compilations of found images and historical film clips sourced from an image library I compiled during my research by using a technique I refer to as sludging. In my adaptation, sludging refers to moving image editing strategies that adopt an updated approach to the modernist technique of montage,[183] and which involve bringing the images and seemingly disparate content and visuals together while acknowledging that the image is always part of broader material, extractive, social and digital networks. The etymology of "sludge" is uncertain, though it may derive from the mid-17th century word "slush", which, as we saw in the Introduction, has Norwegian or Scandinavian origins (*sludd*), and refers to melting or dirtied snow. "Sludge" also denotes the waste produced from mining.

[183] Mark Fisher refers to montage as a typical modernist strategy, which presupposes the unconscious to function as montage-machines. See Fisher, Mark. *The Weird and The Eerie*. London: Repeater Books, 2016, 11. Montage appeared as a political, aesthetic strategy in Third Cinema, famously in the final section *of Hour of the Furnaces: Part 1* (1968), in which a rapid succession of images depicting moments of US imperialism and consumerism are brought together in a montage, before concluding with a still image (paused for several minutes) of Che Guevara's face after his assassination. See Buchsbaum, Jonathan, and Mariano Mestman. "Images of the Itinerary of the Group Cine Liberación and 'Third Cinema'". *Framework* 62, no. 1 (2021): 107–33.

I approach the images and materials in *Chemical Wedding* as speaking to the impact of the white material on various visual registers throughout the 20th and 21st centuries. The video lingers on the flashback images of Jolie and Kidman, and on images and film excerpts of the stock character Pierrot. The clown that most features in the piece is Sarah Bernhard's Pierrot. However, I also include Jean-Louis Barrault's Pierrot from *Les Enfants du Paradis* (1944/1945), and in particular a section from a scene where the clown, on stage, silently stares into the camera before declaring, "I saw everything!". I also include a selection of contemporary TikTok Pierrots.

Other images included in the video, presented in rapid succession, depict white cinematic interiors (stills from the white kitchen scene in the 1981 film *Deafman Glance*, featuring actress Sheryl Sutton; the white lodge and black lodge in David Lynch's 1990–1991 *Twin Peaks*), Kazimir Malevich's grave[184], examples of white colonial and modernist architecture (Le Corbusier's Plan Obus; "Lina's Bedroom" by Adolf Loos), the Hotel Atlantic in Hamburg[185], stills from white food ASMR Youtube-videos,[186] titanium dioxide adverts and specimens of the polluted waters near the titanium mine. Some of these images relate directly to the material and the extractive history of the pigment, while others speak to the material construction of the white face or depict seminal chromatic white spaces, or "white imaginaries" from Western films and architecture produced in parallel with the emergence of the visual regime of titanium dioxide. In creating the sections of rapidly shifting images,

[184] Malevich painted the first-ever white semi-monochrome, *Suprematist Composition: White on White*, in 1918; the same year titanium dioxide was first made available on the global market. As part of the Suprematist movement, Malevich was searching for the point at which abstract art could be reduced to its most fundamental form, what he called art's "zero degree". Malevich found this point by pushing abstraction to an unprecedented degree in paintings such as *White on White*. Malevich attained his goal by removing colour and the illusion of depth and volume, keeping only two geometric shapes: a white square within a square. The artist's concerns were informed by his fascination with aerial technology and aerial photography, and he wanted *White on White* to create a sense of floating and transcendence. After having completed the painting, Malevich declared: "I have overcome the lining of the coloured sky… Swim in the white free abyss, infinity is before you." Perhaps against Malevich intentions, at its alleged zero degree, the painting had the effect of drawing attention to its material surface, its texture and its brushstrokes. When Malevich died in Leningrad in 1935, his friends and disciples buried his ashes in a grave designed by fellow artist and friend Nikolai Suetin. The gravestone consisted of a black square within a white cube. In the image included in *Chemical Wedding* (2022-2024), we see the white shapes of the memorial surrounded by sparse trees and grass, spiky but organic-looking textures of black and dark grey tones. The white cube grave appears nearly luminescent against the darkened vegetation. Malevich's friends had not fulfilled the artist's stated wish to be laid to rest below one of his all-white, skyscraper-like plaster maquettes referred to as "architekton", equipped with a telescope through which visitors could gaze into space at Jupiter. One could say that it was Malevich's last effort to move upwards into the above and beyond through form and the perceived transcendence of chromatic white. Ultimately, he was once again pulled back to the ground. The memorial with the white cube containing the black square was destroyed during World War II, and Malvich's gravesite was largely forgotten. What remains is its image. See Malevich, Kazimir. *Suprematist Composition: White on White*. 1918. MoMA

[185] In the video, I use a colour image I found online, presumably originally analogue but now digitised, of the Hotel Atlantic in Hamburg, which has a signature titanium white façade. The titanum pigment company has utilised the image to promote its product. The grand hotel was built in 1909 to accommodate privileged customers who had or were about to cross the Atlantic. The hotel was extensively used as a location in the James Bond film *Tomorrow Never Dies* (1997). In 2010, the hotel tycoon and billionaire owner of Hotel Atlantic was served a meal in one of the hotel's suites and choked to death on a piece of steak. See Kirschbaum, Erik. "German Tycoon Bock Chokes to Death at Luxury Hotel". *Reuters*, 2010.

[186] The image, a still from a YouTube white food ASMR video, depicts a girl with an array of pure white confectionary placed in front of her as she takes a bite from a white candy stick. Titanium dioxide is the most widely used white food additive in the world. The acronym ASMR, which stands for autonomous sensory meridian response, refers to an internet phenomenon as well as how certain images and sounds can induce a physical sensation in people. Food ASMR is often colour-themed. The feeling is often described as a tingling sensation that starts in the scalp and then moves through the back of the neck to the spine. In some, it triggers a feeling of deep relaxation, while others find it uncomfortable. In other words, ASMR can make one sense an image *psychically*. See McGeoch, Paul D., and Romke Rouw. "How Everyday Sounds Can Trigger Strong Emotions: ASMR, Misophonia and the Feeling of Wellbeing". *BioEssays* 42, no. 12 (2020)

I sought to address these materials' initially seductive but eventually unsettling, unhomely qualities and their underlying sense of horror.

In *Chemical Wedding,* I combine the sludging of still images with footage from an area for waste disposal outside the Norwegian titanium mine. Leading our gaze downwards, this part of the video depicts a grey, silver-like desert, where sand waste generated by titanium production is seen dispersing into air and water. In combining these elements, I wanted to question what takes place between the space of pre-verbal materiality – of the industrial and extracted substance of titanium dioxide – and the fully formed photographic image. The flickering still images are superimposed onto the grey desert footage, and they are visible on screen for only a few seconds at a time, and eventually, for only a fraction of a second, result in a fused and blended afterimage. I found this effect generative in questioning what affects and subconscious, or optically unconscious, forces are at play across the imagery. By "speeding" up the still images and pushing them closer to a moving image, I was interested in the way the work could produce a *compacting* effect, with the results that these seemingly disparate images could become recognisable as a phenomenon that has ideological significance and power. I have approached this compacting effect as both shortening and prolonging the images' temporality, which I considered as a strategy that could bring attention to perception in its forming.[187]

While creating *Chemical Wedding* and developing my methods of sludging, I looked to a moving image genre prevalent on social media platforms like TikTok, known as "sludge content".[188] A Gen Z take on surrealist strategies, sludge content videos consist of two or more unrelated videos playing simultaneously on the same screen. Often, these videos feature a combination of materials that have undergone some kind of process – cut, sliced, or sprayed – and they can often be a combination of ASMR or industrial footage, conjoined with talking head interviews, POV videos of various activities, gaming screen recordings and so on. Sludge is often reported as a strategy used to increase digital creators' algorithmic "reach", as viewers tend to spend more time on videos that "overstimulate" them with seemingly disparate content presented together, rather than on videos where meaning is easily discerned. Sludge content is frequently portrayed by mainstream media as an "unhealthy" phenomenon. In contrast, I suggest that sludge is not a "degradation" of our ability to engage with images, but rather a sophistication. In sludge, images are perceived in a way akin to machine processing, where the viewer scans for the "shape" and "feel" of the content, rather than focusing solely on its easily grasped, literal meaning.[189]

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[187] Manning, *The Minor Gesture*, 2016.

[188] Ede-Osifo, Uwa. "'Sludge Content' Is the Latest Form of Escapism on TikTok". *NBC News*, 26 April 2023; Mattson, Anna. 'Sludge Videos Are Taking Over TikTok — And People's Mind'. *Scientific American*, 10 January 2024; Barnes, Caspar. "Will 'Sludge' Content Stick around or Change Shape?" *Digital Frontier*, 13 June 2024.

[189] Writer Caroline Busta on technical images in the age of "hallucinating" content: "What if, in a time of infinity-content, a meta reading of the shape and feel of content has become a survival skill? The ability to intuit a viable meaning via surface-level qualities – ones that are neither text nor image but a secret third thing – is now essential for negotiating our sprawling information space. Perhaps we're tapping into a more primal human intelligence." Busta, Caroline. 'Hallucinating Sense in the Era of Infinity-Content'. *Document Journal*, 29 May 2024.

In my approach to sludging, I experimented with combining images and videos that are played simultaneously on the screen. As with sludge, the conceptual relationships between the images in *Chemical Wedding* may be hard to discern without any accompanying text to contextualise the work. With this piece, I specifically wanted to test the viewer's responses to the materials without relying too heavily on instructions for how to interpret it – instead, I wanted the viewer to focus on the shape and feel of the imagery. However, visuals that initially seem unrelated may, upon closer examination, reveal potential connections. As a researcher, I am aware of and interested in exploring these connections. In this sense, *Chemical Wedding* does not rely on being entirely nonsensical; rather, in addition to "measuring" the viewer's affective reactions to the content, I intended the piece to present the viewer with the challenge of making connections. These experiments led me to define sludging as a method within my practice.

Figure 17 Leslie Thornton, *Photography Is Easy - Version 2* (2010). Video, colour, sound, 6min
Image: UbuWeb.

While making *Chemical Wedding*, I was also inspired by the rhythm in *Photography is Easy* (2006), a video by Leslie Thornton, set in an orange desert and interspersed with a montage of still images from various locations in the world, which investigates the boundaries between still and moving images. I also looked at *Novel City* (2008), another moving image work by Thornton, which features a woman with a white-painted face in a piece that explores questions of the Other through what Thornton has termed an "Orientalist spectacle". According to the artist, *Novel City* is intended to evoke a "critical self-response, a simultaneous attraction and repulsion that provoke an instance of

cultural self-awareness".[190] In my attraction to and appropriation of mass-circulated images of iconic white femininity – particularly the uncanny versions of these alluring images, such as the photos of Kidman and Jolie – I also had Lutz Bacher's *Untitled (Diana)* (1997) in mind. *Untitled (Diana)* is a short video loop made with footage from the live broadcast of Princess Diana's funeral, depicting her coffin being carried by uniformed male soldiers into Westminster Abbey. During the clip, the camera angle shifts, causing the object of vision to stagger and slide in a strange manner – resulting in Diana's star power being caught between the tragically mundane and the transcendental.

Figure 18 Leslie Thornton, *Novel City* (2008). Video, colour, sound, 7min. Image: UbuWeb

In *Chemical Wedding,* I was interested in drawing on, but also contributing to, these works by juxtaposing footage of a desert-like landscape, sections of still images, images of iconic femininity and the white face, all the while exploring affects of attraction, allure, repulsion and the strange in the imagery. I also update these aforementioned strategies by approaching the sections with rapidly shifting images not as montage, but rather through the method of sludging.

In the final part of the chapter, I will return to discuss *Chemical Wedding*. In the following sections, I will focus on the images of Angelina, Nicole and Pierrot. Beyond their role in *Chemical Wedding*, these images contribute to the theoretical research underpinning the written thesis.

[190] See Thornton, Leslie. *Novel City*. 2008. UbuWeb Film & Video.

Figure 19 Still from Lutz Bacher, *Untitled (Diana)* (1997). Video loop. Image courtesy Raven Row, London/estate of Lutz Bacher and Galerie Buchholz.

Images of whiteness: Angelina and Nicole

If the image of Angelina Jolie has been made possible by an extraction site, it is also an image of whiteness. As proposed by Blight,[191] this term refers to images marked by or complicit in promoting a white way of seeing. In this context, "white" refers to the politics of white people and white cultural and political hegemony. Cultural theorist and sociologist Stuart Hall (1981) has referred to the "white eye" as "always [placed] outside the frame but seeing and positioning everything within it".[192] Such white ways of seeing are all made and not found, as Mirzoeff notes.[193] Blight, primarily concerned with the photographic image, understands the white gaze as speaking to a form of desire. According

[191] Blight, *Image of Whiteness*, 2019.
[192] Stuart Hall. "The Whites of Their Eyes: Racist Ideologies and the Media [1981]". In *Selected Writings on Race and Difference*. Duke University Press, 2021.
[193] Mirzoeff, *White Sight*, 4.

to Blight, the specific definition of "images of whiteness" is that these images work on two levels: there is the *picturing* of the white body in images in one way or another (or associated motifs that speak to white identity or politics), and then there is the *imagining* of whiteness, consciously or unconsciously, as something "neutral, supreme or desirable".[194] Blight suggests that images construct support for white hegemony when they encompass whiteness both as a form of imagination – around white identity and white politics, in its invention of the white body, which is, of course, lighter in tone than many other bodies but never *literally* white – and as a literal picture, as the body imaged.[195] Against such images of whiteness, Yancy suggests developing strategies that mark the white body, making it appear strange and particular, as processed through Social critic James Baldwin's "disagreeable mirror for whites" – a site of uncomfortable truth-telling.[196]

The first photographic images that Europeans produced were images of stars in the sky, Benjamin declares. He writes that photography first brought the stars down to earth, and then posed in the guise of Hitler and Hollywood's charmers. Photographic equality, the possibility and right of all to be represented, became instead the over-representation of charismatic types.[197] Although not inherent to its technology, photography is and has, from early colonial photography to present-day image-making, played an integral role in maintaining a social hegemony, not only of charismatic types – both of the entertainment and fascist kind – but also a social hegemony of whiteness. Thus, since the inception of photography, racialisation has been built into the medium, as photographic dynamic range and tonal values were initially developed to capture the hues of white-skinned people.[198] Although the bias towards white skin in photographic technology has since been corrected, this aspect of the history of image-making still haunts the medium, and it speaks to the multiple biases of legibility that one can find constituting a photograph – not only of a cultural kind, but also in its very technology and materials.

Dyer introduces chromatic whiteness in analysing how photography constructs the white body. He argues that image-making technology emerged through a "culture of light", an image culture founded on two notions: that reality can be represented on a ground of chromatic white, and that there is a special affinity between "white" skin tones and light emanating from above. Here, a connection is made between the white of the image surface (whitened with titanium dioxide) and the white of skin tones, or, in other words, between chromatic white materiality and an image of white

[194] Blight, *Image of Whiteness*, 24.
[195] Blight, *Image of Whiteness*, 21-24.
[196] Yancy and Baldwin in Blight, *Image of Whiteness*, 196-198.
[197] Benjamin, Walter. *The Work of Art in the Age of Mechanical Reproduction*. Penguin, 2008; Benjamin in Leslie, *Synthetic Worlds,* 2005.
[198] Shirley cards are reference photos used by Kodak technicians to balance exposure, colours and hues. The card's name is said to come from the white woman pictured in the first version, a Kodak employee named Shirley. There is an example of the Shirley card in *Chemical Wedding* (2022-2024). Rather than complaints about photographic film poorly documenting other-than-white skin tones, chocolate and coffee companies eventually made Kodak adjust their technologies and the colour-correcting Shirley card to allow for a wider spectrum of deep brown tones to be captured on film. See Roth, Lorna. "Looking at Shirley, the Ultimate Norm: Colour Balance, Image Technologies, and Cognitive Equity." *Canadian Journal of Communication*, vol. 34, no. 1, 2009, 111–36.

identity. However, Dyer is primarily concerned with the construction of white identity in images and films, and the consequences of a group of people associating themselves with a colour that thrives on invisibility and various other culturally established meanings,[199] rather than with how chromatic white materiality shapes such a construction. Dyer states: "I [do not] consider colour to be the prime cause of racial distinction and racism, but it is part of the way that racial identity is thought and felt about, and is of particular significance in a culture so bound up with the visual and the visible".[200]

A substance makes the face

In my research, I am not primarily concerned with images of whiteness in a broad sense, such as those understood as representations of white people promoting a politics of white identity. Rather, I am interested in the moments when the white material, in moments held together by photography as a set of conditions (shaped by desire, speculation and technology) produces imaginaries that are part of a visual regime of chromatic whiteness. The substance of titanium dioxide, as I have argued so far, has underpinned a modern obsession with all things white, and it functions, in some manifestations, as the material construction of white racialisation. In this chapter, I propose that a third component participates in the constellation outlined by Blight (while also following Dyer), wherein the white substance – the white chemical resource – manifests in the photographic moment to support the white body and face, and thus white identity, by linking material forms and white infrastructures to a cultural unconscious.[201]

A notable example of when the chemical process behind titanium whiteness is co-joined with an image of whiteness (as in white identity) can be found in the 30-minute-long Norwegian informational film advert from 1954 titled *Eventyret Fra Sort Til Hvitt* (The Fairytale of Black to White).[202] I came across this advert in the Norwegian titanium company's business archive. In the film, we encounter a young, white, blonde housewife in a domestic setting. A disembodied male voice presents itself to the housewife as channelling both an "old god", a titan,[203] and also as the white objects in the woman's home. The voice declares that titanium dioxide is all-present in the woman's life. The housewife responds quizzically, and a back-and-forth between the housewife and the voice begins.

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[199] Dyer writes: "to apply the colour white to a group of people is to ascribe a visible property to a group that thrives also on invisibility". See Dyer, *White*, 42.
[200] Dyer, *White*, 42.
[201] Mirzoeff writes: "White infrastructure connects, distributes, enables, and stores the set of desires and fantasies that comprise what it is to make whiteness. They do so by connecting material forms to the cultural unconscious. This collective unconscious is the sedimented product of the assemblage of types and stereotypes from statues to cartoons and what Du Bois called "racial folklore". It is collective, not individual, and while it is sustained by imaginary relations, it has all too real effects." See Mirzoeff, *White Sight*, 11.
[202] *Eventyret Fra Sort Til Hvitt (Fairytale From Black to White),* directed by Robert Dahl/Titania, 1956.
[203] For an analysis of the name of the Norwegian-American pigment company, Kronos Worldwide Inc., and its associations with the Greek mythological figures Kronos (Cronus) and Chronos, see Chapter 3.

Figure 20 Still. *Eventyret Fra Sort Til Hvitt* (The Fairytale From Black to White), Robert Dahl/Titania, 1956.

The voice says: "*I am here, hiding in your delicate underwear, in your teapot, on your walls, in your calendar, in your crystal bowl and in the white shoe polish that you apply to your favourite pumps*." The housewife makes her way around the living room, seemingly confused, while the camera follows her movements. The voice chases the young woman into the shower, where she attempts to hide, in coy panic, behind the white shower curtains with a piece of white soap in her hand. The voice, still present, confirms that she cannot escape, no matter how hard she tries, upon which the housewife surrenders to the voice's message, accepting the white material's presence everywhere, with a renewed smile. The scene reminds me of my experience in my all-white bedroom, as I described in the Introduction of this thesis.

What begins as an initially silly scenario gradually takes on an uncanny, unintended Hitchcockian undertone.[204] The scene acts as an introduction to an instructional montage comprising of footage from the ilmenite quarry and the pigment processing plant, thus combining an image of whiteness featuring a housewife with the extractive refinement process that produces white pigment. The weirdness and barely-under-the-surface horror qualities of the film advert offered me clues on how to foreground the unsettling and strange aspects of the visual regime of white material, which I later applied in my practice.

[204] Halland and Johnslien, "With-On White", 2023.

Figure 21 Still. *Eventyret Fra Sort Til Hvitt (The Fairytale From Black to White)*, Robert Dahl/Titania, 1956.

Before the voice pursues the housewife into the shower, the woman is filmed standing in front of a mirror, her back to the camera, and her face is visible as a reflection. According to literature scholar Kristin Ross, the 1950s advert trope featuring a housewife pictured as she observes herself on a reflective surface is a moment of "female narcissistic self-satisfaction", in which possession and self-possession are intertwined. The women are "defined midway between the twin poles of domestic science and object fetishism".[205] This trope was prevalent in household promotional imagery at the time, when the motto in the advertising seemed to be "Let's win over the women, and the rest will follow",[206] as psychiatrist and political philosopher Frantz Fanon has noted.

However, in the case of the titanium pigment advert, the focus is not on a household product as associated with such a narcissistic self-image, but on a substance that provides chromatic whiteness. Moreover, this substance is not primarily promoted through the presentation of white objects and surfaces, but through the face of a white woman. A connection between the white face and the white substance is formed, albeit metaphorically. When the intruding voice, which represents the all-present modern chromatic whiteness, disturbs the housewife in her self-satisfaction, something more unsettling and potentially sinister is introduced into the scenario.

[205] Ross, *Fast Cars, Clean Bodies*, 1996, 85-86.
[206] Fanon in Ross, *Fast Cars, Clean Bodies*, 77.

I continue by examining three images of whiteness featuring Angelina Jolie, Nicole Kindman and Pierrot, where titanium dioxide appears not only metaphorically related to the face, but it is also applied directly onto the face.

Uncontrolled visibility

In the photo flashback image of Angelina Jolie, the white substance "contributes" to the photographic moment when it has been applied to the actress' waxlike skin as a cosmetic enhancement and material support for the photographic representation of a superstar who gained fame in large part due to her white beauty. Dyer reminds us that the history of makeup was for a long time a history of the whitening of the face.[207] And the whitest of the faces belongs to the "fair" lady. Dyer continues: "The various degrees of white skin, in which the fair lady is the whitest, the working men less white and so on. The instability of the criteria for white skin is what gives it strength."[208] The identification of women with whiteness and men as those in search of whiteness is, moreover, according to Dyer, central to the "construction of skin white people".[209] The gendering within the white imagination is present in several images in *Chemical Wedding*. The buildings of Plan Obus are shaped like the bodies of women – the local Algerian women – that is, those whom Corbusier wished to "whitewash"; Lina's bedroom is white; Shirley Sutton's haunting kitchen is all-white (of note here, Sutton is a black actress, equipped with a large kitchen knife, who eventually finds her way out of the oppressive white kitchen, albeit to face a potentially tragic ending).

Importantly, the purpose of the setting or fixing powder that the Hollywood actresses wear in the flashback images is not primarily to make the face explicitly whiter – as was the purpose of cosmetic powder for a long time in the history of makeup – but to control the appearance of the makeup they are wearing, including any products that are applied to imitate "white" skin tone – that is beige-pink foundation, powder and concealer. Kidman and Jolie represent a certain kind of unquestioned hegemonic white femininity in Hollywood, which peaked just around and after the turn of the millennium; the kind of actresses whose films I would consume as a young girl.[210] However, I suggest that the whiteness of their bodies is more inconspicuous than in earlier eras of Hollywood. In the flashback images, titanium dioxide contributes to the material construction of whiteness when it is combined with a body identified as white – specifically, the white, female body of a star– held together by the parameters of a photographic moment to create a molecularly assisted image of whiteness.

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[207] Dyer, *White*, 48.
[208] Dyer, *White*, 57.
[209] Dyer, *White*, 74.
[210] I remember Nicole Kidman from *Eyes Wide Shut* (1999), directed by Stanley Kubrick; *Dogville* (2003), directed by Lars von Trier; *Birth* (2004), directed by Jonathan Glazer, and *Moulin Rouge!* (2001), directed by Baz Luhrmann. I watched Angelina Jolie in *Girl, Interrupted* (1999), directed by James Mangold. One film featuring Jolie that I never actually watched, though its posters were everywhere, is *Lara Croft: Tomb Raider* (2001), directed by Simon West.

It is when the substance first *malfunctions*, I propose, that we are made aware of titanium dioxide and its role as a material support for a white appearance. What normally goes unnoticed becomes remarked. As Mirzoeff has pointed out, infrastructures function as intended when they are "de-noticed".[211] When infrastructures are disrupted, they can instigate, at best, comical situations, and at worst, infuriating ones. "So too have some white people been outraged to have their infrastructures become visible", Mirzoeff asserts.[212] As previously mentioned, in the images of Jolie and Kidman, it is as if the normative white world of Hollywood and the visual regime of titanium dioxide have been rendered weird.[213]

Another prevalent aspect in the visual regime of the white material is the desire for control, particularly self-control. This is evident in the case of Le Corbusier, who was captivated by the power of whitewashing our surroundings: when armed with white paint, you become not only the master of your home but also the *master of yourself*.[214] Chromatic white provides *inner cleanness*. Everything is *shown as it is*; however, this "as it is" requires thorough chromatic cleansing and cleaning beforehand, so essentially, it is about *controlled visibility*. However, in the flashback images, the process involving titanium dioxide, intended to secure the stars' appearance, malfunctions.

The technology involved also fails. "Controlled visibility", as Dyer refers to it,[215] or to control appearance through light, is one of the primary principles of lighting in movies and photography. The most established style of movie lighting emerged from lighting practices centred around white women (often back-lit, female actresses in early and mid-20th century films were given soft facial light and blonde, white halos; men were lit more harshly). In the case of the flashback images, which belong to the genre of red-carpet paparazzi photography rather than the movies, although they contribute to the same image industry, visibility is out of control. Both the camera (the flash) and the whitening agent/opacifier malfunction, and scandal (comedy) ensues. The flashback images show how whiteness (skin) so often goes unnoticed, by rendering the whiteness of the stars and the apparatus that normally smoothly assists them (titanium dioxide and the camera) strange.

I am interested in the collective unconscious that surfaces, the *unthought-known*, through and with these "failing" images, which I propose that the figure of Pierrot can help us access.

Transitional face: Greta Garbo

Before I continue with Pierrot, I would like to pause on what I will refer to as a *transitional face* between the Hollywood actresses Angelina Jolie and Nicole Kidman and the clown's white face: the face of actress Greta Garbo. Philosopher and literary theorist Roland Barthes likens the face of

[211] Mirzoeff, *White Sight*, 11.
[212] Mirzoeff, *White Sight*, 11.
[213] Phrase adapted from Yancy in Blight, *The Image of Whiteness*, 196-198.
[214] See Le Corbusier. *The Decorative Art of Today*. Paris : Editions Crès, 1925. Translation of: L'Art décoratif d'aujourd'hui. London : Architectural Press, 1925, 188.
[215] Dyer, *White*, 86.

Garbo, in full makeup, to a Platonic idea.[216] In *Mythologies* (1957), Barthes writes:

> Garbo offered to one's gaze a sort of Platonic Idea of the human creature, which explains why her face is almost sexually undefined, without leaving one in doubt. It is true that this film (in which Queen Christina is by turns a woman and a young cavalier) lends itself to this lack of differentiation; but Garbo does not perform in it any feat of transvestism; she is always herself, and carries without pretence, under her crown or her wide-brimmed hats the same snowy solitary face. The name given to her, the Divine, probably aimed to convey less a superlative state of beauty than the essence of her corporeal person, descended from a heaven where all things are formed and perfected in the clearest.[217]

It remains unconfirmed whether Garbo's cosmetics contained titanium dioxide; however, her makeup was evidently white and powdery in appearance, with a "snowlike thickness" and a texture resembling "plaster".[218] According to Barthes, her makeup was protected not by its features but by the surface of its colour.[219] One might say that Garbo's face exhibited the properties of titanium pigments – dense, "pure" whiteness.

In Barthes's analysis of Garbo's face, several elements prevalent in the Western imaginary of chromatic whiteness are replicated: the association of whiteness with the sky, with ethereality, beauty and fragility, with ideas rather than "dirty" materiality, and with the godly. Barthes then suggests that the actress with a white mask stands in for a Platonic idea of a human being, thus maintaining the notion of the white woman as the essential human. Interestingly, Barthes also introduces the idea of the ungendered white face as an "instability" that allows the face to represent a perceived (white) human universality. Barthes proceeds: "In spite of its extreme beauty, this face, not drawn but sculpted in something smooth and fragile, that is, at once perfect and ephemeral, comes to resemble the flour-white complexion of Charlie Chaplin."[220] That is to say, Garbo's face, with all its regality, also displayed the characteristics of a clown.

When the white face is adopted – or rather, worn – by a clown like Pierrot, it may, I suggest, subvert the imagined universality of the white face from within.

[216] Ideas or abstract forms that exist in a non-physical realm, according to Plato.
[217] Barthes, Roland. "The Face of Garbo". In *Mythologies*, Vol. Mythologies London: Vintage, 1957/1993; pp. 56–7, 1993.
[218] Barthes. "The Face of Garbo", 1993.
[219] Barthes. "The Face of Garbo", 1993.
[220] Barthes. "The Face of Garbo", 1993.

Figure 22 TikTok Pierrot. Still 5 from *Chemical Wedding* (2022–2024), 4K video, colour, sound, 05:20 min.

The whitest white face

There is a face whiter than that of the fair lady – and Angelina, Nicole and Greta. It is the face of Pierrot. One might say that this sad clown's face is the equivalent to the whitest white pigment. The face of the clown is the only actual white face we ever encounter, as Badiou has noted.[221] With Pierrot, the white face is no longer implicit but explicit, suspended between the comedic, the melancholic, the uncanny, the alienated and even the horrifying. In Pierrot's case, the white face also presents us with an ambiguous gender. Today, Pierrot appears in contemporary iterations on TikTok, often circulated under the hashtag #clowncore.

The character is reportedly embraced by a new generation for, amongst other aspects, its perceived nonbinary or gender-fluid qualities.[222] I would argue that the primary characteristic of Pierrot as a stock character is perhaps rather the *absence* of gender as a defining trait – an interpretation introduced by actress Sarah Bernhardt over a century earlier. The clowncore content shared on social media platforms often feature contemporary Pierrot clowns – the creators themselves dressed in clown attire and makeup, cosplay style – but also repurposed historical footage.[223] Under the posted content, users will often comment: "gender" or "this is so gender". In accordance with Gen Z humour, these remarks are absurdly obvious in their reference to identity

[221] Badiou, *Black,* 102.
[222] Rex, Hatti. "Why TikTokers Are Turning to the Circus for Fashion Inspo". *Dazed*, 11 December 2020; Poggi, Maria Santa. "Clowncore Is the Larger-than-Life Fashion Trend Taking over This Season". *I-D*, 17 March 2022; Bateman, Kristen. 'Inside TikTok's Clowncore, The High-Fashion Aesthetic You Shouldn't Laugh Off'. *Refinery 29*, 4 February 2022.
[223] Of popularity is the Russian version of Pierrot (referred to as Piero), a young, tender version of the clown from a 1975 Soviet musical television film, *The Adventures of Buratino*. Roman Stolkarts is the young actor impersonating the clown.

politics, but they are also somewhat inscrutable. I would like to speculate that the recent interest in Pierrot – in the wake of the 2020 Black Lives Matter movement and the growing awareness around racial representation and the conditions and legacies of white supremacy – may also be due to a recognition of the "markedness" of the white face, as opposed to its historically perceived neutrality.

The clown's productive failure

Like the photo flashback images, the figure of Pierrot can also be understood through the idea that a person, object or infrastructure becomes noticeable when it fails to perform as expected. This is, initially, an idea from philosopher Martin Heidegger,[224] and one that professional clown and performance scholar Marcelo Beré draws upon when he suggests that clowns operate within a poetics of *misfitness* and "productive failure". By revealing aspects of the "referential context of the world" – a Heideggerian term that refers to the everyday, habitual practices that make up our lives – clowns, as Beré proposes, become "disclosing agents through the embodiment of misfitness".[225] The clown works with failure – in its way of coping with the world, with words, with objects, in its interpretation of situations and in its engagement with social and cultural norms. A figure like Pierrot may be said to reveal the contingent yet pervasive and implicit laws that structure our daily lives by failing to conform to them, and thereby challenging these laws.

If we follow this line of argument, Pierrot "fails at gender", and thus challenges the binary concept of gender. Pierrot's white face is not implicit but explicit, painted with dense titanium pigments, thereby failing to maintain the unremarkability of the white face and, in turn, challenging it. During early modernism, Pierrot was characterised as alienated and melancholic, concerned with the night and the moon, and failed to be seduced by fantasies of progress and bright sky-oriented transcendent ideologies. The clown's failure is productive insofar as it generates a comedic (or melancholic, uncanny or terrifying) performance, as well as a rupture or revelation that makes visible what was once unnoticed, inviting the onlooker to perceive the world differently. Following Beré's perspective, one could propose that a clown's productive failure creates a gap in the various structures that govern our lives, and from which one may imagine these structures otherwise.

While making *Chemical Wedding,* I was interested in exploring images of Pierrot clowns with titanium white faces – both historical and contemporary iterations of Pierrots circulating online in various image economies – as I saw them as pointing to gaps within the visual regime of the white material.

Of course, we all fail to fit in. In Beré's reading of clown poetics through Heidegger, this is also the premise: to be human, or *Dasein* ("being there"), is to be in the world and to dwell on the earth,

[224] Heidegger in Beré, Marcelo. "Misfitness: The Hermeneutics of Failure and the Poetics of the Clown - Heidegger and Clowns". *Revista Brasileira de Estudos Da Presença* 10, no. 1 (2020).
[225] Beré, "Misfitness", 2020.

yet also to never truly feel at home in it.[226] We attempt to fit in, but to varying degrees we continuously fail to do so, while we also internalise the norms we strive to adjust to. Importantly, some humans suffer from both gendered and white infrastructures significantly more than others who are more likely to benefit from them.

Figure 23 *Easter Masquerade Party at Alfred Roch's House, Jaffa, Palestine (*1924*)*.
Image courtesy of Rachman Collection AIF/Samia Salfiti.

The figure of Pierrot has, on a few occasions, also been appropriated to subvert white identity. Poet and writer Langston Hughes, a leading figure of the Harlem Renaissance in the 1920s, reimagined Pierrot as a black clown. Hughes's engagement with Pierrot was a means of recreating the aesthetic space that minstrelsy in the US had stolen from black creativity, poetry scholar Madhuri Deshmukh asserts.[227] Another example where the character of Pierrot was used to subvert European white hegemonic culture can be found in a 1924 photograph from a salon in Jaffa. In the image, around

[226] Beré, "Misfitness", 2020.

[227] As a poet, Langston Hughes navigated a space between black culture and a white, Western literary tradition, positioning himself as an insider and an outsider to both. Deshmukh writes: "Hughes adopted the Pierrot mask as an affirmation of both racial and artistic autonomy. [...] In discarding the black mask of minstrelsy and donning the Pierrot mask, Hughes's transformation of the wistful, tragic clown into Black Pierrot was an act of 'signifying' that reversed the 19th-century American transformation of the commedia dell'arte into minstrelsy in the first place, thus reclaiming the realm of aesthetics – traditionally defined in American society as the binary opposite of all things black – *for* black expression." The practice of American minstrel theatre, according to art historian Kobena Mercer, cemented racial stereotypes while also revealing "the constitutive ambivalence that structures whiteness as a cultural identity". These performances provided whites with the corporeal and libidinal freedom they projected onto black bodies while simultaneously subordinating the very people they caricatured. Hughes subverted the established order of masks by appropriating Pierrot from the whites. See Deshmukh, Madhuri. "Langston Hughes as Black Pierrot: A Transatlantic Game of Masks". *The Langston Hughes Review* 18 (2004): 4-5,12; Kobena Mercer in Smith and Sliwinski, eds. *Photography and the Optical Unconscious*, 2017, 192.

60 dinner guests are seen posing for the camera dressed up in Pierrot costumes. The photograph could be read like many Orientalist studio photographs, where Europeans would dress as characters from Arab tales. However, in this case, the photograph captures a group of affluent, politically influential Palestinians dressed as European clowns in a reverse orientalist appropriation of a European aesthetic trend.[228] The image serves as a point of departure for Jumana Manna's 2012 short film, *A Sketch of Manners (Alfred Roch's Last Masquerade).*

In *Chemical Wedding,* I do not engage in strategies of racial or cultural *flipping* of the Pierrot figure, although they would undoubtedly be productive critical strategies in many instances. In my research, I focus on responding to an extractive visual regime that upholds chromatic whiteness as a norm and broader cultural aspiration, while also attempting to identify moments where this white material functions as, yet fails to fully become, a material construction of racialised white subjects in images. In response to the research sub-question that serves as the departure point for this chapter, I aimed to engage with image strategies in which both the white face and titanium dioxide are rendered strange, marked and particular. This is to say that I have concentrated on finding moments when white faces are "de-masked", in Yancy's terms,[229] from within a broader visual regime of titanium dioxide.

In addition to the artworks previously mentioned in this chapter, I have also drawn on and contributed to the work of thinkers and practitioners in *The Image of Whiteness* (2019),[230] where the strategy of "making whiteness strange" is discussed at length. My research contributes to this intervention by applying the method of sludging, and by developing research strategies based on a specific case study of a molecular resource, image economy and a particular shade of white – the whitest and most total of whites – in order to address the processes through which whiteness is both materially and symbolically made and unmade.

Weirding white

In the sludge section of *Chemical Wedding*, I was interested in investigating the effects and affects evoked by the images and materials I had compiled in my titanium white image. As mentioned in the previous section, I found resonance in the writings of Yancy and Dyer as I sought to develop strategies to render the visual regime of the white material strange.[231] Additionally, Fisher's writings on the weird and eerie in film[232] have informed my understanding of how these categories manifest in my practice and exploration of the white material in relation to image-making processes.

[228] Ari, Nisa. "Orientalism Repeated: Shifting Time in Jumana Manna's *A Sketch of Manners* and the Politics of Photography in Palestine". *Third Text* 30, no. 5–6 (November 2016): 331–45.
[229] See Yancy in Blight,*The Image of Whiteness*, 192-193.
[230] Blight, *The Image of Whiteness,* 2019.
[231] See Yancy in Blight, *Image of Whiteness*, 196-198; Dyer, *White*, 13.
[232] Fisher, *The Weird and The Eerie*, 8.

What the weird and eerie have in common is an engagement with the strange, rather than the horrible or the scary – although both the weird and eerie may encompass an underlying sense of horror. The character of the clown and its association with horror is by now well-established due to the work of artists such as Bruce Nauman[233] and the recent mass hysteria phenomenon of the "killer clown craze".[234] The association of chromatic whiteness with horror is also not new; it is a recurring motif in literature such as Herman Melville's *Moby-Dick* (1851).[235] In the following section, I focus on my interest in exploring the affects of the weird and eerie in my practice, particularly in the video work *Chemical Wedding*.

The weird and the eerie, which Fisher describes as not quite genres, are concerned with a fascination for the outside – for that which lies beyond standard perception and understanding. Fisher argues that the weird and the eerie invite a form of critique that allows us to process the "inside" through the "gaps and impasses of the outside".[236] Although related, the weird and the eerie function in slightly different ways.

The weird is that which does not belong. As Fisher writes, the weird brings to the familiar something which ordinarily lies beyond it and cannot be reconciled with the "homely" (even as its negation).[237] I propose that the images that feature the white face of Pierrot and the photo flashback malfunctions evoke such weirdness. In these images, the white face has been rendered unhomely by the very substance that often works to materially and symbolically construct it. The sense of the surreal and the wrongness associated with the weird, Fisher continues, often indicates the presence of something *new* – something that our previous frameworks or conceptions are not equipped to locate or categorise. The weird thus challenges us to restructure these frameworks, Fisher states.[238] In *Chemical Wedding*, I was interested in exploring how the initial weirdness of combining the photo flashback and Pierrot images could challenge a current framework to produce a new framework that encompasses an awareness towards the white material's visual regime.

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[233] In various cinematic examples, and notably in the "Clown Torture" videos by artist Bruce Nauman, there is a focus on the clown's obligation to perform and to obscure their "true" self, their numerous failings (with the clown also serving as a stand-in for the figure of the artist in Nauman's work), but above all, the clown as a symbol of horror. See Nauman, Bruce. *Clown Torture*. 1987.

[234] Numerous examples recount "clown white" appearing on a face to signify the terrifying. The figure of the clown as a source of fear is reflected in the media-fueled mass hysteria and moral panic phenomenon that has spread across the English-speaking world over the past eight years, known as the "killer clown craze". This phenomenon is driven by reports of "evil clowns" appearing in incongruous settings, such as near forests and schools. In an unrelated 2020 study, Americans reported fearing clowns more than climate breakdown. The term for an irrational fear of clowns is coulrophobia. See Poole, Steven. 'The Great Clown Panic of 2016: "A Volatile Mix of Fear and Contagion"'. *The Guardian*, 31 October 2016; Bader, Christopher D., Joseph O. Baker, L. Edward Day, and Ann Gordon. *Fear Itself: The Causes and Consequences of Fear in America*. New York: NYU Press, 2020.

[235] Melville wrote extensively about the horror of whiteness not of the face but of the whale. Melville writes: "But not yet have we solved the incantation of this whiteness, and learned why it appeals with such power to the soul; and more strange and far more portentous – why, as we have seen, it is at once the most meaning symbol of spiritual things, nay, the very veil of the Christian's Deity; and yet should be as it is, the intensifying agent in things the most appalling to mankind." See Melville, Herman. *Moby Dick*, 1851.

[236] Fisher, *Weird and Eerie*, 10.

[237] Fisher, *Weird and Eerie*, 11.

[238] Fisher, *Weird and Eerie*, 13.

Figure 24 Jean-Gaspard's Pierrot. Still 6 from *Chemical Wedding* (2022–2024), 4K video, colour, sound, 05:20 min.

According to Fisher, we are faced with the eerie when we are in the presence of something that urges us to disengage from our current attachments. The eerie raises our awareness around the forces that govern our mundane reality but which are typically obscured. In *Chemical Wedding*, I consider the footage depicting the grey sand waste desert and mining pit as eerie – landscapes where humans are absent are often an unmistakable indicator of the eerie, Fisher states.[239] The simultaneously inhuman and intensely human sites of deep extractive activity can, furthermore, be seen as providing the materials we rely on for mundane consumption but that typically remain unseen. I propose that there is a specific subcategory of the eerie: the landscapes left behind by extractive capitalism. As Schuppli states, "Anthropogenic matter is relentlessly aesthetic in the way it throws disturbing material re-arrangements back at us."[240]

To summarise, by combining a sludge section of images that, in various ways, speak to the impact of the white material on visual registers, with footage of the grey mining landscape, I have attempted to measure the effects and explore the affects of the weird and eerie as they have presented themselves to me within the visual regime of the white material. In the following section, I explore how fantasies, desires, myth and ambivalences may be approached as manifesting across the materials and imagery through the concept of the "optical unconscious".

[239] Fisher, *Weird and Eerie*, 13.
[240] See Schuppli, Susan. "Dirty Pictures". In *Living Earth Field Notes from the Dark Ecology Project 2014-2016. Eds. Belina, Mirna and Arie Altena. Amsterdam: Sonic Acts, 2016.*, 2016, 191.

Optical unconscious

Through photographic images, Walter Benjamin proposes, we discover the existence of an optical unconscious akin to the instinctual unconscious accessed through psychoanalysis, however one that is not strictly personal but collective.[241] Benjamin declares that image-making technology allows us to access ways of seeing that are either actively denied or otherwise made unavailable to us through various ideological mechanisms.[242] It was in the essay "Little History of Photography" (1931) that Benjamin first introduced the term. Since then, the term has been taken up by theorists and practitioners to explore how photography can open up the unknown, the unseen and the uncontrolled, while also questioning how domination, race and colonialism have shaped image-making from its very inception (including Benjamin's own intellectual contribution).[243] I would like to apply Benjamin's ideas to the visual regime of the white material as a component of this written thesis, and to complement my exploration of latent images and ambivalences prevalent in its imagery through practice. However, it is difficult for me to speak with any certainty about how viewers will respond to this material; for some, it may not trigger the same affects and associations – which leaves this part of the chapter within the domain of the speculative.

I believe Benjamin's use of the *unconscious* is intended not as a direct reference to psychoanalysis, which one would associate with the term, but rather as an image or figure of speech analogous to Freudian vocabulary. One of Benjamin's many definitions of the term posits the optical unconscious as a form of collective perception, which he likens to a collective realm of fantasy. Benjamin proceeded to develop a mass communication theory from ideas centred on the unconscious rather than rationality or reason. In his proposal, photography is seen as a medium for disseminating a culture's latent desires, fears and defence mechanisms.[244] It is a perspective that acknowledges that we often encounter visual forms unconsciously, yet these visual experiences nonetheless shape our responses – somatic reactions, mood and behaviour in particular.[245] Considering my research problem, this is an interesting proposition, and one which pertains to a synthetic substance and visual phenomena that are both ubiquitous yet seldom remarked upon.

According to Benjamin, the political potential of photography lies in its ability to intervene in the "deformations" and "stereotypes" that are often found in the perceptions of the deranged and the dreaming, as well as within cultural imaginaries. In moments of what Benjamin terms "flashes" and "snaps", this information may become available to us. This occurs not because of photography's so-called indexical relationship to reality, but rather due to its proximity to *fantasy*. Like "latent

[241] The original quote: "It is through photography that we first discover the existence of this optical unconscious, just as we discover the instinctual unconscious through psychoanalysis." Benjamin, Walter. "Little History of Photography (1931)" in *One-Way Street and Other Writings*, 2009, 243-244.
[242] Smith and Sliwinski, eds. *Photography and Optical Unconscious,* 4-9.
[243] Many authors have pointed out that Benjamin's thoughts about the optical unconscious and modernity more broadly were inflected with colonialism and scientific racism. See Smith and Sliwinski, eds. *Photography and Optical Unconscious,* 17.
[244] Smith and Sliwinski, eds. *Photography and Optical Unconscious,* 5-9.
[245] Mark Reinhardt in Smith and Sliwinski, eds. *Photography and Optical Unconscious,* 178.

memories", details of photographic information snap into focus and become available in unpredictable moments. These latent meanings "flash up in moments of danger and desire",[246] and they can quickly fade from view unless seized in a moment of recognition.[247] Consider the photo flashback images and how, through a literal flash – which poses a relative "danger" to both the heteronormative white celebrity culture of Hollywood and the industry that provides the material of titanium dioxide – the latent *weirdness* inherent in the visual regime of the white material, which typically operates smoothly and unnoticed, is made "accessible".

So far, I have been drawing on the instinctual interpretation of Benjamin's idea of the optical unconscious, but we can also consider the optical application of the term. The distinction does not appear clear-cut, as Benjamin seemingly shifts between the two. Instead, these aspects have been separated and specified amongst those who have taken up Benjamin's ideas.[248] Neuropsychological research has demonstrated that the eye perceives the world in highly partial ways – sometimes referred to as the Troxler effect[249] – and that the brain filters out much information registered by our sensory organs, while adding visual elements not obtained through them.[250] In other words, our eyes do not work like cameras. One could say that it is the Troxler effect that "disappears" the widespread use of chromatic white in the modern environment (when you step into an art gallery, are you ever surprised by the sight of white walls?).

Science may support Benjamin's observation that the eye captures the world in partial ways. Nevertheless, the following questions remain: how can we speak of what is allegedly *unconscious* to us all, as per definition, something we are not aware of? Or in other words, how does one gain the privileged position from which to observe what others cannot? This question is important to me, as I consider myself a researcher who attempts to study a visual regime in which I am fully implicated and immersed, while also asserting that this is a phenomenon largely overlooked by most people. Would not the unconscious processes within our visual field, which disappear certain aspects from view, still be at work when we look at photographic images through our partial eyes?

Benjamin proposes that there is "a different nature" that speaks to the camera as opposed to the one that "addresses" the eye – different in the sense that instead of a visual space worked through by human consciousness, like a painting, there is a visual space that has not been affected

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[246] Smith and Sliwinski, eds. *Photography and Optical Unconscious,* 4.

[247] Much critical effort has been directed at unpacking Benjamin's idea of the flash of the dialectical image as it remains a "dark star" and a "black hole" in his writing – in other words, it invites many readings and few straightforward answers. Benjamin's writings on the flash of the dialectical image can be found in Benjamin, Walter. *The Arcades Project*. Cambridge, Mass.: Belknap Press of Harvard University Press, 1982, 473.

[248] Visual cultures scholar Shawn Michelle Smith, for instance, finds the term useful if one stays on the optical side of the "equation" (which would be the *instinctual versus optical*) rather than applying the term as if it speaks to an instinctual unconscious in accordance with a psychoanalytic model. Smith and Sliwinski, eds. *Photography and Optical Unconscious*, 177.

[249] The Troxler effect refers to when "a certain kind of given stimulus that does not change over time eventually [will] be ignored by the neuron that receives the stimulus. […] If one keeps a fixation point steadily under one's gaze without moving it or oneself, eventually an unchanged stimulus close by it will fade and disappear from sight, due to neural adaption in the retina and in the brain." See Troxler in Smith and Sliwinski, eds. *Photography and the Optical Unconscious*, 2017, 265.

[250] Kandel, Eric. 'What Is Art for? Science Shows It's in the Eye – and Brain – of the Beholder'. *The Art Newspaper*, 2016.

by the human conscious, and thus has come to be unconsciously.[251] Benjamin proposes that photography technology may disrupt our habitual modes of seeing when the photographic image brings something to our attention that which otherwise would have remained unregistered if observed with the naked eye, thus revealing something akin to an unconscious within our ways of seeing. "We have no idea at all", Benjamin asserts, "what happens during the fraction of a second when a person steps out." Nevertheless, photography, he asserts, "with its devices of slow motion and enlargement, reveals the secret".[252] It is by scaling up and scaling down, slowing down or speeding up, and capturing the rich mesh of visual details otherwise overlooked – in other words, through photography's properties of scale, temporality and detail – that the technology may offer a *slip of the tongue*, standing in for or revealing various unconscious aspects within our visual field.[253] In my image-making practice, I draw on several such strategies, which may also be seen as aligning with certain structuralist concerns.

I wonder if the "optical unconscious" in its instinctual variety may still be generative if one extrapolates it to a broader scale as an analogy (and not as an actual aggregate of multiple unconscious minds). If psychoanalysis posits that the unconscious and the conscious so often come into conflict with one other, so too do shared social ideas and ideology often appear contradictory, ambivalent and full of paradoxes. White is both a colour and, at once, not a colour. In white supremacy, the colour white is applied to a group of people as a visible property, while that group also thrives on invisibility.[254] White is the literal colour that is also perceived as colourless, because it cannot be seen when it stands in for emptiness, non-existence and death.[255] Perhaps such collective unconscious aspects in shared social ideas may manifest, and hence also slip or reveal themselves, in the visual field through photographic moments, or in artworks that produce gaps that bring them into view.

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[251] Again, Benjamin refers to the optical and instinctual interchangeably, which can be slightly confusing – Benjamin was often concerned with the *infinite* in the stuff of images, words and things in his tendency towards empirical mysticism.
[252] Benjamin, "Little History of Photography (1931)", 243-244.
[253] According to Benjamin, the effectiveness of critical engagement with photography hinges on subjects who are familiar with the widespread global circulation of images and who possess the ability to interpret them. Only under these conditions can one grasp an image as a dialectical image that "reveals in a flash the capitalist structures that undergird the world of commodities and images" (Benjamin, *The Arcades Project*, 1982, p. 11). In this context, Benjamin argues, the theorist and researcher play a crucial role by presenting conceptual models that may assist the subject's critical interpretation of images or artworks. If successful, the subject may approach the image as "a fragment from the past, read in light of the present", thereby activating the "image-making medium within" and creating "a dialectical image through which the subject might see the mirage of capitalism exposed" (Benjamin in Smith and Sliwinski, eds., *Photography and the Optical Unconscious*). However, in our current time, I do not believe that the theorist-writer is equipped with exceptional conceptual tools that are not accessible to the "regular" viewer – consider, for example, the clever TikTok *prosumers* who interact with and produce "sludge content" – and that such revelations or insights may occur in anyone (See Harbison, *Performing Image*, 2019).
[254] Dyer, *White*, 42.
[255] Dyer, *White*, 45.

Figure 25 Bruce Nauman, *Clown Torture* (1987). Four-channel video, colour, sound, approx. one hour. Image courtesy of 2018 Bruce Nauman / Artists Rights Society (ARS), New York.

In general, I find the concept of the optical unconscious to be generative when discussing images and art, particularly because it allows for a consideration of the unnamed, the unknown and the uncontrollable. If we are not to reduce any image, aesthetic experience or artwork to the social or political spheres, we can imagine a remnant that lies beyond these domains as *gaps*. An artwork is always a product of certain social and historical conditions, but, one would hope, it also goes beyond these conditions. The optical unconscious might sometimes be aligned with literal knowledge – like in a few of the aforementioned examples – but it will also manifest as excess, something that lies beyond language, as a *shape and feel*.

In this chapter, I have argued that the photo flashback images of Angelina Jolie and Nicole Kidman may represent "productive failures" that reveal gaps in the visual regime of the white substance, and that foreground its strangeness through the affects of the weird and the eerie. I also suggest that the found images of Pierrot, the clown with the whitest white face, offer insights into the cultural and latent fantasies, ambivalences and myths associated with the white face in the West's cultural imaginary. In addition to these images, I have compiled a large archive of images from advertising, architecture and various cinematic scenarios related to chromatic whiteness, the white face and the synthetic titanium substance. Through this material, particularly that which features in the animated sludge section of *Chemical Wedding*, I hope the piece may "reflect and invite impulses that well up

from within, exceeding the grasp of empirical historiography",[256] to borrow the words of Mark Reinhardt.

In *Chemical Wedding*, I sought to engage with latent images and the collective optical unconscious as it manifests within images that form part of a Western visual regime. This regime presents the white material as promising control, hierarchical structure and the gendering and whitening of the subject – dynamics intrinsically tied to power, race, colonialism and various modern fantasies and myths concerning light, the immaterial and the universal. However, it is not a domain where the "ego can be in charge".[257] If *Chemical Wedding* holds any power, it lies in drawing together under-explored connections and inviting a sense of relinquished control.

[256] Reinhardt in Smith and Sliwinski, eds. *Photography and Optical Unconscious,* 197-198.
[257] Reinhardt in Smith and Sliwinski, eds. *Photography and Optical Unconscious,* 197-198.

Chapter 3:
Portal/Terrain

I build my language out of rocks.
– Édouard Glissant, *Poetic Intention*, 1969.

The hermit tells the old miner amongst the party that he and his mining brothers are "well nigh inverted astrologers".
– Esther Leslie, *Synthetic Worlds: Nature, Art and the Chemical Industry*, 2005.

Shimmering

I pour black sand across the dark hardwood floor in the exhibition space. The room is hot; the midday sun is caught in the blackout curtains I installed in front of the windows earlier in the day, pressing against the fabric. Only a dim, orange light passes through, which infuses the white walls with warm grey. The room has recently been covered with a fresh layer of Exhibition White from Flint's Theatrical Chandlers, a paint containing high-quality, "obliterating" titanium dioxide pigments. This paint is likely derived from ilmenite sand, like the one currently forming soft pyramids that grow across the floor as I work around the space. The sand moves like a dry liquid – by now, I am familiar with how ilmenite behaves. Occasionally, small craters appear on the sand's surface, indicating that ilmenite grains are escaping between the wooden floorboards. I begin filming the sand while using the flash on my iPhone, and I notice that the ilmenite transforms: it shimmers on my screen. I direct my phone's flashlight at the sand and witness this effect once more, now unmediated. In the air, sand particles swirl and sparkle. Some stick to my skin. I think of how I often wear this substance, albeit in its transmuted form.

I recall the warehouse I entered while visiting the titanium mine in Southwestern Norway, where small mountains – about 10 meters high – of raw ilmenite were stored. This sand was freshly crushed – the result of large rocks being taken from the pit and beaten into manageable particles, marking the first of numerous mechanical and chemical steps in the manufacturing process that transforms the raw material into white pigment. I imagine how this entire storage space would scintillate if I had a large enough light source. Depending on its degree of pulverisation, in daylight, ilmenite can appear as a dark, matte grey (sand texture) or a pure, matte black (flour texture). In the dark, however, under a flash or sharp light, it comes weirdly alive.

In the studio, after several experiments with titanium dioxide in its pure pigment form, I can no longer find potential for the inert, opaque white powder to surprise me[258] (I will return to creating moving-image works with "found" titanium pigments in a renewed approach; more on this in Chapter 4). The shimmering dark sand, on the other hand, had a different appeal. I believed the material could point me to a gap within the visual regime of the white material. Following the instruction of philosopher Isabelle Stengers, I sought to develop a set of image-making methods that would allow the raw material, rather than myself, to "pose" the questions.[259]

Rematerialisation

This chapter concerns my engagement with the raw material of ilmenite, the shimmering black sand from which white titanium pigments are derived. It addresses my research sub-question: *how might image-making processes be rethought using theoretical and art research on titanium dioxide, with a focus on the synthetic substance's extractive history in the context of the Norwegian experience?* In the early days of the visual regime of titanium dioxide, images alluding to or depicting the raw material and the "magical" alchemical processes through which a black substance is transmuted into the whitest white were promoted by the pigment industry; however, this is no longer the case. Today, the material history of titanium pigments has disappeared from contemporary promotional imagery. In this chapter, I analyse this shift in the visual regime of titanium dioxide and consider its effects. I propose that the current "dematerialisation" of the white material generates an imaginary that aspires towards the sky and the transcendental, in which the white material appears as if emerging from nowhere and as immaterial.

The chapter explores my encounter with the extractive processes in the titanium mine and the surrounding landscape in Southwestern Norway through a movement in the opposite direction: down towards the ground, to the dark and shimmering, to the below and beyond. Alongside this reversal in direction, there is a parallel development in my studio practice. Initially, I produced a series of artworks, the *Sunscreen Pictures* (2022), which explored relations between titanium dioxide, the image and imaginaries related to the sky, the skin and the sun. Later, I shifted my approach and began to produce a series of photo paper-based works with ilmenite titled *Portal/Terrain* (2024). Here I present and evaluate the methods I developed in response to my encounter with the mining site and my experiments with ilmenite's shimmering properties. In particular, I explore the mineral's significance as a portal to other realms.

[258] Even to painters, titanium dioxide is often not the preferred white pigment due to its opacity; lead white offers richer tones, transparency and potential for build-up.
[259] The entire quote by Stengers: "researchers must accept the possibility that it is not man but the material that 'asks' the questions, that has a story to tell, which one has to learn to unravel." See Stengers, Isabelle. *Power and Invention: Situating Science*, 1997, 126.

The sky-bound image

In contemporary promotional imagery for the white substance, we are presented with a recurring set of ingredients: the sun, light, a blue sky and the colour white – elements that have been established as a trope. Even space, typically depicted as black, is instead portrayed in blue (Figure 29). In these advertisements, the brightness and durability of the pigment are emphasised, as reflected in the slogans of several major titanium companies: “First choice for a brighter life” (Kronos Worldwide, Inc.), “Brilliant transformation” (Tronox), and “Creating a brighter, more durable, and efficient world” (Chemours). As seen in Figures 26-29, the promise of a “bright” life and future and a “durable and efficient” world is paired with the colour combination of sky-blue and chromatic white shapes or objects – often white infrastructure, for instance, a “pure” white bridge, or a globe consisting of an intricate network of white lines. In the case of Figure 26, the representation of global white infrastructure is pictured as being held (like a globe) in the hand of a white person.

I propose that these promotional materials contribute to shaping a contemporary visual regime of chromatic whiteness, wherein an imaginary of titanium white as an aspiration towards the sky-bound and the transcendental is central. When forging a connection between the sky, white infrastructure and white hands, these images perpetuate aspects of what Dyer named a “culture of light”,[260] in which the optical properties of chromatic white are made related to the notion of light that emanates from above, the depiction of white peope and finally: the white image ground. In other words, the titanium advert has become an image of whiteness.

Figure 26 Stock photograph used by the titanium dioxide industry in 2022.
Image: Gerd Altmann from Pixabay.

[260] Dyer, *White*, 1997

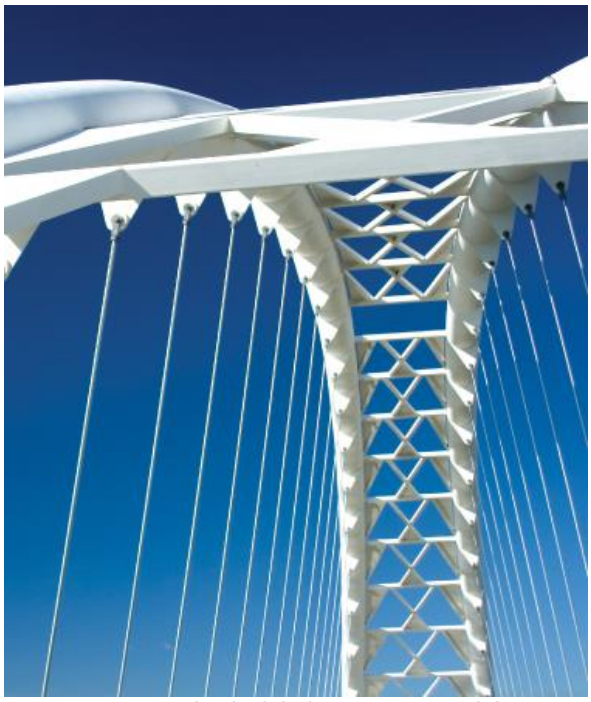

Figure 27 and 28 Left: Titanium dioxide company magazine from 2011. Image: Cristal Global, tronox.com. Right: Titanium dioxide advert from 2022. Image: Venator.

Figure 29 Titanium dioxide advert from 2022. Image: Kronos Worldwide, Inc.

In this project, as I explored how a theory and art research practice can rethink image-making processes in relation to a white substance, examining the images produced by the titanium industry became central to the written thesis. Insights from this analysis resurfaced in the studio, influencing and redirecting my practice at various times. In the early stages, I studied the contemporary advertisements mentioned in the previous paragraph while developing the *Sunscreen Pictures* series. I discuss these pieces later in this chapter. First, I explore what is omitted from contemporary titanium advertising.

Moving downwards

Ilmenite sand has its own stories to tell; stories excluded from contemporary titanium dioxide imagery, where the extraction and transformation processes behind titanium pigment production are conspicuously absent. Ilmenite is a titanium-iron oxide mineral that contains the white substance, though this remains hidden as long as its titanium dioxide purity does not exceed 30 or 40 per cent. At 99 per cent purity, the white material appears in the form in which we encounter it as a market-ready product. In ilmenite, titanium dioxide is encapsulated within a material that reflects its geological provenance – information that is erased once the raw material undergoes numerous chemical processes in the pigment manufacturing plant. The camera reveals this secret when the black sand sparkles. Titanium dioxide is highly reflective, which may cause this sparkling effect. However, somewhat surprisingly, this reflectiveness diminishes when the white substance is encountered in its final, refined powder form, where it presents a matte, flat appearance.

Ilmenite can be found, often together with anorthosite, in landscapes with specific geological compositions, such as the rare, lunar-like terrain of Dalane in Southwestern Norway. Ilmenite and anorthosite are the minerals most frequently encountered on the moon. Anorthosite gives the moon its pale appearance, and while ilmenite, along with volcanic ashes, forms the darker spots observable on the lunar surface from earth (if lunar mining were ever to occur, lunar ilmenite would be in high demand).[261]

Although the chemical transformation process involved in titanium production – the turning of a black substance into the whitest white – is no longer outwardly communicated by the industry, conversations with miners, chemists and the host (the designation I use for my contact in the company) who work in the mine and pigment plant revealed a tangible connection to the raw material, both felt and verbalised. One does not have a choice. In these places, black ilmenite sand is omnipresent. However, the mine bears no trace of white titanium dioxide; this material only appears in the pigment plant located across the country in Southeastern Norway. In the mine, it is all about the valued black rock.

[261] *Space.com*. "Moon Packed with Precious Titanium, NASA Probe Finds". 11 October 2011.

During my first visit to the pit, I am given a sample of local ilmenite sand to take home. Later, the host offered me a ton – 1,000 kilograms – of the sand (a promise that, unfortunately, would not be fulfilled). The initial small gift nonetheless marked the beginning of a period during which I could experiment with making artwork from ilmenite. I discuss these pieces later in the chapter. First, I trace ilmenite across a few different sites.

Origin stories

August 2021, UK: I am wading barefoot up a stream in Manaccan, Cornwall. The riverbed is shallow; its dark sand is littered with sharp stones that press into my skin. Openings in the trees produce patches of white light on the moving surface of the water, revealing that the dark sediment has a reddish hue. To access this part of the river, I had to crouch and pass under a tiny bridge seemingly built for people much smaller than me. Here, in 1791, a young British clergyman and amateur mineralogist named William Gregor noticed a curious sand that resembled gunpowder.[262] *Through rudimentary chemical experimentation – I picture him working away in the Georgian-era equivalent of a garage – the man discovered that from the black sand, which today is known as ilmenite, you could extract a titanium-based metal, but also a white powder.*[263] *Gregor called his chemical element "menachanite", a name that would not stick. The white powder remained unnamed.*

I film the river's movements. The water appears thicker than usual, oily, and it casts distinct shapes over submerged rocks and other elevations. I pick up a few rocks and place them in my pocket; they feel cold. For a moment, the thought strikes me that the Cornish reverend has had the results of his material experiments displayed in more art spaces than any artist, dead or alive, ever (all the white cubes since James Abbott McNeill Whistler's 1883 exhibition at London's Fine Art Society). We could also credit Gregor with the white pages of most books printed since the early 1900s. The paint covering the Challenger space shuttle as it exploded in 1986 and whitened skimmed milk, cigarettes, the background on most packaging labels and photographic prints – and not to forget the unrealised geoengineering efforts to spray titanium dioxide particles into the stratosphere to cool the earth and give us technicolour sunsets as a bonus. From such a perspective, titanium dioxide appears as a hyperobject.[264] *Yet, the hyperobject argument quickly collapses on itself, encompassing everything and nothing at once.*

[262] Russell, Arthur. "The Rev. William Gregor (1761-1817), Discoverer of Titanium." *Mineralogical Magazine and Journal of the Mineralogical Society* 30, no. 229 (2006 1955): 617–24.
[263] This white substance was not exactly titanium dioxide, but hydrous titanic oxide formed by hydrolysis. See Russell, Arthur. *Mineralogical Magazine and Journal of the Mineralogical Society,* 2006: 617–24.
[264] Morton argues that the *hyperobjects* of the Anthropocene, objects like global warming, climate, or oil that are "massively distributed in time and space relative to humans", have become newly visible to us because of the mathematics and statistics that helped to create these disasters in the first place. See Morton, Timothy. *Hyperobjects: Philosophy and Ecology after the End of the World*. 2013.

Moreover, the discovery aspect is – as it often is – more complex than it may initially appear. There are several points of departure for the invention of the white material, and Gregor's discovery is only one of them. Shortly after Gregor's river findings, a Prussian chemist, Martin Klaproth, also identified titanium and provided it with a catchier name (titanium, based on the Titans from Greek mythology).[265] It is unknown whether Klaproth also distilled titanium white. In 1908, two young men, Peder Farup and Gustav Adolf Jebsen, began experiments in Bergen, Norway, to produce colour pigment from ilmenite. In 1909, they obtained a patent for the first industrial production process for titanium dioxide, known as the sulphate process.[266]

Around the same time, a parallel historical event occurred: the French-born chemist A.J. Rossi developed a "competing" process to produce titanium pigment, the chlorine process, in the United States. Like the dual inventors of photography, Louis Daguerre and Henry Fox Talbot (who both claimed to have invented photography in 1839), not only one white male was involved in the invention of a modern colour pigment. As Benjamin once said, the "time was ripe for the invention, and this was sensed by more than one".[267]

In other words, inventions and discoveries are as cultural as they are material. Around the same time, in 1918, the Norwegian predecessor of Kronos Worldwide, Inc. and an American competitor both made the white pigment available on the global market. A white century followed. Norway became Europe's centre for titanium dioxide production, being the only European country with significant natural deposits of ilmenite and rutile (the deposits in Cornwall are insignificant in comparison).

Like many histories of the Anthropocene, the origin stories of the white substance may appear as a "meditation on the great white men of industry and innovation", potentially reinforcing "imperial genealogies", as Yusoff has cautioned.[268] Ambivalences within such narratives are revealed in the early visual material produced by the titanium industry, which I will discuss in the following section. In this chapter, I aim to propose an alternative story centred around ilmenite, rather than stories of great white men of invention, by following a downward gaze – a connection that is continuously undone in the contemporary visual regime of titanium dioxide. I will return to this after examining a figure frequently encountered in imagery produced by the titanium industry: a Greek Titan.

Kronos and Chronos

During my visit to the mine, I was granted access to historical photographs and advertisements from the mining company's business archive. Here I examine how some of these promotional materials

[265] Two alternative origin stories for titanium and titanium dioxide, neither of which I have been able to verify with academic sources, suggest that titanium dioxide is named after Mount Titanos from the *Iliad* – a mountain with white peaks but no snow. Another account suggests that Martin Klaproth chose the name for the chemical element titanium not to highlight its properties of strength and durability, but rather for its neutrality.
[266] Sandersen, Erik. *Kronos Titan AS 100 År [100 Years of Kronos Titan As]*, 2016.
[267] Benjamin, "Little History of Photography", 240.
[268] Yusoff, *A Billion Black Anthropocenes or None*, 25.

conjure imaginaries of titanium dioxide as being derived from a black raw material by invoking remnants of Greek mythology and holistic Romanticism, intertwined with modern notions of progress and white supremacy.

In the early days of titanium production, the character of the Titan god Kronos – depicted as a tall, white, muscular man – appears as a recurring motif in the visuals produced by the titanium industry. The reference to Kronos dates back to the founding of the first titanium company in Norway in 1916, Kronos Titan AS. The American multinational company, which has been the majority owner of all Norwegian titanium operations since the 1920s, as well as other major pigment plants and extraction sites worldwide, adopted the name Kronos Worldwide, Inc the same year. Today, the local mining company in Southwestern Norway where I did fieldwork is still called Titania. These companies are interconnected through complex ownership structures.

In Greek mythology, Kronos (also spelt Cronus) ruled over the other Titans during the golden age of the Titan gods, and he was revered as the patron of harvest. Kronos is infamous for devouring his children to prevent them from overthrowing him. As such, the deity is associated with the reaping of the land, the extraction of value from the earth and the subjugation of others. During conversations with the host, I noticed that he referred to Kronos as the "god of time". However, Khronos or Chronos, the god personifying time in pre-Socratic philosophy, is a distinct deity from the Titan god Kronos. Chronos was not a Titan, he symbolised the destructive cycles of time, and was typically depicted as an older man with a long grey beard. Kronos and Chronos were conflated during the Renaissance, leading to iconography that combined their symbolism. As a result, one would sometimes encounter the figure of a Father of (destructive) Time, often depicted holding a harvesting scythe.[269]

Inverted astrology

In an advertisement from the 1920s (shown in Figure 30), titanium paint is marketed through a black-and-white printed illustration depicting a landscape and a figure, likely personifying the Titan god Kronos. In the background of the illustration, a mountain range with a white peak is visible – potentially a reference to Mount Titanos, the mountain with white peaks but no snow, as described in the *Iliad*. The mountain is rendered with minimal detail, set against a black night sky sprinkled with sparkling stars. Here, if one interprets the night sky and its stars as a metaphor for ilmenite, a connection between black ilmenite and white titanium is suggested, while the white peak and the landscape below represent the final, refined product of "titanwhite" (as it is referred to in the advert). In contrast to the actual extraction and pigment manufacturing process, this image is reversed; in the mine, the ilmenite moves from the ground upward to be transformed into a white powder. According to Leslie, the idea of a miner as an "inverted astrologer" was frequently evoked in the early

[269] Erskine, Andrew, and Jan N. Bremmer. "Kronos and the Titans as Powerful Ancestors". In *The Gods of Ancient Greece*. Edinburgh University Press, 2010; "Cronus". Britannica, 2022.

days of mining and resource extraction.[270] The image of a glittering, valuable substance being unlocked from a "dense" dark below is how both Romantics and miners, according to Leslie, often conceived of extraction in the 18th and 19th centuries.[271] This advert, if interpreted as a spatial reversal of the mining process, may draw on such imaginaries.

The white material and its visual regime emerged in the 20th century, reflecting the histories, ideas and aesthetics of that period. Yet, in this advert, one can potentially discern remnants of ideas that developed during the early phase (the 18th and 19th centuries) of the synthetic pigment and dye industry, when a Romantic worldview fused with an extractive ideology.[272] This historical context and its legacies may help explain the frequent allusions to the sky and space in both historical and contemporary titanium dioxide advertisements. Contemporary ads, therefore, can be viewed as cultural remnants of Romantic extractivism. More significantly, they suggest that a notion of movement – both downward and upward – is central to the imaginaries surrounding titanium mining.

Figure 30 Advert from ca. 1920s, Kronos Worldwide, Inc.
Image: Sandersen, Erik. Kronos Titan AS 100 År [100 Years of Kronos Titan As], 2016.

[270] Leslie writes: "Astrologers study the forces and influences of the stars, while you are discovering the forces of rocks and mountains and the manifold properties of earth and stone strata." See Leslie, *Synthetic Worlds*, 23.
[271] Phrase adapted from Leslie, *Synthetic Worlds,* 7.
[272] Leslie, *Synthetic Worlds*, 33.

In the foreground of the advertisement in Figure 30, we see a muscular, naked man, appearing powerful yet in a kneeling position, with a serpent covering his private parts. He is reaching upwards, holding a piece of rock in his hand. The man is positioned atop a globe marked with the word "Norway". Above this, the company logo ("Titania Co As") appears in a slightly larger font. Reference to Greek beauty ideals and the Titan god Kronos is evident in the image. There is also a sense of sensuality in the portrayal. The mine, as a place where industry merges with desire, frequently appears in Romantic poetic responses to mining and the extractive industries, as Leslie has maintained.[273] "The miner's relationship to matter is aesthetic and sensual", writes Leslie. "It is enough for him [the miner] to know where the sparkly and glittery deposits lurk and that he can draw them into the light."[274]

The Enlightenment and Industrial Revolution are often regarded as marking the onset of the modern bifurcation between humans and nature. However, in 19th century Romanticism and science, Leslie describes scientific and poetic contributions in which humans were attributed with a "mineral consciousness".[275] During this period, "nature", embodied in plants, rocks and stars, was seen as possessing subjectivity and agency, Leslie asserts.[276] This historical moment fostered a holistic, yet uncritical view and a belief in the interconnectedness of minerals, humans, chemistry and industry, which contrasts with today's more dominant narrative that this era marked the beginning of the modern nature/culture divide.

The advertisement, however, diverges from such Romantic holism, as it also portrays a white man's (gender-intended) total domination of the earth. The figure exhibits characteristics that align more closely with the Titan god Kronos (the serpent) rather than the personification of time, Chronos. The figure displays elements that also reflect modern notions of progress rather than cyclicity; the movement suggested by the man's body is upwards, often associated with progress, and he holds a rock instead of a scythe, alluding to extraction. The advertisement can thus be interpreted as drawing on various influences – from Greek mythology, possibly including its 16th century German reception given the figure's statuesque appearance and chromatic whiteness,[277] to Romantic notions of mining, as well as 20th century ideologies of extractivism within the context of colonial modernity.

The Titan and the globe continue to be evoked in contemporary titanium advertising, although the symbolism has been simplified and diluted since the earliest iterations of these figures. In a

[273] Leslie, *Synthetic Worlds*, 16-17.
[274] Leslie, *Synthetic Worlds*, 19.
[275] Leslie, *Synthetic Worlds*, 9.
[276] Leslie, *Synthetic Worlds*, 9.
[277] Well into the 21st century, the notion of a pure, marble-white Antiquity persisted, despite substantial evidence that many sculptures were originally painted and polychromatic, as noted by classicist scholar Sarah Bond. One influential figure who contributed to this misconception was Johann Joachim Winckelmann (d. 1768). His two-volume work *Geschichte der Kunst des Alterthums* (History of the Art of Antiquity) was highly popular in Europe and played a key role in shaping modern art history. Winckelmann's writings reinforced the belief that white marble statues, such as the famed *Apollo of the Belvedere*, represented the pinnacle of beauty. After publishing on this topic, Bond received death threats from the Alt-Right. See Bond, Sarah. "Whitewashing Ancient Statues: Whiteness, Racism And Color In The Ancient World". *Forbes*, 2017; "Classicist Receives Death Threats from Alt-Right over Art Historical Essay". *Artforum*, 15 June 2017.

modern version of the multinational company's logo, which echoes the historical advertisement just discussed, blue shapes form the silhouette of a man, likely Kronos, depicted against a white background. The man reaches upwards, holding something round in his hand – no longer clearly identifiable as a rock, but rather spherical, possibly alluding to the shape of the globe. If so, the man now holds a globe while standing upon one. I am uncertain how to interpret this tautology or doubling – perhaps it suggests that the man dominates the globe, positioned atop it, while holding a miniature version of it in his hand. The serpent that covers the Titan's private parts in the 1920s advertisement (Figure 30) has been replaced by a banner displaying the company's current name (Kronos), which curves around the figure and the globe like Saturn's ring.[278] Adjacent to the logo is the slogan: "Brighter together". This is the contemporary logo for the multinational mining company. By the beginning of the 21st century, blue had replaced black in most titanium advertisements. With this, the chromatic reference to black ilmenite is erased, and the substance's origin stories are buried along with it.

Figure 31 Contemporary advert for Kronos Worldwide, inc.
Image: Kronos Worldwide, inc.

Matter racialised

In my study of titanium dioxide, I identified one archival image – a promotional poster from around 1920 – that explicitly links the geo-chemical process of deriving titanium white pigment from black ilmenite with skin colour. In this image, which I will not reproduce here, the division of matter – black raw material and processed white product – is distributed alongside a corresponding division of human features: the skin of black children and the skin of white children.

The advertisement is a black-and-white illustration depicting a large, athletic white man, presumably the Titan god Kronos again, surrounded by a group of children. The man is shown

[278] The Roman equivalent of Kronos is the god Saturn.

submerging some of the children, portrayed as black, into a bucket of white paint, which transforms them into white children (the black children have black skin and ethnically black features, while the white children have white skin and ethnically white features). After the whitewashing, the white children are shown happy and smiling, frolicking in small pools of white paint. In this image, titanium paint is presented as a literal "whitening agent", a technical term for titanium dioxide, that possesses the power to transform black subjects into white racialised subjects, positioning blackness as the material origin of white identity.

The host mentioned this advertisement in passing when I inquired whether the production of titanium pigment has ever historically drawn on or contributed to ideas of racialisation or racism, past or present. The German subdivision of Kronos produced the aforementioned advert, and the host implied that it reflected the context in which it was created – hinting, without explicitly stating, at a Germany on the path to Nazism. However, the promotional image was also circulated in Norwegian newspapers at the time, without controversy, for as long as 30 years, from the 1920s to the 1950s.[279] Baldwin's and anthropologist Margaret Mead's words seem particularly relevant to such historical compartmentalisation: what we call history may often be "a way of avoiding responsibility for what has happened, is happening, in time".[280]

I found out more information about the Norwegian circulation of the whitewashing advertisement after my initial conversation with the host, but I did not have the opportunity to ask him about it again. The image reveals that promotional materials featuring racist stereotypes were widely accepted in Norway at the time. Such adverts were often created for products sourced from other parts of the world, such as Friele's coffee, which sources its beans from South America, or Joikakaker, fish cakes from the indigenous territory of Sápmi in Northern Norway, promoted with a figure presenting as Sámi. However, this historical advert stands apart from these examples, as it centres on the material construction of white racialisation from blackness within Norway's predominantly homogeneous white society – particularly true at that time – even though the industry itself did not cross national borders.

The important question here is: how this whitewashing advert should inform our interpretation of other advertisements that draw on similar symbols and figures, such as the Titan god, and whether remnants of these imaginaries resurface in contemporary adverts and imagery. If we reconsider the previously discussed 1920 promotional poster (Figure 30), with the black, star-lit sky and the man embodying the characteristics of a Greek Titan god, perched atop a globe – his skin as white as a whitewashed neoclassical sculpture – and view it in the context of the explicitly racist promotional image, one could argue that the first advert now presents an image where white supremacy is personified in male form, reinforced by a white material. Moreover, in this advert, the globe is

[279] Hareide, Helene. "Eit norsk industrieventyr endra utsjånaden på verda [A Norwegian industrial adventure changes the way the world looks]". *Morgenbladet*, 2023.
[280] Mead, Margaret, and James Baldwin. *A Rap on Race*. London: Corgi, 1972, 177.

inscribed with the word “Norway”, geologically situating the country as a source of the white material that possesses the alchemical power to transform black, racialised matter into white subjects.

In contrast, contemporary images promoted by the industry function differently, having removed references to ilmenite and the colour black, or blackness, altogether. The racialisation of matter through blackness has disappeared. Yet, the production of white identity through references to the white material remains (as in the image of the white globe held in a white hand – Figure 26). In these images, chromatic whiteness, along with associated skin whiteness, is presented as though it were born *ex nihilo*.

Material stories are origin stories, Yusoff argues in *A Billion Black Anthropocenes or None* (2018), and these origin stories produce not just arrangements of matter, but also subjects through divisions of matter.[281] Yusoff understands geology – which she names White Geology – as a regime that produces both subjects and material worlds, where race is established as an effect of power within the language of geology. The division between materiality and its subjects within geology as inhuman or human operationalises race, Yusoff argues – for instance, during slavery, black subjects became categorised as matter of potential value – alongside, for instance, coal – rather than belonging to the category of the human.[282]

To arrive at her theory, Yusoff interrogates texts which marked the origins of geology as a discipline, and she locates how geology and racial propositions were intertwined in the early days of the discipline.[283] Yusoff declares: “Black and brown death is the precondition of every Anthropocene origin story, and the grammar and graphia of this geology compose a regime for producing contemporary subjects and subtending settler colonialism.”[284] She quotes Marx: “The veiled slavery of the wage-workers in Europe needed, for its pedestal, slavery pure and simple in the new world […] Capital comes dripping from head to foot, from every pore, with blood and dirt.”[285] Yusoff argues that slavery precedes and prepares the “material ground” for the West in terms of both nation and empire building, “and continues to sustain it”.[286]

In the case of titanium dioxide, however, I have no evidence that the Norwegian pigment industry, although its adverts may draw on and contribute to White Geology – or rather something I name *White Geo-Chemistry* (more on this in Chapter 5) – have directly contributed to large-scale instances of racial violence in the form of labour exploitation, land grabs or the displacement of indigenous people. The white material’s extraction and production does not occur in a previously or

[281] Yusoff, *A Billion Black Anthropocenes or None*, 19
[282] Yusoff, *A Billion Black Anthropocenes or None*, 4.
[283] Sources include the published accounts of geological surveying in North America by Sir Charles Lyell in 1845, author of *The Principles of Geology*. In his writing, a table of contents lists: “Fossil Shells,” “Condition of Slave Population,” “Geology and Cretaceous Strata” and “The Coloured Population multiply faster than the Whites,” and so on, side by side. This attests to the author seeing no difference between social and geological strata, Yusoff argues, in the crossings between property and possibility across fossil objects and black people. See Yusoff, *A Billion Black Anthropocenes or None*, 74-75.
[284] Yusoff, *A Billion Black Anthropocenes or None*, 66.
[285] Marx ([1867] 1961, 759–60) in Yusoff, *A Billion Black Anthropocenes or None*, 55.
[286] Yusoff, *A Billion Black Anthropocenes or None*, 55.

currently colonised territory. The workforce is primarily white working-class people, who have been employed by the company for decades over generations. In other words, the industry remains enclosed within Norway's still predominantly white territory. On the other hand, the racialised ideas promoted by the industry's adverts, both past and present, should be understood as having the potential for real, lived effects.[287]

The historical adverts position a black material as a precondition for a white material by introducing a corresponding metaphorical link to black and white skin and racialisation. In contrast, contemporary adverts promote the idea that a white material, along with white identity, is produced within the confines of a Western, predominantly white reality. Many coloured dyes and pigments, including black pigments, are conceptualised in relation to their source. For example, black pigments have often been understood as "of the Earth" and its products, such as soot, vegetable matter and burnt animal material.[288] While black pigment is frequently linked to its raw material,[289] the same cannot be said of white pigment, which is often portrayed as the colour closest to light, or even as "made of light".[290] In contemporary promotional imagery created by the titanium industry, the raw material is nowhere to be seen, and there is no visible evidence or mention of the processes of chemical transmutation in the pigment plant; the focus is solely on the white material. The connection between the pigment, its ties to the earth, and the dark, shimmering mineral is severed (as are explicit references to black skin). The visual regime that emerges no longer depicts the production of white material from black raw material found in the ground; it presents chromatic whiteness as if it emerges from nowhere.

I include the genealogy of the images produced by the industry to demonstrate how the contemporary visuals, which at first glance may seem unrelated to social or political issues such as racialisation, carry a history that is far from neutral. As Yusoff has shown in the case of the settler origins of geology as a discipline, the titanium industry, too, was founded upon, if not physical colonial violence, then imaginaries that construct ideas not only around chromatic whiteness as a "neutral" colour, but also around concepts of racialisation inherited from colonial modernity.

This theoretical and historical research has informed my experiments with titanium dioxide, ilmenite and image-making in the studio – work that I discuss in the following section. First, I present an example of an early piece I produced in response to contemporary titanium dioxide

[287] Mirzoeff. *White Sight*, 2023, 11.
[288] Boime 1990 in Dyer, *White,* 1997, 47.
[289] A contemporary example: In early 2023, the biochemicals company Nature Coatings, a new sustainable pigment manufacturer, launched a carbon-negative black pigment made from wood waste. Adverts for the product feature images of the pigment's source, wood waste, alongside a series of promotional images featuring a black fashion model, marking a collaboration between the pigment company and Levi's. In this case, the attempt to produce a more environmentally and socially conscious pigment is promoted not only through a reference to the source material, but also through the deliberate connection between black skin and black pigment. This demonstrates that such connections are not confined to the past but continue today, albeit driven by different politics – those of diversity in representation and identity politics.
[290] Dyer, *White*, 1997.

advertisements, along with the various considerations that led me to shift my approach and begin working with ilmenite instead.

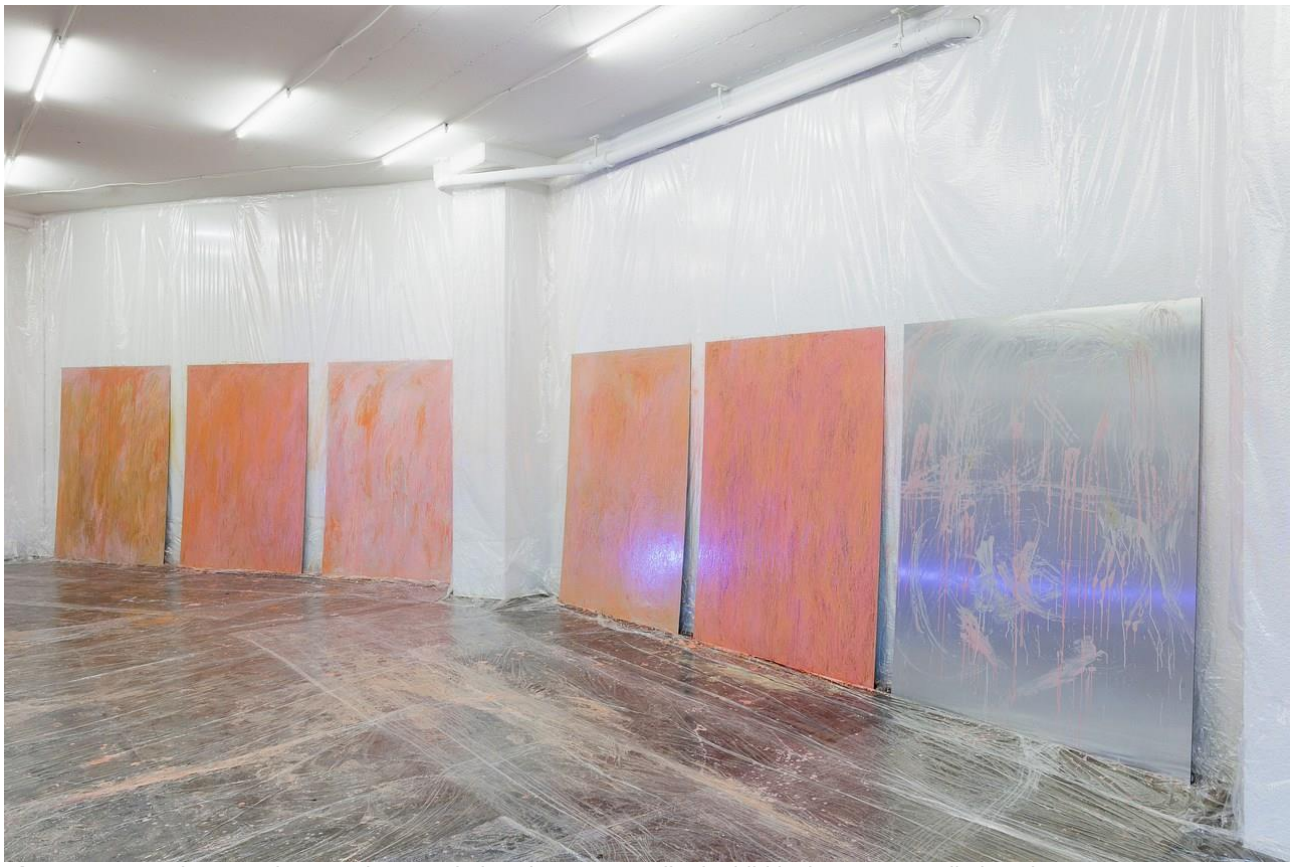

Figure 32 Pamela Rosenkranz, *Viagra Paintings* in *My Sexuality* (Exhibition), 2014. Installation view. Karma International, Zürich. Image courtesy Karma International, Zürich.

Shifting: *Sunscreen Pictures*

Before my travels to the ilmenite mine and the Cornish river, I had primarily focused my experiments in the studio on titanium dioxide and other materials; products and objects that, in different ways, questioned and responded to what I discovered were the various functions and consequences of the white material. This locally bound studio practice was partly imposed on me due to external factors: the travel ban during the COVID-19 pandemic prevented me from conducting any research trips to Norway during the initial phase of my research, from the autumn of 2020 until the end of 2021. In the first phase of the research project, I thus produced a series of works in the studio in response to my research into images that, in various ways, conceptualise titanium dioxide or chromatic whiteness – particularly adverts and other images that forge connections between the white material, the sun, substances for the skin and the sky. I refer to these works as the *Sunscreen Pictures*. They marked the initial experiments that eventually led me to develop the methodological term *shifting*.

Shifting is a term I use to describe image-making methods that explore states of in-betweenness – that is, methods that interrogate the material properties and representational strategies of semi-opacity, oscillation, and shimmering. In other words, methods that focus on the

spaces between image and materiality. I am interested in such methods because I believe they can explore perception as it forms, as well as identify gaps in a visual regime, which may invite ways to reimagine such regimes otherwise. Shifting describes several of the methods and strategies I have developed as part of this research, and it also resonates with Diane Severin Nguyen's comments on artworks inducing "sudden shifts" in the relationships between materials, images and flow, as referenced in the epigraph to Chapter 1.

As we saw in the Introduction, the etymology of "shift" comes from Old English *sciftan*, meaning "arrange, divide, apportion", and this word is related to the German *schichten*, meaning "to layer, stratify". Over time, "shift" came to mean changing or moving from one state to another. My approach aligns with this later understanding, relating to what shapeshifts, shimmers and oscillates.

Figure 33 Pamela Rosenkranz, *Viagra Paintings* in *My Sexuality* (Exhibition), 2014. Installation view. Karma International, Zürich. Image courtesy Karma International, Zürich.

The *Sunscreen Pictures* series were presented in the public-facing installation[291] *House of Sky* in 2022. The images were made while I experimented with developing various techniques to use titanium dioxide products in other ways than intended. I created the *Sunscreen Pictures* by photographing windows smeared in sunscreen lotion, a product whose "technology" is attributable to UV-reflective titanium dioxide pigments. The result was semi-abstracted images with patterns created by hand and finger marks, light and shadow. Through the sunscreen smears, one could see glimpses of a white, blue and pink sky. Made with an iPhone camera, the images involved a layering of material, window, screen, sky and light, and they produced an interface between seeing and (not)

[291] On the Art Research programme at Goldsmiths, each PhD researcher is expected to produce at least one installation that is open to the public per academic year.

being seen. The repeated motifs were tightly cropped, which limited the knowledge of what appeared beyond and in front of the windows.

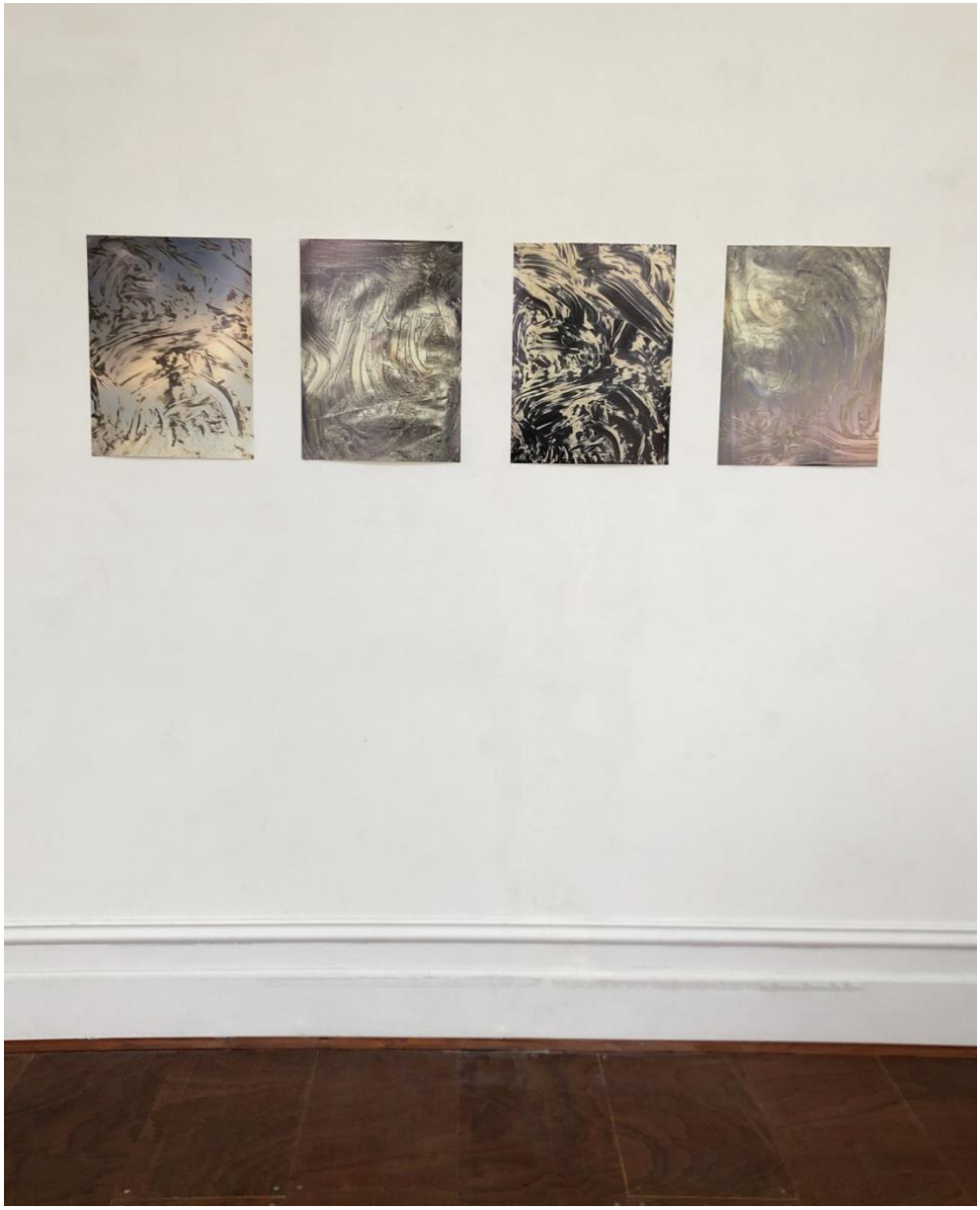

Figure 34 *Sunscreen Pictures* (2022), inkjet print, 29.7 x 168 cm, *House of Sky*, installation view, public-facing installation, Goldsmiths Art Research programme.

Although the images had undergone a "flattening", their hints of photographic "documentation" pointed to their entangled states. At times backlit with sunlight emanating from outside the windows and at other times lit with artificial indoor light sources, the smeared sunscreen transitioned from white to grey tones. In the *Sunscreen Pictures*, instead of eliminating shadows – a key theme within instructional writing on photography, as a means to maximise the legibility of a photograph,[292] which I see as indirectly related to the historical bias of the Shirley card – shadows became the motifs.

[292] Wu, Simon. "On Opacity: How Artists Resist 'Representation' and Legibility". Art in America, 2022.

Finally, handprints left in the sun lotion produced a human presence on the otherwise layered but flattened surfaces. If these traces recall the gestures of abstract expressionism, it is via Pamela Rosenkranz's chemically assisted Viagra paintings in the exhibition *My Sexuality* (2015). While Rosenkranz's artwork applied a "molecular perspective" in a more enclosed, painterly exploration of chemicals, art-making, masculinity and desire, I draw on molecular perception in the *Sunscreen Pictures* to explore the impact of a molecular resource on imaginaries related to titanium dioxide, the image, the sun, the sky and the skin.

Sunscreen lotion is a substance associated with health and hygiene that alludes to our often complex relationship with the sun and our conflicting desires for exposure and protection.[293] Sun protection skin care emerged at a particular time in history. It was introduced on the market shortly after the invention of titanium dioxide and about the same time as the advent of the white, built environment, when white identity was undergoing significant changes – following altered labour conditions, the aristocratic beauty ideal of pale skin was replaced with a bourgeoise "sunkissed" complexion. More frequent exposure to the sun required a new product: sunscreen lotion.

Heliotherapy followers of this era would fetishise the *sun cure* and tan their skin while lending ideas about sun worship from past and non-Western civilisations – sun cults from Ancient Greek mythology, the Roman solarium, Chinese solar healing cults, and sunlight's healing properties as they are conceived of in Arabic medicine and Rousseau's writings on nature[294] – and they merged these appropriated histories with new cultural tendencies and discoveries made in the Western sciences. The medicalisation of sunlight developed parallel to the perceived health-promoting properties of white interiors.[295] Both substances, sunscreen and white paint, were made possible by titanium dioxide, in other words: by the mine in Southwestern Norway, and similar extraction sites elsewhere. These intertwined histories, together with the contemporary titanium adverts, formed the reference points for the *House of Sky* installation.

Vis-à-vis the four sunscreen photographs, I covered two large windows with sunscreen lotion using the same technique I used to make the photographs, in an attempt to establish a connection between the images and the material within the exhibition space. Without the controlled positioning of the camera, light and shadow, the sunscreen lotion smears applied directly to the windows appeared less "painterly" than in the photographs. Instead, they evoked associations with abject white semi-transparent bodily fluids, or a room steamed up with perspiration, obscuring the outside view. I found this effect generative, given the associations of cleanliness and maximised visibility prevalent in the visual regime of titanium dioxide. To my surprise, and contrary to the titanium pigment's reputation for stability and durability, the white hue of the sunscreen also faded, and the

[293] Timofeeva, Oxana. *Solar Politics*. Cambridge: Polity Press, 2022.
[294] Carter, Simon. *Rise and Shine: Sunlight, Technology and Health*. Oxford: Berg, 2007, 58.
[295] Wigley, "Chronic Whiteness", 2020.

substance became increasingly buttery in appearance over the course of the exhibition.[296]

After presenting these material and image experiments in the installation *House of Sky*, I concluded that the *Sunscreen Pictures* series successfully explored a tipping-point at which the materiality of a substance – a product containing titanium pigment – becomes recognised as a fully formed image. This recognition, I found, exemplifies one way in which an artwork can rethink image-making processes in relation to titanium dioxide.

Figure 35 *House of Sky*, 2022, public-facing installation, installation view, Goldsmiths Art Research programme.

Yet, several aspects concerning the *House of Sky* installation still needed to be resolved for it to be able to respond to my main research question (*How might image-making processes be rethought using theoretical and art research on titanium dioxide, with a focus on its material specificity and the Norwegian experience*?). I was unsure whether the viewer would fundamentally question material whiteness in relation to image-making upon encountering the artwork. The particular set of references evoked by sunscreen lotion became perhaps too specific for a study on the visual regime of titanium dioxide. There was also another issue: in the *Sunscreen Pictures* series, human skin has

[296] There were also other objects in the exhibition space (a series of towels, painted eggshells and carton boxes), which I later deemed to be a distraction from the main focus of my research and practice.

been removed as a reference point, and the image surface stands in its place. The series nonetheless makes a general connection between image and skin via the sunlotion. This presents a problem within the work: it risks concealing the fact that human skin in images has not historically been, and still is not, treated equally, as exemplified by the biased Shirley card.

I concluded that the series distracted from the main focus of the research. The installation relied mainly on a final, processed titanium dioxide product, and did not account for or address the extractive and chemical processes of titanium production (at this point, I had not yet visited the mine nor the pigment plant, so naturally, my focus had been on the materials and images that I could access in London). More generally, working with titanium dioxide in this way proved unsatisfactory for another reason: relying mainly on the white substance, I risked recentering titanium dioxide whilst attempting to examine it critically. Although the *Sunscreen Pictures* series did mark an engagement with the history and materiality of photography and how it relates to various hegemonic whites (the titanium coloured image surface and its technology's relation to imaginaries of white people) – thus, in principle, it seemed like a critical gesture that spoke to the relations between titanium dioxide and image-making processes – I believe that in practice, the works were too convoluted to communicate this critical engagement effectively. Finally, regarding my choices concerning formats and composition, the dimensions of the works as installed in the exhibition space were slightly too restrained and minimal for an effective intervention. I decided to leave this approach behind and move forward with my research using other methods.

After my visit to the mine, I began producing photographic works with ilmenite to re-establish the connection between the white material and the black mineral, thus highlighting their implications in processes of extraction and chemical transformation. Through such strategies, I aim to "undo" the conceptual work that makes it seem as if titanium dioxide comes out of nowhere, as something immaterial. In the final section of this chapter, I discuss the processes that led me to create these ilmenite works, titled *Portal/Terrain*. Before that, I include some notes from my field trips to the mine and discuss the process of producing footage for the video work *Chemical Wedding* (2022–2024), which also guided me towards developing works with ilmenite in the studio.

Landfill, skyfill

June 2022, Southwestern Norway: From the mining company's circular headquarters, there is a panoramic view of the Jøssingfjord. Grey mountains frame deep greens and blues. The pigment clients and I were presented with this vista rather than the scene of large ilmenite boulders being crushed into grains of sand – a section of the mine that, according to new regulations, apparently poses a safety risk. Even in my search for a way down, I am forced into an upward movement. The French and the Swiss pigment clients photograph each other on the balcony. I ask a blond woman, who is American, and a representative for one of the foreign branches of the mining company, if this

is not indeed the fjord where mine tailings used to be deposited; she affirms quickly and moves on to initiate a group photo of the clients, as I withdraw to the other side of the balcony.

Today, mine tailings are disposed of on land, forming a vast, steel-coloured desert. In the 1980s,[297] *due to the company's inability to control particle dispersal in water, it was ordered to construct a landfill. Local shrimp would trap black sand particles in their gills instead of the usual light quartz, which, while harmless, was "not cosmetic" and thus made the shrimp "harder to sell", according to a geoscientist I interviewed before my travels.*[298]

We are later taken to the landfill for brief sightseeing. The problem of sand drifting beyond its designated area is apparent. The sand is transported from the landfill with strong gusts of wind down into the valley, the village and the river below us – this is a skyfill[299] *as much as a landfill. This air pollution is detrimental to breathing beings and vegetation, and various efforts to stop it have been made. When rain falls, the tailings gain weight, and heavy metals, such as nickel, are released from the sand and sink into the ground, finding their way into the groundwater.*[300] *The deposit is considered at capacity when it is 100 meters deep, which is expected to happen by 2024.*[301] *After that, the waste will sit there, awaiting new techniques for waste management or the invention of new profitable products derived from its grey mass. Here and there, treetops peak up above the sand. I step away from my company and the host to film the landscape – footage that I will later use in Chemical Wedding. One client photographs me while I am filming, and will later email me the image. The camera is directed back at me. In the photograph, I appear as a tiny, orange figure in a sea of ash.*

In the afternoon, we drive past the fjord *we observed from the mining company's panoramic balcony earlier in the day. The company do not offer a close-up view of the waters. I ask the host if our van can make a brief pitstop, but I am informed that the site is of no interest to the pigment clients – my suspicion that our visit is highly choreographed is confirmed. Later that summer, in August, I will return to visit the fjord and the surrounding areas without the constraints imposed by the pigment company. During my second trip, I once again fail to reach the fjord's shoreline – after an unusally hot summer, destabilised air currents had amassed and erupted into a surprise thunderstorm, which I was caught in while descending the smooth, barren mountainside. I managed to observe the fjord from an elevation of about 100 meters as I was perched underneath an overhanging rock, attempting*

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[297] Gotaas, Y. *Vurdering av miljøkonsekvenser av sandflukt fra et land-deponi for avgangsmasser fra Titania A/S, Sokndal [Assessment of the environmental consequences of sand drift from a land landfill for tailings from Titania A/S, Sokndal].* 80/88. NILU, 1988.

[298] Professor Emeritus Per Aagaard, Department of Geosciences, University of Oslo, Interview by author, London/Oslo, 6. April 2021.

[299] Phrase borrowed from Prince, Sesh. *Dispersion*. London, 2022.

[300] Schaaning, Morten Thorne, Hilde Cecilie Trannum, Sigurd Øxnevad, and Kuria Ndungu. "Benthic Community Status and Mobilization of Ni, Cu and Co at Abandoned Sea Deposits for Mine Tailings in S.W. Norway – PubMed". *Norwegian Institute for Water Research-NIVA, Oslo, Norway, Marine Pollution*, no. Bulletin 141 (2019): 318–31.

[301] The land deposit of mine waste expands by 2.7 million tons yearly. See Halland and Johnslien, "With-On White", 2023.

to shelter from lighting, flooding rainwater and debris (a team of local firefighters would, to my embarrassment, have to come to my rescue – they arrived in several fire trucks).

From land, the former waste deposit of the Jøssing fjord appears like any other Norwegian fjord; the water is dark blue, and when there is no storm, it is reasonably calm. Under the surface of the Jøssing fjord, however, is a dust-filled world.

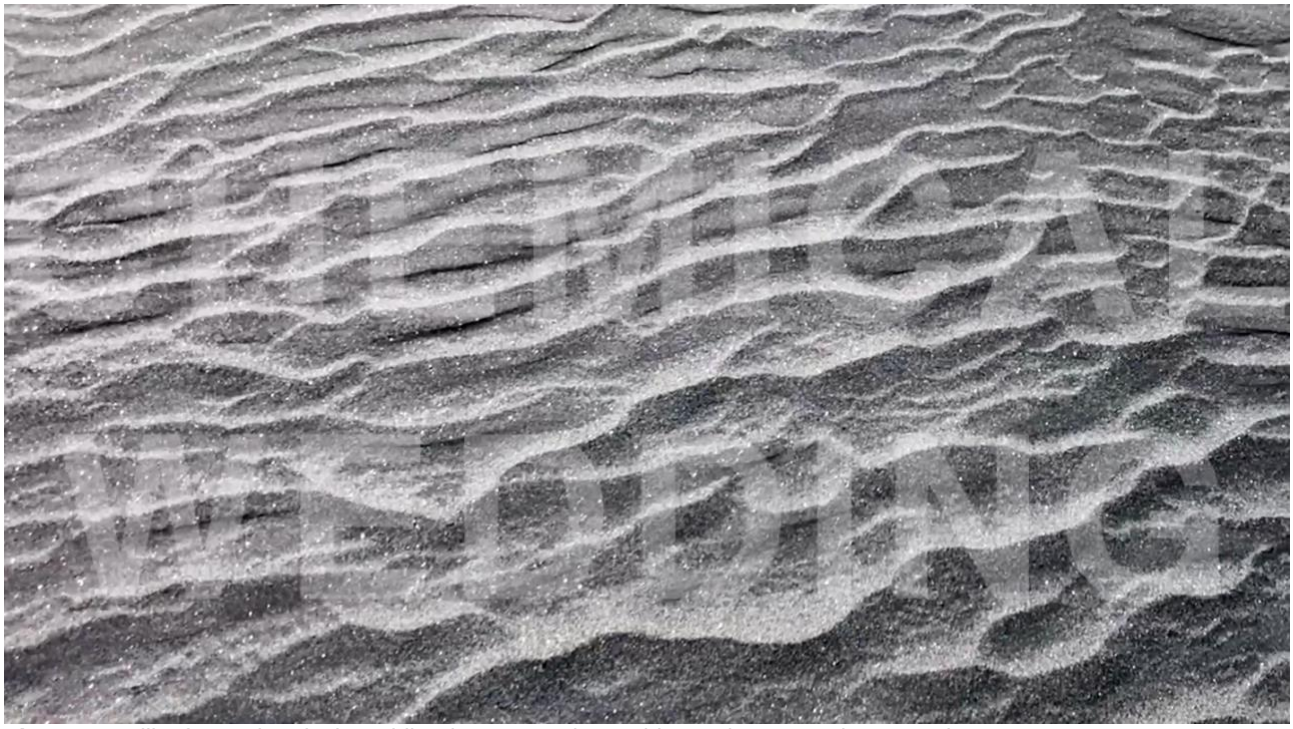

Figure 36 Still 7 from *Chemical Wedding* (2022–2024), 4K video, colour, sound, 05:20 min.

Serpent star

For three decades, the mining company dumped its tailings from the ilmenite mine directly into the Jøssingfjord, which, originally 70 metres deep, had been reduced to a depth of 20 metres by the 1980s. Norway is notable for its lack of legislation on waste disposal in waterways. In 2022, only 11 out of 2,500 industrial mines worldwide allowed mine tailings disposal in water. Five of these were located in Norway (which may seem surprising, considering these waters are prime tourist attractions).[302] To my surprise, I learned that the fjord, although scoring above toxicity-safe levels, is considered to have a "satisfactory" biological status according to current official parameters.[303]

[302] See "Representantforslag 145 S (2021–2022) fra stortingsrepresentantene Birgit Oline Kjerstad, Lars Haltbrekken, Alfred Jens Bjørlo, Ola Elvestuen, Sofie Marhaug og Une Bastholm". [Representative proposal 145 S (2021–2022) from Storting representatives Birgit Oline Kjerstad, Lars Haltbrekken, Alfred Jens Bjørlo, Ola Elvestuen, Sofie Marhaug and Une Bastholm] Dokument 8:145 S (2021–2022)]", 2022; Ulven, Elisabeth, and Tone Sutterud. "Norway to Allow Mining Waste to Be Dumped in Fjords". *The Guardian*, 12 January 2024.

[303] Professor Emeritus Per Aagaard, Department of Geosciences, University of Oslo, Interview by author, London/Oslo, 6. April 2021; Jens, Skei (NIVA/Skei Mining Consultant) et al., ed. "Mining Industry and Tailings Disposal: Status, Environmental Challenges and Gaps of Knowledge". Norwegian Environment Agency, 2019; Schaaning, Morten Thorne, Hilde Cecilie Trannum, Sigurd Øxnevad, and Kuria Ndungu. "Benthic Community Status and Mobilization of Ni, Cu and Co at Abandoned Sea Deposits for Mine Tailings in S.W. Norway – PubMed". *Norwegian Institute for Water Research-NIVA, Oslo, Norway, Marine Pollution*, no. Bulletin 141 (2019): 318–31.

Referring to the fjord as a dead ecological zone is thus, apparently, technically imprecise. Yet, underwater footage captured by fishermen and amateur divers reveals a haunting seascape. Independent marine biologists, moreover, have indicated that contrary to the official biological assessment of the waters, there is often cause for concern when only one or two species dominate an ecosystem.[304]

In the fjord, a tiny bivalve (*Kurtiella Bidentata*) and a relative of the starfish, the serpent star (*Amphiura Filiformis*), are feral species that thrive in an otherwise diminished ecosystem. I refer to these creatures as "feral" in the sense described by anthropologist Anna Tsing and artist-theorist Elaine Gan, who both use the term to denote species that flourish in the "ruins" of human-initiated projects yet remain beyond human control.[305] According to a marine biologist, with whom I corresponded prior to my visit to the mine, it remains unclear whether the coexistence of the bivalve and the serpent star is harmonious or parasitic; nonetheless, this relationship has ensured their survival.[306]

Early on in my research, I attempted to develop a video work that referenced this solitary duo and the unique optical properties of the serpent star,[307] but ultimately I abandoned this line of research. I found the approach too focused on the local ecology of the mine, at the expense of losing sight of the key concerns surrounding image-making and material processes in the production of the white material. Instead, I wanted to direct my attention to the interactions between materiality, extractivism and image-making more broadly within the visual regime of titanium dioxide. I believed this would be more precise and generative for addressing my research question. Scientific imagery of a harlequin serpent star and a bivalve, however, is included in the sludge section of *Chemical Wedding*.

Although I consistently filmed and photographed during my visit to the mine, I ultimately chose not to include large portions of this material in my practice output. Having been exposed to many projects – both theoretical and artistic – that explore extractive industries, I observed that they frequently rely on similar types of imagery, to the extent that these have become established tropes – for example, a small human figure dwarfed by the vast mining pit and heavy earth-moving machinery, or sublime mountains of sand. As Toukan has noted, the impulse to expose is often

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[304] "Urovekkende Funn På Bunnen Av Jøssingfjorden [Disturbing discovery at the bottom of the Jøssingfjord]." *NRK*, 2017.
[305] See Tsing, Anna L., ed. *Feral Atlas: The More-Than-Human Anthropocene*. Stanford University Press, 2021.
[306] Morten Thorne Schaanning, ex. Senior Researcher, Marine Pollution, Norwegian Institute for Water Research, Interview by author, London/Oslo, 12. April, 2021.
[307] The serpent star can navigate around obstacles and escape from predators in dark, muddy waters for one reason: its entire skeleton forms a visual system. The serpent star's skeleton is like an eye or an assemblage of light-sensitive cells. Today, the invertebrate's unique photosensitive body is a reference for scientists building lenses for optical computing. Through Biomimetics, according to Karen Barad, the serpent star, also known as the brittle star, is changing our understanding of optics. The serpent star turns lighter in colour at night, which may seem evolutionary suboptimal. Yet rather than passively hiding from predators, the creature is intent on maximising its body vision and being prepared for escape at any time. During the day, the serpent star turns darker to protect its body from overexposure to light, like sunglasses. For more about the serpent star, see Barad, Karen. "Invertebrate Visions: Diffractions of the Brittlestar". In *The Multispecies Salon*, 221–41. New York, USA: Duke University Press, 2014.

insufficient; observational footage employed as an "evidentiary image" does not guarantee a predictable response from the viewer. In many cases, it may even diminish the image's affective and rhetorical impact.[308] In the final iteration of *Chemical Wedding*, I retained the footage of the landfill and a single shot of the open-pit mine. I was interested in how these scenes explored the largely unknown ecological consequences of the usage and dispersal of the white material, which I saw as a gap within the visual regime of the titanium industry.

However, I chose not to include other footage from the mine or the pigment plant, as I felt this imagery risked aestheticising the industrial and chemical processes occurring there. Additionally, I found that this footage did not sufficiently address my research concern of rethinking the relationship between image-making processes and the white material. Instead, I continued my experiments with ilmenite, developing methods and strategies for image-making in the studio.

Figure 37 Lutz Bacher, *Black Beauty* (2013-2012). Black silicate. Dimensions variable. Installation view. Image courtesy Institute of Contemporary Art, London.

Portal/Terrain

When I still presumed the pigment company would provide me with a ton of ilmenite, I considered filling an entire room with the sand. With such an intervention, I was interested in creating a relationship between the raw material, a titanium-covered white cube space and a moving image work. The space would thus reference the chemical transmutation involved in turning black sand into white pigment – it would reinstate, or at least question, this hidden relationship. Although a gesture tried and tested several times before – filling a space with sand or other organic or synthetic material

[308] See Toukan, "Cruel Images", 2019.

– for instance, in Lutz Bacher's work *Black Beauty* (2012-2013),[309] I wanted to see what this could bring to my study of titanium dioxide.

When it became clear that the host was unable to provide me with the ilmenite, for reasons I expand on in Chapter 4, I purchased all the ilmenite sand that I could acquire from a company which offers it to ceramicists who apply the mineral in glazes for texture. After acquiring 60-plus kilos of the sand, I emptied their stock. I reassessed my approach, not only for practical reasons – on the consumer market, ilmenite sand is costly, scarce and rarely bought in large quantities. I decided to abandon the idea of installing the sand "unmediated" in the gallery space, primarily because I was unable to present it in a way that forged an explicit connection between the sand and the moving-image works. The material and the image operated on separate levels, yet they remained separate, and thus could not allow for a generative experiment relevant to my research question.

Figure 38 Lutz Bacher, *Black Beauty* (2013-2012). Black silicate. Dimensions variable. Installation view. Image courtesy Institute of Contemporary Art, London.

[309] Lutz Bacher's 2012-2013 installation *Black Beauty* involved filling the ICA with black silica, accompanied by images and artefacts of personal and philosophical significance, including a photograph of her late husband, an astronomer with whom she had shared her life. Bacher presented the sparkling black sand in a space with particularly sterile white gallery light (the ICA has later redone their building), which made for a striking contrast, an otherworldy landscape, perhaps lunar, in an otherwise mysterious installation operating in the gaps between binaries; at once intimate and cosmological, minute and infinite, severe and humorous, the exhibition seemed to generously offer something to its viewer while at the same time not giving much away at all.

These experiments, though unresolved, led to the next stage in my practice. I began creating a series of works using photographic paper – more specifically, printed photographs that I had produced earlier in my research – and covered them with a layer of ilmenite sand. This process left the original images almost, but not entirely, occluded. I saw the work as drawing on a method of shifting – as exploring states of in-betweenness. I illuminated these photographic works in a dimly lit space to reveal the shimmering qualities of the ilmenite sand, which I considered another form of shifting. I titled the series *Portal/Terrain* (2024). The artwork proposes a relationship between the raw material and the photographic paper surface, which is whitened with titanium dioxide. I found this approach generative in relation to my research question, particularly in how it engaged the material, extractive and social processes that "lie beneath" the white image surface by bringing the raw material to the front, so to speak. In creating these works, I considered them portals to something unknown, but also to the hidden relationships that are "edited out" in images that present the white material as if it appears from nowhere. I believed that this approach could reinstate the hidden relation.

Furthermore, I viewed these ilmenite works as pointing to gaps in the visual regime of titanium dioxide as they refer to its broader structure; the pieces reference the extractive infrastructures, the connection to the earth and the subterranean movements present in the titanium industry, as well as the alchemical and historical meanings attached to the chemical process through which the white material is derived from a black substance. Although the separation between material and image remains in *Portal/Terrain*, they are combined within a single image that is simultaneously an unmediated substance and a nearly signified image – in other words, they are *shifting*. My interest in creating works where the motifs of the images are partially obscured also arises from the fact that I found them to be open to interpretation.

Black mirrors

While experimenting with ilmenite, I attempted to locate other known uses of the mineral apart from titanium and titanium dioxide production, but I found few. I was wondering what material histories the works would activate in addition to the ones I was uncovering within the titanium industry. While visiting the mine, I was told that the mining company was, for the first time, developing a product directly from ilmenite that they would market to the fossil fuel industry. The product's function escaped me at the time (yet, I remember remarks from company representatives regarding their considerations about promoting a black product versus a white one).

I discovered that ilmenite was also used at a different time in a region where it naturally occurs: black mirrors in ancient Mesoamerican cultures were often fashioned from this mineral. Pre-colonial civilisations in this region paid particular attention to the brilliance and shimmer of materials. These black mirrors had various functions, many of which remain only partially understood. Archaeologists propose that the black mirrors may have served both as luxurious jewellery and as divinatory devices for ritual communication with otherworldly beings. In the latter case, the mirrors

were believed to function as portals to other realms – realms that could be seen but not interacted with. The ilmenite would often be worn around the neck, just above the solar plexus – the black mirrors would be kept close to the body. Between 1500 and 500 BC, the Olmecs made concave mirrors from ilmenite, producing an inverted mirror image, like a pre-photographic lens. It is believed that these concave mirrors would be used to light fires; thus, ilmenite came to be associated with fire, the sun and the sun gods. It is also speculated that in later Mesoamerican societies, black mirrors were believed to be like bodies of water.[310]

The black mirrors of Mesoamerican civilisations should not be confused with Claude glasses – mirrors used by amateur artists and tourists in 18th century England. Functioning like a proto-Instagram filter – and as a means to compose a picture, as they reflect and concentrate an image – these black mirrors mediated a scenic landscape while one's back was turned to the scene.[311]

Figure 39 John Dee's black mirror crafted by the Aztecs.
Image: The Trustees of the British Museum.

[310] High-level skills were required to polish and shape the black mirrors, and archaeologists believe respected artists sought by the elite created them. See Ménager, Matthieu, Silvia Salgado, and David Freidel. "Introduction: Recent Research on Iron-Ore Mirrors in Mesoamerica and Central America". *Ancient Mesoamerica* 35, no. 1 (2024): 1–5.; Stirling, M.W., MD. Coe, D.C. Grove, and E.P. Benson. *The Olmec & Their Neighbors: Essays in Memory of Matthew W. Stirling*. Dumbarton Oaks Other Titles in Pre-Columbian Studies. Dumbarton Oaks Research Library and Collections, Trustees for Harvard University, 1981: 128-130; Andrieu, Chloé, and Naya Cadalen. "The Other Side of the Mirror. Maya Late Classic Iron-Ore Artifact Production: An Insight from Cancuen". *Ancient Mesoamerica* 35, no. 1 (2024): 97–114.

[311] The Claude glass is often said to have shaped the modern idea of a landscape. Claude glasses were usually fabricated like mirrors with a darkened tinted surface, thus they were not made from ilmenite or metallic ore. Claude glasses were named after the 17th century French Baroque artist Claude Lorrain, and were associated with the emergence of the "picturesque" aesthetic category. See Claude Glass. 1780-1775. Victoria & Albert Museum Prints, Drawings & Paintings Collection; Winterhalter, Elizabeth. "The Claude Glass Revolutionised the Way People Saw Landscapes". JSTOR Daily, 18 February 2021.

The black mirror associated with the infamous 14th century alchemist, occultist, polymath and advisor to Queen Elizabeth, John Dee, on the other hand, is directly related to the black mirrors of Mesoamerica. Dee's mirror was acquired during the colonisation of modern-day Mexico.[312] It was likely crafted by the Aztecs and brought to Europe following the Spanish conquest, but at some point, it was given a leather case inscribed with: "The Black Stone into which Dr Dee used to call his Spirits". Exactly how the black mirror came into Dee's possession – who was also known by the code name 007 – remains unclear. Today, the object is associated with the entangled relationship between science and magic in the late Renaissance, as well as with the European colonisation of the Americas. In other words, the material of ilmenite is intertwined with histories of magic and science under the shadow of colonial modernity.

Shimmer: in-betweenness made visible

Regarding ilmenite's shimmering qualities, which initially drew me to the material, I found that, according to anthropologist Deborah Bird Rose, shimmering can be understood as the "visible oscillation between different states".[313] In other words, shimmering – or something that shimmers – can be approached as a process and a state of in-betweenness made tangible and visible. This observation is particularly relevant to my interest in states of in-betweenness, and how these manifest in my work when I use the method of shifting.

In her essay "Shimmer: When All You Love is Being Trashed" (2017), Rose approaches shimmering as an interplay between matter, light, spirits and potential. Rose develops her ideas from Indigenous Yolngu Aboriginal cosmology and their processual art-making technique, which involves first laying down a dull painting surface before adding details that produce a brilliant shimmer. For the Yolngu, the brilliance is a manifestation of ancestral power. Based on this anthropological work, Rose proposes that shimmer is the "iridescence of life in interaction", the brilliance of processes from which *life is made*[314].

I am aware that referencing these histories of ilmenite and shimmering may appear to invoke contexts and reference points external to the cultural setting of my research sites – the titanium industry and the Norwegian experience. Nonetheless, I wish to include them, as I find they offer valuable insights into the mineral that became central to my material research. Beyond its role as a raw material for the titanium industry, ilmenite has few notable applications in the West. That ilmenite would lead me to material histories beyond Western contexts was something I could not have anticipated – the material had its own story to tell. I discovered that ilmenite holds significance not

[312] Not made from ilmenite but obsidian, the black mirror used by John Dee, now part of the British Museum's collection, was recently found to have originated in what is now Mexican territory. See "A 'Spirit Mirror' Used in Elizabeth's Court Had Aztec Roots". *Nature (London)* 598, no. 7880 (2021): 239–239.
[313] Rose, Deborah Bird. "Shimmer: When All You Love Is Being Trashed". In *Arts of Living on a Damaged Planet: Ghosts and Monsters of the Anthropocene*, edited by Anna Lowenhaupt Tsing. Minneapolis, US: University of Minnesota Press, 2017.
[314] Rose, "Shimmer: When All You Love Is Being Trashed", 2017.

only as a portal to other realms – worlds beyond the visual regime of the white material – but also through its ability to evoke shifting, that is, states of in-betweenness.

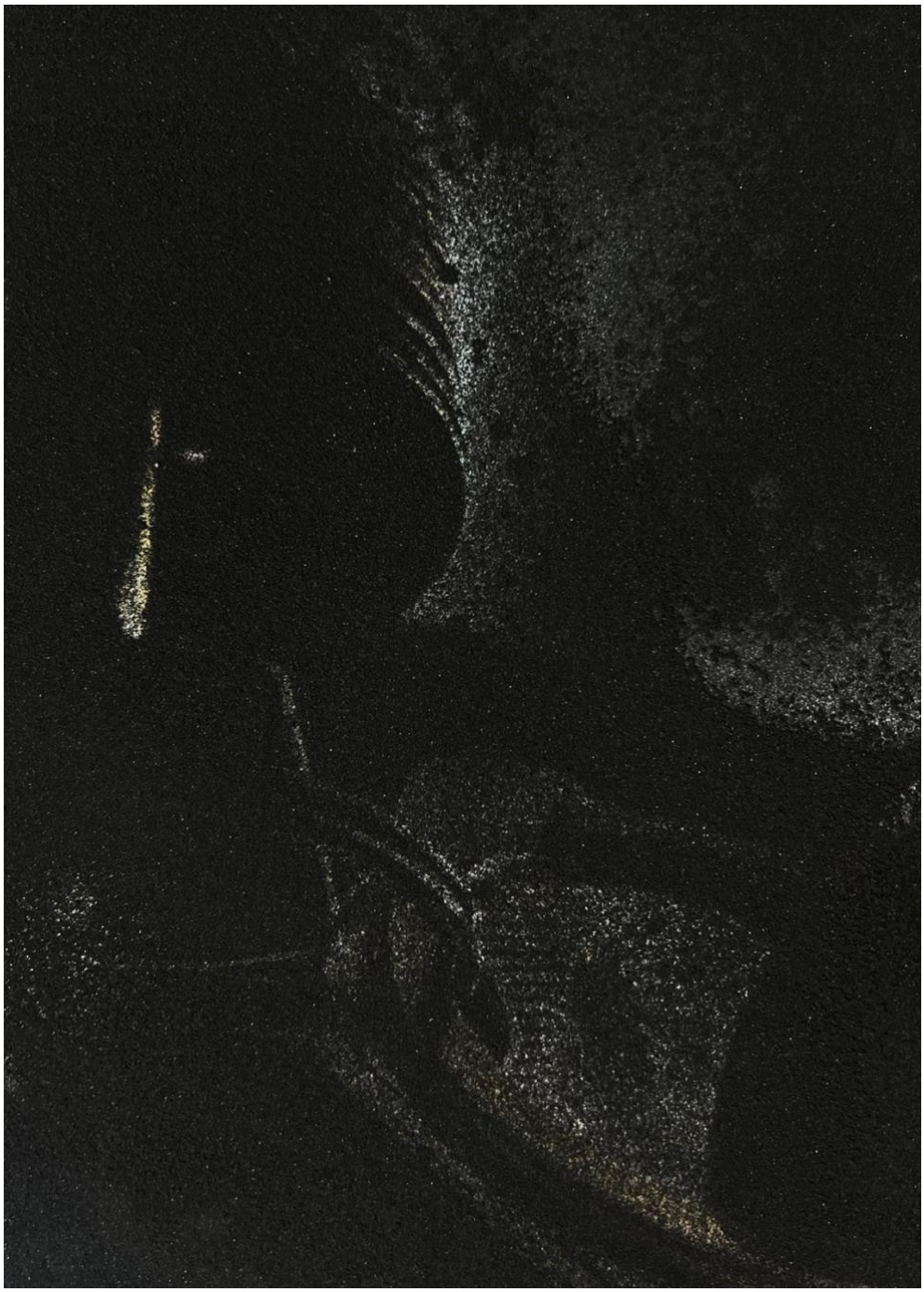

Figure 40 *Portal/Terrain* (2024), ilmenite on photo paper, detail. The complete series will be presented in the exhibition installed for the viva voce, as specific lighting is essential for fully experiencing the artwork.

Figure 41 *Portal/Terrain* (2024), ilmenite on photo paper, detail. The complete series will be presented in the exhibition installed for the viva voce, as specific lighting is essential for fully experiencing the artwork.

Metabolic shifting

Though *Portal/Terrain* (2024) resolved some of the issues I had been grappling with, the question of how others might interpret these artworks remained. Specifically, I wondered whether the series would prompt viewers to fundamentally rethink image-making processes in relation to titanium dioxide. Without accompanying text, I believe some aspects of *Portal/Terrain* and the research behind the artwork remain impenetrable, leaving this aspect unresolved. However, I believe sufficient context can be provided when this work is presented alongside the two main video works produced

as part of this research – *The Opacifier (Erased White City)* (2024) and *Chemical Wedding* (2022-2024).

Another potential issue with *Portal/Terrain*, in light of this chapter, is that my engagement with ilmenite risks evoking Romantic undertones. Romanticism often viewed the natural world as a place of unity and holism, and where mining was seen as a journey into a dense, dark "sparkling" underworld, filled with mystery and wonder. The association with the "underworld" and "inverted astrology" – the idea of uncovering a hidden, "magical" realm beneath the earth – is tied to this early industrial imagination. These narratives uncritically framed extraction as a sublime encounter, often obscuring the violent disruption of both human and non-human environments.

In the context of *Portal/Terrain*, this risk of invoking a Romantic reading could complicate the work's critical stance on extractivism and its role in the visual regime of titanium dioxide. In producing *Portal/Terrain*, I was interested in the series of artworks as a critical reflection on how extractive industries shape both our material world and visual regimes. While I aim to question and examine the cultural and environmental impacts of ilmenite mining, Romantic holism might suggest a more harmonious or even redemptive view of the relationship between the extractive activity and the ecologies it impacts. This could undermine the critical lens I seek to apply to the historical and contemporary entanglements of image-making, materiality and extraction within the titanium industry.

Moreover, I perceive *Portal/Terrain* as contributing to the artistic field of molecular practices, exemplified in this chapter by the artist Pamela Rosenkranz. Rather than engaging with a chemical solely in its final form as a synthetic product, like Rosenkranz's work*, Portal/Terrain* investigates the processes involved in the white substance's *creation*, tracing the extractive and material histories of a molecular resource. In this chapter, and through *Portal/Terrain*, I have also sought to question what is excluded when references to the raw material for the white pigment are omitted from the promotional imagery produced by the titanium industry. By engaging with the raw material, ilmenite, which was once mediated and communicated by the pigment industry and systematically removed from its promotional materials later on, I aim to reinstate a hidden relationship that is essential to the metabolism of the titanium dioxide industry. Furthermore, I have sought to reintroduce into the field of molecular practices an enigmatic aspect, as seen in Lutz Bacher's 2012-2013 installation *Black Beauty*.

Through a method of shifting, *Portal/Terrain* operates within a space of semi-opacity and oscillation, examining states of in-betweenness, existing neither fully as image nor fully as material, and thereby bringing the raw material composing the surface of the images into view. In doing so, I aim to engage with the various histories that ilmenite evokes, while also drawing attention to the processes of image-making themselves. In this way, I seek to comment on the often unseen extractive histories that contribute to the creation of an image's surface. In this

light, *Portal/Terrain* could perhaps be considered a "quiet act"[315] operating within the unthought space of the visual regime of titanium dioxide. My focus on the movement downward and below, along with the materials and beings encountered in this pursuit, seeks to cut through the visual regime of white material by rematerialising, re-historicising, and reconnecting the substance to its material stories. These stories reveal histories of extraction, colonial legacies, and racialised matter, yet they also gesture toward other worlds and possibilities.

[315] Here, I borrow and rephrase Yusoff's words via Campt. In the tradition of black poetics, Yusoff proposes that new intimacies with the inhuman and with matter are forged and reworked to create a new geology of belonging. This geology comprises non-stratified forces that present a sense of possibility, refusing to be captured by White Geology and colonial modernity. These are, in other words, "quiet acts" of refusal that operate within the unthought space of White Geology. See Yusoff, *A Billion Black Anthropocenes or None,* 84-88.

Chapter 4:

The Opacifier (shutdown)

White shuts out, is opaque, you cannot see through it. Power-crazed white.
– Derek Jarman, *Chroma: A Book of Colour*, 1994.

We take pride in making the world brighter with the most effective whitening agent in the world – titanium dioxide.
– Kronos Worldwide, Inc., 2022

Shutdown

One Thursday morning in February 2023, I received an email: "Problems have occurred. Please call me". The host, my contact at the titanium pigment company, who had previously offered me a ton of ilmenite, informed me that I was no longer welcome to visit the mine or the pigment plant, nor would I receive the materials as we had discussed. "I could have given you as much as you wanted", he said, "but unfortunately, this is no longer possible". The host apologised but made it clear there was nothing more he could do. I asked if time might help, and whether waiting until the media attention had subsided would make a difference, but he stood firm: "No". The white business had shut its doors on me. The directive had come from the highest ranks of Kronos Worldwide, Inc., the titanium headquarters in Dallas, Texas, and the majority owners of the Norwegian titanium industry. The American branch had issued a full closure of all facilities, prohibiting further collaboration with "researchers and artists" across their international subsidiaries.

The week prior, the headline "Norwegian government funds study to find out if white paint is racist" began to spread across alt-right online circles as well as mainstream and right-wing media. The first major research project (in addition to my own study) on titanium dioxide, titled *NorWhite* and led by Norwegian architectural historian Ingrid Halland and artist and researcher Marte Johnslien,[316] triggered this viral backlash. Upon receiving large sums of public funding, a project description for *NorWhite* was published online. A bullet point in the project layout stated that the research would examine how Norway, by giving the world a substance that "is present in literally every part of modern life", had "led to an aesthetic desire for white surfaces", which the project would investigate to determine if it is historically related to "racist attitudes".[317] This area of research

[316] Halland, Ingrid. "NorWhite | TiO2 Project", 2023; Halland and Johnslien, "With-On White", 2023.
[317] These sentences were reproduced by a range of right-wing media outlets, such as Breitbart and New York Post/Fox News. See Penley, Taylor. "Norway Funds Research to Find out If White Paint Is Racist". *New York Post, FOX News*, 20

represented one of several focuses, yet it did not go unnoticed by a right-wing columnist who specialises in scrutinising and "exposing" publicly funded Norwegian art and research initiatives.[318] After the columnist's piece was published, the story snowballed. The headline spread to English-speaking right-wing media and went viral in so-called "anti-woke" social media circles, eventually culminating in coverage on Fox News. The researchers informed me that they received daily threats in their inboxes for weeks.[319] No longer inconspicuous, the white material had been *seen*. No longer neutral, the charged nature of titanium dioxide had surfaced, albeit through dismissal and ridicule. The exact reasons for the industry's order to lock down remain unknown to me, and no explanation was offered.

Viral relations

In this chapter, I address the set of relations that crystallised when the viral backlash occurred, when the "white business" shut down and when a company that believed they were invisible realised they were not. Through sudden public attention (and shutdown), what formerly passed as unseen – both the material of titanium dioxide and its extractive industry – came into view. In the following section, I discuss how the incident shed light on the opaque nature of the extractive industry of titanium dioxide, before laying out how encountering this difficulty in conducting my research led me to alter my approach in both research and practice. The chapter departs from the research sub-question: *how might image-making processes be rethought through theoretical and artistic research on titanium dioxide, with a focus on the white material's historical inheritances within the context of the Norwegian experience?*

In my practice, the shutdown precipitated me to develop a new moving image work in London titled *The Opacifier (Erased White City)* (2024), which explores the (white) material residues of the year 1908 in physical sites and the realm of moving images, employing strategies of shifting. In my research, I focused on how the Norwegian titanium industry has gradually withdrawn from public view – initially occupying a public role, but later adopting a more indirect position, from which it has nonetheless contributed to the ongoing emergence of a visual regime of material whiteness. Additionally, I explore the relationship between titanium dioxide and modernisation in post-independence Norway – a country often perceived as peripheral to imperialism, yet one that absorbed elements of colonial ideology before the onset of modernism. Finally, the viral incident led

January 2023. Williams, Thomas D. Williams. "Norwegian University Studies Role of White Paint in Promoting Racism". *Breitbart*, 23 January 2023.

[318] Teigen, Espen. "Offentlig Pengebruk, Norsk Politikk | Får 12 Millioner Skattekroner Til å Forske På Hvordan Norge Gjør Verden «hvitere»: – Det Aller Tåpeligste Jeg Har Sett Noen Gang" [Public Spending, Norwegian Politics | Receives 12 million Kroner of Norwegian Taxpayer's Money to Research How Norway Makes the World 'Whiter': – The Most Stupid Thing I've Ever Seen]". *Nettavisen*, 2023

[319] The viral backlash and harassment of the researchers parallels the experience of classicist scholar Sarah Bond, who received death threats from the alt-right for her published work on the polychromy of classical sculpture. See "Classicist Receives Death Threats from Alt-Right over Art Historical Essay". *Artforum*, 15 June 2017.

me to examine how the Norwegian titanium industry is positioned within the broader global pigment economy.

Access and restriction

The access I had been granted before the COVID-19 lockdown was unusual for the extractive industries. There is a tradition of trust in public institutions and companies in Norway,[320] with the consequence that there is less critical scrutiny of both the public and private sectors. This may explain why, for me, there was an easier way in. It is doubtful that I would have gained the same access in, for instance, the US or the UK. Even within the mine and pigment plant, this cultural divide was apparent; I was barred from photographing any equipment belonging to the American branch of the company. I spotted American canisters, barrels, tubes and chains that likely have been unphotographable since the 1950s. Otherwise, there were no restrictions. Initially, I was generously welcomed by the Norwegian subdivision. Even in a Norwegian context, the access I was granted was unusual, especially when compared to the hermetically sealed fossil fuel industry (which has likely adjusted to international standards). Had I not been Norwegian, securing this access might have been more difficult.

Since the *NorWhite* project launched around the time of the viral backlash, it is unlikely that the researchers would be granted the same access I benefited from during the middle phase of my research. Although one of the researchers associated with *NorWhite* had visited several times previously, I was the last researcher to gain inside access to the titanium dioxide industry in Norway before the ejection of researchers and artists. The shutdown marked the third phase of my project. I began my study with no access to my research sites due to the COVID-19 pandemic and the travel restrictions of 2020 and 2021. When I was eventually able to travel, I visited the pigment plant and the mine twice – once under the supervision of the company, and once on my own – before access was once again revoked. Thus, this thesis has been developed through alternating phases of infrastructural access and restriction, even though the white substance, of course, remains materially pervasive. Upon being expelled from the sites, I redirected my focus to my immediate environment in London.

[320] For example, in a recent study on trust in public institutions post-COVID-19, Norwegians reported significantly higher levels of trust compared to, for instance, the British. See Price, D., Bonsaksen, T., Leung, J., McClure-Thomas, C., Ruffolo, M., Lamph, G., Kabelenga, I., & Ostertun Geirdal, A. “Factors Associated with Trust in Public Authorities Among Adults in Norway, United Kingdom, United States, and Australia Two Years after the COVID-19 Outbreak”. *International Journal of Public Health* 68 (2 August 2023); OECD. “Drivers of Trust in Public Institutions in Norway’” OECD, 15 March 2022.

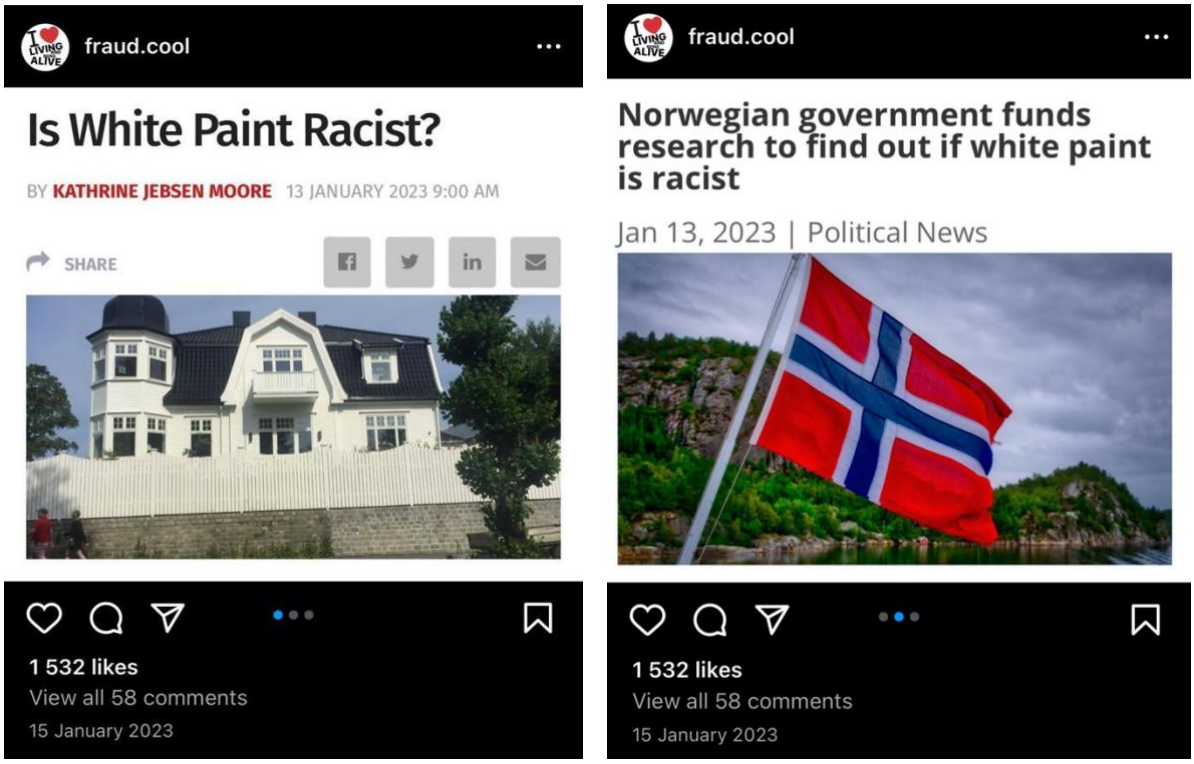

Figure 42 Screengrabs of the news article headline turned into a meme and circulated on Instagram.

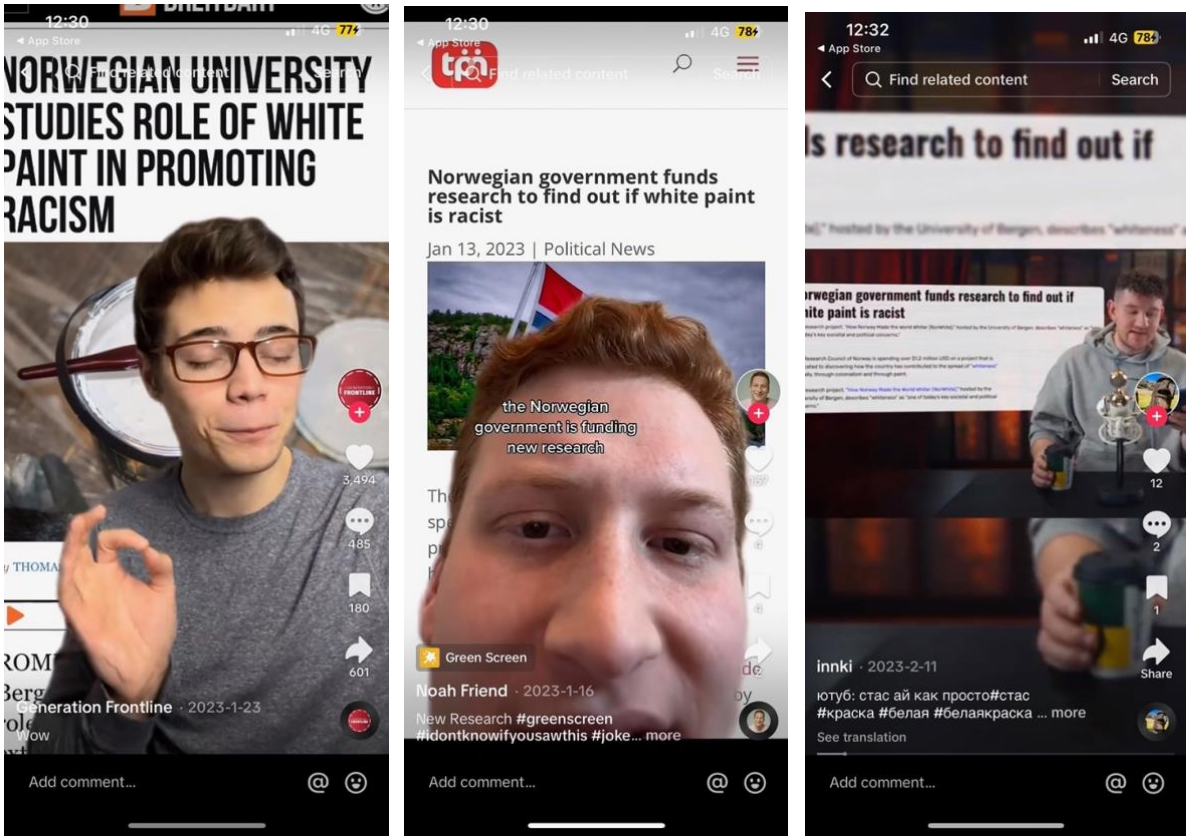

Figure 43 Stills from TikTok videos responding to the news headline and the memes.

Obscure substrate of extraction

Most extractive companies do not rely on branding and have little to benefit from public exposure and media attention. In his book on extractive economies, *Material World* (2023),[321] writer Ed Conway proposes that the private nature of these businesses is the reason why extraction and industrial products and their role in modern life are little known and so often go unnoticed: "Most people who work in the chemicals are, like many in the Material World, desperately private." One of Conway's interviewees declares: "The first thing you learn in this business is never to talk to the press. If you're talking to the press, it's usually because of an emergency or a disaster."[322]

In the book, Conway posits a split between what he refers to as the "ethereal world" and the "material world". The former refers to the world of companies dealing with branding, products and ideas, and the latter the world of substances boringly extracted to produce the former by the "most important companies you've never heard of".[323] The most recognised brands – Google, Apple, Amazon and the like – all rely on an obscure network of companies, often multinationals that have operated in the shadows (or, more precisely, in the darkness of pits) for decades.[324] The titanium dioxide company Kronos Worldwide, Inc. is one of those companies.

Conway moreover argues that the privacy on the material world's behalf – and a general lack of interest from the public, who are more concerned with the immaterial world and its ideas –means we know very little about how these companies function and what extractive and chemical processes everyday products rely on. Conway adds that, given the complexity of these products, "no single human could carry out, or for that matter direct, these numerous processes".[325] As artist Sung Tieu has demonstrated, there is also extensive secrecy surrounding chemical inventions in the extractive industries. As discussed in Chapter 1, Tieu created a work in which she tracked thousands of hazardous chemicals used in fracking, some of which are recent inventions unknown even to experienced chemists, as they hold the status of "confidential business information."[326] This is no longer uncommon in the extractive industries.

According to Conway, the bias towards the immaterial world has led to a situation where we do not accurately measure the quantity of materials extracted from the earth – in fact, such data does not even exist.[327] In this regard, our impact on the globe as geological agents is unknown. We have a wide range of scales and measures to account for the value produced from the material world, but rarely do we measure the materials extracted or displaced, or the waste product generated as part of these activities.[328]

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[321] Conway, Ed. *Material World – A Substantial Story of Our Past and Future*. New York City: Knopf Publishing Group, 2023, 151.
[322] Conway, *Material World*, 151.
[323] Conway, *Material World*, 13-14.
[324] Conway, *Material World*, 13, 14.
[325] Conway, *Material World*, 11.
[326] Packard, "Sung Tieu: Not Fracking Around", 2023.
[327] Conway, *Material World*, 15, 16.
[328] Conway, *Material World*, 16, 21.

When I asked the host how much rock is required to produce titanium dioxide, he informed me that titanium dioxide accounts for about one-fifth of the ilmenite extracted – a much higher percentage than for rare earth minerals, yet still significant. However, the amount of waste rock disposed of during the search for ilmenite is not precisely recorded. The pigment company is continually forced to invent new strategies for its disposal. At the core of the pigment industry lies the task of making matter disappear – matter that was never officially registered as displaced in the first place.

Extractive aesthetics

Conway informs us that in 2019, we "extracted more resources than humankind did in the vast majority of its history – from the earliest days of mining to the Industrial Revolution, world wars and all."[329] We rely on expanding mineral economies to make the green transition,[330] and so we are likely to extract even more matter from the earth's surface in the future.[331] In his book, Conway focuses on what he identifies as the six essential substances in human history, which he asserts have built our modern world and will shape our future: sand, salt, iron, copper, oil and lithium. In the case of titanium dioxide, its extractive industry is driven by aesthetics. In contrast to other major, growing mining industries that extract substances to meet human primary needs such as energy or nutrition, titanium dioxide is not extracted for life-sustaining purposes but primarily for aesthetic reasons, which of course also converge with social and political forces and above all: the demand to generate profit.

Without the white substance, our papers and books would appear more yellow, dull and transparent, as would photo paper, projection screens, plastics, paints, toothpaste, candy, iPhone covers and cigarette papers. Hospitals and white cube galleries would no longer have that striking, sterile "neutral" white (though, of course, we would not recognise what a striking sterile white is if we had never seen a titanium dioxide surface). Pastel-coloured paints would be less opaque, and we would not have sunscreen – or if we did, it would be a zinc-based product. Zinc would also be the default for anything we wanted to present as white, yet zinc white is more translucent and less luminous than titanium white. Titanium dioxide is everywhere, but it is not essential. Aside from its use in new smart surfaces as titanium nanoparticles and recent experiments to produce white paints as an alternative to expensive, energy-intensive air conditioning – both still niche areas of technological innovation – titanium dioxide primarily serves as a *finish* to a surface.

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[329] Conway, *Material World*, 2023, 15.

[330] The titanium dioxide industry promotes itself as a participant in the new green economy through the use of titanium nanoparticles in self-cleaning, antimicrobial surfaces and smog-absorbing buildings. However, the industry's core products remain coatings and surfaces.

[331] At the beginning of 2024, Norway granted controversial permission to begin exploratory deep-sea mining in its territories, a move opposed by both the UK and the EU. The effects of deep-sea mining on global ecosystems remain unknown, though they are likely to be detrimental. Initially, the permits focus on rare earth minerals used in batteries and similar technologies. However, large quantities of ilmenite are also found on the seabed along Norway's west coast, extending beyond the North Sea into the Atlantic. This could become a future target if Norway permits large-scale industrial mining. See *BBC News*. "Deep-Sea Mining: Norway Approves Controversial Practice". 9 January 2024, sec. Science & Environment; Conway, Ed. *Material World*, 2023, 15.

This reveals an extractive industry, driven by a capitalist logic, silently operating underground to produce a visual regime that shapes aesthetic experiences tied to notions of neutrality, hygiene, beauty, absence, taste, cleanliness, ethereality and other modern myths. I propose that titanium dioxide compels us to rethink the relationships between the "material world" and the "ethereal world", as the extractive visual regime of titanium dioxide operates within both. It does so through various forms and phases of invisibility, even when the final refined product of titanium pigment is distributed within the ethereal world as a substance that promises the absence of material reality.

Norwegian invisibility

The titanium industry in Norway has largely remained sheltered from public scrutiny. Apart from environmental protests in the 1980s against the disposal of mine waste in Jøssingfjord – which received national press coverage – the pigment company has gone largely unnoticed. These protests were "successful" in that they led to new legislation, forcing the mining company to shift its waste management practices from waterways to land. However, the media attention at the time focused not on the product (the white pigment), its cultural significance, or the chemical and mechanical processes used to derive it, but solely on the environmental consequences of the industry, referenced only by the company name. In other words, the general public remained unaware that these sites were producing material whiteness.

According to a newspaper database,[332] I found that there were around a dozen news articles published annually in the mid-1980s concerning the environmental protests, followed by decades of virtually no mention of the pigment company, the product or the mining sites until the 2010s, when dozens of scientific articles began to appear, focusing on advancements in titanium pigment technology. From then on, coverage steadily increased, reaching a peak in 2022 and 2023, with news stories about the EU ban on titanium dioxide as a food additive,[333] discussions and protests surrounding the establishment of a new titanium dioxide mine in Northwestern Norway (Engebøfjellet) and a range of articles referring to the *NorWhite* project and the media backlash surrounding its research.

The viral headline "Norwegian government funds study to find out if white paint is racist" was transformed into a meme in the square format of Instagram posts, which spread even further. The meme was simply a screenshot from one of the first online articles describing the *NorWhite* project, with the headline paired alongside a Nordic landscape and a Norwegian flag. The meme circulated across Instagram, TikTok and various online forums. On these platforms, the headline was

[332] These numbers were generated using Atekst Retriever, the largest news database in the Nordic countries, which contains over one hundred million searchable articles.

[333] As mentioned in the Introduction, in August 2022, the European Union banned titanium dioxide as a food additive. See Shi, W., Han, Y., Guo, C. et al., 2019; Conference, Goldschmidt, 2021; Tyner, K. M., A. M. Wokovich, D. E. Godar, W. H. Doub, and N. Sadrieh. 2011; Jovanović, Boris, and Héctor Guzmán, June 2014; Larue, Camille, ed. "Ecotoxicity of Titanium Dioxide Nanoparticles". *Nanomaterials MDPI*, no. Special issue (Forthcoming).

presented without any context, deemed laughable, absurd and ridiculous. Most articles that followed this viral incident were authored by members of right-leaning, "anti-woke" online forums, TikTok users or the conservative press. The tone of their responses was largely consistent: equating white paint with racism was considered absurd and laughable. Wokeness had not only "gone too far", but had also reached its extreme, logical conclusion – where even the mere mention of the word "white", or the existence of white paint, was labelled "racist".

Yet this was something the online spreaders already knew; the moral panic conveyed by the titanium paint meme – so typical in identity politics and culture wars – primarily served to confirm pre-existing beliefs and opinions. None of the writers appeared genuinely shocked; the predominant affect was one of glee, and no one seemed inclined to conduct further research or investigation into the topic. Ultimately, the meme functioned as clickbait, feeding the pleasure of confirmation bias. In many ways, the viral backlash marked a moment when the Norwegian titanium industry became framed by culture wars imported from the US. However, more significant for my study than the incident itself was the company's reaction.

It wasn't until the media attention in 2023 that the Norwegian titanium industry, as a producer of a white material, was truly *seen*. In addition to the "Norwegian government funds study to find out if white paint is racist" meme circulating online, there were also long-format feature articles chronicling the industry's history, accompanied by images from the mining company's business archive and analyses of their cultural and social significance in relation to national identity, race and ideas of progress and modernity. These were materials that the Norwegian subdivision had initially offered to researchers with trust, and perhaps some naiveté, before performing a U-turn under orders from the American branch. The host, a chemist by training who had worked for the company for over 30 years, expressed apprehension about the coverage and its focus. With each news story, he remarked, "This is just not what we do". After decades of quietly operating in the background, the industry's sudden visibility caused deep unease.

Titanium and the nation

But this was not always the case for the Norwegian titanium industry. In the early days of pigment production, during the 1910s and 1920s, the company produced promotional materials and even orchestrated PR stunts to associate the white pigment with an image of the nation, as Halland and Johnslien have demonstrated.[334] For instance, the titanium company sponsored the white paint for Norwegian polar explorer Roald Amundsen's ship when he embarked on his 1918 expedition to the North Pole[335] – thus linking an imaginary of chromatic whiteness, exploration and triumph with a distinctly Nordic flair. Leslie presents the idea that chemical and material histories are always also

[334] Halland and Johnslien, "With-On White", 2023.
[335] Halland and Johnslien, "With-On White", 2023.

political and aesthetic histories.[336] Similarly, imaginaries of chromatic whiteness found contemporary salience at a time when Norway had recently gained independence from Sweden, and efforts to construct a new national identity were underway, as Halland and Johnslien assert. The white product of titanium dioxide aligned with the young nation's desires, promoting notions of progress, modernity, brightness and strength with a Nordic twist.[337]

While building a new public archive on titanium mining in Norway, Halland and Johnslien discovered a set of promotional images produced by the pigment company that establish a racial distribution along chromatic colour lines.[338] In one example, a photographic image depicts Black individuals in a desert landscape, presumably in a country somewhere on the African continent – though no details are provided – dressed in bright, colourful clothing. This is contrasted with an image of a pristine, snow-white winter landscape, devoid of people. Viewed through the lens of Batchelor, these images may be seen as drawing on chromophobia.[339] Batchelor describes chromophobia as a societal impulse to purge colour from a culture that manifests in various ways. One manifestation is the notion that colour belongs to a "foreign" body – the body of the feminine, the primitive, the non-white, the queer – in short, the alien. Another is the perception of colour as superficial, subordinate and cosmetic. Together, as Batchelor argues, chromophobia constructs colour as both dangerous and trivial. When something is considered both dangerous and trivial, it reveals a set of assumptions that are the hallmark of prejudice, Batchelor adds.[340]

The promotional image that associates vibrant hues with black and brown skin is contrasted with an image that supposedly evokes its opposite: chromatic whiteness, represented by an all-Norwegian winter landscape, devoid of foreign elements and entirely absent of people. In other words, a primordial state of "natural" whiteness equated with the nation. This image combines the pastoral, which has been a strong element of Norwegian national identity since the cultivation of national romanticism of the 19th century,[341] with the aesthetics of all-white modernism.

Norway is often viewed as having been peripheral to Europe's colonial forces, yet in the early stages of nation-building, the country looked to major imperial powers, such as the UK, for guidance. The notion of *Norwegian exceptionalism* – the idea of Norway as uniquely humanitarian and a peace-promoting force in the formerly colonised, developing world – has now been thoroughly

[336] Leslie, *Synthetic Worlds*, 2005.
[337] Halland and Johnslien, "With-On White", 2023.
[338] Halland and Johnslien interviewed in Hareide, Helene. "Eit norsk industrieventyr endra utsjånaden på verda [A Norwegian industrial adventure changes the way the world looks]". *Morgenbladet*, 2023.
[339] I have not yet encountered any studies that explore how chromophobia has developed independently in non-Western cultures. In Batchelor's work, chromophobia appears as a distinctly Western, modern phenomenon. See Batchelor, *Chromophobia*, 23.
[340] Batchelor, *Chromophobia*, 23.
[341] The significance of pastoralism and the connection to the "outdoors" in Norwegian culture is partly due to the simple fact that the average population density in Norway is 13 people per square kilometre, compared to 277 in the UK. See Hylland Eriksen, Thomas. "The Role of Nature in the Nordic Countries". *Aarhus University*, 2019.

challenged.[342] While the Nordic country does not have a direct colonial history, Norway has significantly profited from Europe's position as a global centre and has actively contributed to the production of colonial discourse.[343] This is evident in the way the titanium industry incorporated colonial imagery and imaginaries into its repertoire, such as the image of the winter landscape discussed in the previous paragraph. This occurred despite the industry operating solely within Norwegian territory and without significant exchanges or flows of materials or products with other regions of the world.

In the next section, I will demonstrate how I approached addressing Norwegian material whiteness and its associated imaginaries, as it relates to a broader aesthetic regime inherited from colonial modernity, within a moving image-based practice.

The Opacifier

I had intended to return to the mine and the pigment plant to gather more footage and conduct further research, but after the shutdown, this was no longer possible. This obstacle gave rise to the question of what could be generated from the new limitations imposed on my research. The obscure yet forceful response from the Dallas headquarters of the pigment company compelled me to examine the visual regime of titanium dioxide and the Norwegian titanium industry within a broader geographical context, while also reflecting on issues of infrastructural access and restriction.

During the COVID-19 lockdown, I had traced the discovery of ilmenite and the chemical element titanium to Cornwall. With my research and practice focus now redirected, I began once again to explore how the white material manifested in my immediate surroundings, this time shifting my attention to London. I had often noticed White City on the TFL map but had never visited the neighbourhood, which, as far as I knew, was dominated by a shopping mall and little else. I imagined White City as a non-place,[344] in the style and with the ambience of the early 2000s. No reason to visit had ever presented itself – until I began filming a new video work, initially titled *The Opacifier*, in various urban areas of London. I eventually visited White City and ended up producing most of the footage there. I will return to this artwork shortly.

Alongside adjusting my approach to the practice-based elements I had intended to develop on-site in Norway, I also shifted my focus in the studio. I moved away from producing still images and concentrated primarily on moving images, which I believed could engage more generatively with my research question: *how might image-making processes be rethought using theoretical and art*

[342] See Loftsdóttir, Kristín, and Lars Jensen, eds. *Whiteness and Postcolonialism in the Nordic Region: Exceptionalism, Migrant Others and National Identities*. Routledge, 2016; Bøstein Myhr, Annika. "Challenging Nordic Exceptionalism: Norway in Literature by and about Irregular Migrants". *Law and Literature*: 1–30.
[343] See Loftsdóttir and Jensen, eds. *Whiteness and Postcolonialism in the Nordic Region,* 2016; Bøstein Myhr, Annika. "Challenging Nordic Exceptionalism" 1–30.
[344] "Non-place" is a neologism coined by the French anthropologist Marc Augé to refer to transient, public spaces where humans remain anonymous and spaces that do not hold enough significance to be regarded as "places" in their anthropological definition. Such places include motorways, hotel rooms, airports and shopping malls. See Augé, Marc. *Non-Places: Introduction to an Anthropology of Supermodernity*. London: Verso, 1992.

research on titanium dioxide, with a focus on its material specificity and the Norwegian experience? Video allowed for an extended temporal engagement with the image as it relates to the white substance, and this interested me because it could provide heightened awareness of its functions.[345] I also find moving images better suited to exploring perception as it forms, and the states of in-betweenness that exist between materiality and image.

Figure 44 Robert Rauschenberg, *Erased de Kooning Drawing* (1953). Drawing, 64.14 cm × 55.25 cm × 1.27 cm. Image courtesy of SF MoMa.

In parallel, I abandoned my experiments with the white pigment, as I found this approach risked recentring both chromatic whiteness and the white substance as a commercial product. I returned to working with titanium dioxide and I developed a new approach, using “found” titanium pigments in

[345] Lury and Wakeford, *Inventive Methods*, 17.

my filmmaking. I obtained the pigments by crushing ibuprofen pills, acquiring cosmetic fixing powder, and rubbing sandpaper against a surface of screen paint, photographic paper and a white exhibition wall to collect white titanium particles. “Extracting” the material from its situated use in the world felt like a more interesting gesture than utilising a product fresh from a pigment manufacturing plant – the found pigments were imperfect, no longer the whitest white, with hints of grey and green. In developing this approach, I was interested in how it could address both the pigment as it manifests in physical space and as a material condition to produce moving images (as previously mentioned, titanium dioxide is the pigment most commonly used in projection screens and it is also present in various camera devices, including the iPhone, which I frequently use).

My experiments with found pigments led me to create *The Opacifier*, a video featuring semi-opaque imagery produced by diluting found titanium dioxide pigments in a glass of water and mounting them on a camera lens as a mechanical “image filter” for a handheld iPhone camera. While making the work, I reflected on how titanium dioxide – one of the most widely used industrial pigments today, valued for its dense opacity and luminosity – often functions as the material foundation of perceived “neutral” grounds, such as white image or wall surfaces, which are marked by a notion of absence (of materiality, of anything). I was also concerned with how these materially immaterial surfaces enable visibility. Additionally, I reflected on the notions of “blocking off” and “shutting down”.

By applying the pigment as a filter and against its intended purpose, the material construction of the white “image ground” become the image and vice versa, through a method of shifting. As discussed in the Introduction and Chapter 3, shifting describes my methods that explore states of in-betweenness in pieces that foreground or activate relations through locating gaps, as well as material and representational strategies of semi-opacity, oscillation and shimmering. In the case of *The Opacifier*, I produced semi-opaque imagery – neither fully material images enclosed in themselves, nor strictly representational images pointing to the outside world, but images that oscillated between the two states. I was interested in how such a method could challenge established logic related to the filmic space and the white material though a strategy of “productive failure”.[346]

Erased White City

While making the video piece, I had also taken a cue from *Erased de Kooning Drawing* (1953) by artist Robert Rauschenberg (Figure 44)[347] – via methods of post-structuralist film – to question how a video piece can be produced through erasure. I altered the title of the work to reflect this: *The*

[346] Here, I draw on a phrase from Gianmaria Andreetta. Andreetta writes: “The embrace of failure and imperfection as essential elements in the renewal and disintegration of film creates space within the boundaries of established logic.” See Andreetta, Gianmaria. “Planned Failure”. In *OLD WORLD*, 2023.

[347] Rauschenberg's *Erased de Kooning* (1953) also served as a reference point in the development of my video work *Chemical Wedding*. However, my translation of Rauschenberg’s act of erasure into a method of shifting proved more successful in *The Opacifier*.

Opacifier (Erased White City). Rauschenberg created *Erased de Kooning Drawing*, consisting of a Willem de Kooning drawing that had been meticulously effaced, as part of his attempt to discover whether an artwork could be "produced entirely through erasure".[348] That is, through an act focused on the removal of an image's traces, rather than generating an image. *Erased de Kooning Drawing* is open to a range of interpretations, partly due to the allure of the unseen, and partly because of the artist's enigmatic motivations for erasing the drawing in the first place – the work can equally be read as a "homage, provocation, humour, patricide, destruction, or celebration".[349] Importantly, the artwork would be indecipherable without the inscription on the frame informing the viewer that it is, in fact, an erased De Kooning drawing.

I began experimenting with different strategies to erase footage. However, the final work differs from *Erased de Kooning Drawing* by only performing a partial erasure. Instead of erasing an iconic drawing by a celebrated artist, I attempted to partially erase both the image and its hegemonic white backdrop through a method of shifting.

I found the method produced ghostly, uncanny, dreamlike and occasionally *dull* images. In the video, we move through what appears to be a city or populated area, yet the sites remain partially obscured – sunlight occasionally "blinds" the lens and washes out the image. In creating this work, I sought to explore the unsettling qualities and unhomeliness I encountered while studying the visual regime of the white substance. As discussed in Chapter 2, the Freudian notion of the *unheimlich* or "the unhomely"[350] arises when we are confronted with the strange within the familiar, the strangely familiar or the familiar as strange.[351]

In the Introduction, I explored the idea of titanium dioxide and chromatic whiteness as related to control, particularly in my discussions of Le Corbusier and my own experience of whitewashing as a young girl. I found that the unsettling effect partly stemmed from how the images conveyed a lack of control: with incomplete vision, there is a sense of temporal and spatial disorientation. The footage could also be seen as alluding to the association of chromatic whiteness with death.[352]

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[348] Rauschenberg, Robert. *Erased de Kooning Drawing*. 1953. SF MoMa.
[349] Rauschenberg, *Erased de Kooning*, 1953.
[350] Fisher cites Freud's examples of the unhomely, including doubles, doppelgangers, mechanical entities that appear human and prostheses. A newer example is the uncanny valley effect produced when an animation carries a close resemblance to human appearance – something that seems familiar but not quite. See Fisher, *The Weird and The Eerie*, 9.
[351] Fisher, *The Weird and The Eerie*, 10.
[352] Dyer elaborates on how white, as it relates to death, frequently appears in Western imaginaries. From its inheritance from Christianity to various seminal films – especially within the Western genre – chromatic whiteness often manifests as a warning or an announcement of death. See Dyer, *White*, 207.

Figure 45 Bruce Nauman, *MAPPING THE STUDIO II with Color Shift, Flip, Flop, & Flip/Flop (Fat Chance John Cage)* (2001). Video, 7 projections, colour, sound, 5h45min. Image courtesy of Bruce Nauman/ARS, NY and DACS, London 2024.

In creating this work, I also drew on Bruce Nauman's *Mapping the Studio II with color shift, flip, flop & flip/flop (Fat Chance John Cage)* (2001), in which infrared footage from the artist's studio, recorded over several months, is overlaid with shifting colours, creating an abstracting effect. In the video work, Nauman turns his gaze toward the studio, where "nothing" happens aside from the daily activities of mice and the sound of the wind; similarly, I direct the camera toward the non-place of White City, where little occurs. I would also like to note that my choice of name for the method of shifting was partly inspired by Nauman's title, "colour shift". *The Opacifier (Erased White City)* differs from Nauman's piece in that I aim to highlight the direct relationship between the video and the colour overlay, between the optical moving image and the material moving image, by using titanium dioxide as a filter.

As in Nauman's video, the sound in my work is unaltered; we hear ambient, everyday sounds – cars passing, birds, footsteps and fragments of melodies spilling through the streets. I found that the ambient soundscape enhanced the unsettling effect of the found pigment "filter" and the ghostly images it produced. The footage is close to something entirely mundane, yet not quite. Had I added a soundscape that forced a specific feeling of unease or underlying horror upon the viewer, I believe the results would have felt contrived.

Proto-modernist imperial white

The specificity of the site where the footage for *The Opacifier (Erased White City)* was produced is central to the video piece. Beyond its current function as a non-place, I was also interested in the site's history. After discovering a series of historical images, my interest in White City as a site for recording footage grew from the realisation that the neighbourhood is named after what I refer to as a type of proto-modernist imperial architecture. This architecture was first exhibited at a large-scale public fair in 1908, styled as a colonial exposition – one of the clearest expressions of both conscious and unconscious imperial propaganda.[353] The fair took place the same year that the two Norwegian chemists began developing the chemical manufacturing process for titanium pigment. I became interested in exploring the material residues of 1908, a year in which a chemical invention became intertwined with emerging conceptualisations of chromatic whiteness at the tail end of imperialism and just before the onset of modernism. Known as the Franco-British Exhibition, the 1908 fair, which attracted more than eight million visitors, was the first in a series of White City Exhibitions held on the site until it was abandoned in 1914.

Figure 46 Franco-British Exposition, White City, London, UK, 1908. Image: National Portrait Gallery, London.

In the centre of White City, as it was presented during the fair, and in the images I had collected – some from a bird's-eye perspective, others from a "street view" level – was an artificial lake, which visitors could cross seated in white, swan-shaped boats (navigated by men seemingly modelled after

[353] Geppert, Alexander C. T. "London 1908: Imre Kiralfy and the Franco-British Exhibition". In *Fleeting Cities: Imperial Expositions in Fin-de-Siècle Europe*, 101–33. London: Palgrave Macmillan UK, 2010; Littlefield, David. "White City: The Art of Erasure and Forgetting the Olympic Games". *Architectural Design* 82, no. 1 (2012): 70–77; Mackenzie, John M. "The Imperial Exhibitions". In *Propaganda and Empire: The Manipulation of British Public Opinion, 1880–1960*. Manchester University Press, 2017.

Italian gondoliers). Surrounding the lake was a sprawling yet symmetrical network of buildings covering 140 acres, constructed in various "Oriental" styles. In addition to these structures, which included architectural features from various colonial territories, the fair featured a "Garden of Progress", an "Irish native village" and a "Senegalese native village", all showcasing living people. At the core of the imperialist exposition was an attempt to justify the imperialist project by foregrounding the triumphs of white progress over the perceived "belatedness" of the rest of the world, including "exotic" black people (at the time, according to Dyer, the British considered Irish people to be "black").[354] The buildings featured domes and arabesque arches but had no trace of colour; they were all covered in white plaster – creating an immense, whitewashed city, hence the name, White City.

After World War I, the buildings fell into disrepair and were later demolished in 1937. Later, White City became the site of residential buildings, the BBC's broadcasting centre, and eventually the colossal, air-conditioned Westfield shopping centre. The neighbourhood's name, however, remained unchanged.[355]

The White City of 1908 directly influenced another public fair: The Jubilee Exhibition was held in 1914 in Frogner Park, Oslo, to celebrate Norway's newfound independence from Sweden. The Norwegian fair exhibited many of the same features and ideological sentiments as the 1908 fair – albeit on a smaller scale. Approximately 1.5 million people attended the Jubilee Exhibition – about half of Norway's population at the time – making it the most visited public fair in Norway in the 20th century. The entertainment section of the 1914 Jubilee Exhibition, much like the 1908 fair in London, featured an "exotic" village with living Congolese people, outsourced to the British company European Attractions Ltd. Although Norway had no direct colonial ties, the fair's organisers chose to align themselves with colonial "entertainment practices" via a British subcontractor. Unlike the UK fair, however, there was no whitewashed orientalist architecture; instead, the exhibition featured continental architecture in an "antique" style – yet it was still all-white.

The fair indicates how Norway borrowed aspects of colonial ideology from the UK when building a new national identity post-independence. I propose that the fair reflects a significant moment of cultural transference between Norway and the UK at the beginning of the 20th century, particularly concerning imaginaries of chromatic whiteness, progress and imperialism, which contributed to shape a new visual regime of whiteness. I have not been able to confirm whether titanium white was used to paint the fair's buildings, as the pigment would have been new to the market at the time, but Sam Eyde, who later became co-owner of the titanium pigment company,

[354] Richard, Dyer, *White*, 52.
[355] Geppert, "London 1908: Imre Kiralfy and the Franco-British Exhibition", 2010; Littlefield. "White City: The Art of Erasure and Forgetting the Olympic Games", 2012; Mackenzie, "The Imperial Exhibitions", 2017.

was on the fair's planning committee.[356] This information highlights a structural connection between an event that symbolised the import of imperial whiteness and the emerging Norwegian white pigment industry.

However, more broadly within Norwegian society, the explicit framing of Norway as adjacent to colonialism gradually diminished, giving way to the notion of Norwegian exceptionalism. The cultural transfers and ideologies that contributed to the emergence of the visual regime of chromatic whiteness in its early days fell into obscurity. With the waning of imperial Europe, many countries, such as France, as Ross has pointed out, turned to a form of interior colonialism.[357] In a parallel movement, the imaginary around titanium dioxide, which initially defined itself explicitly in opposition to an Other – whether a non-white person, material (such as black ilmenite), or colour – also became internalised, focusing exclusively on whiteness.

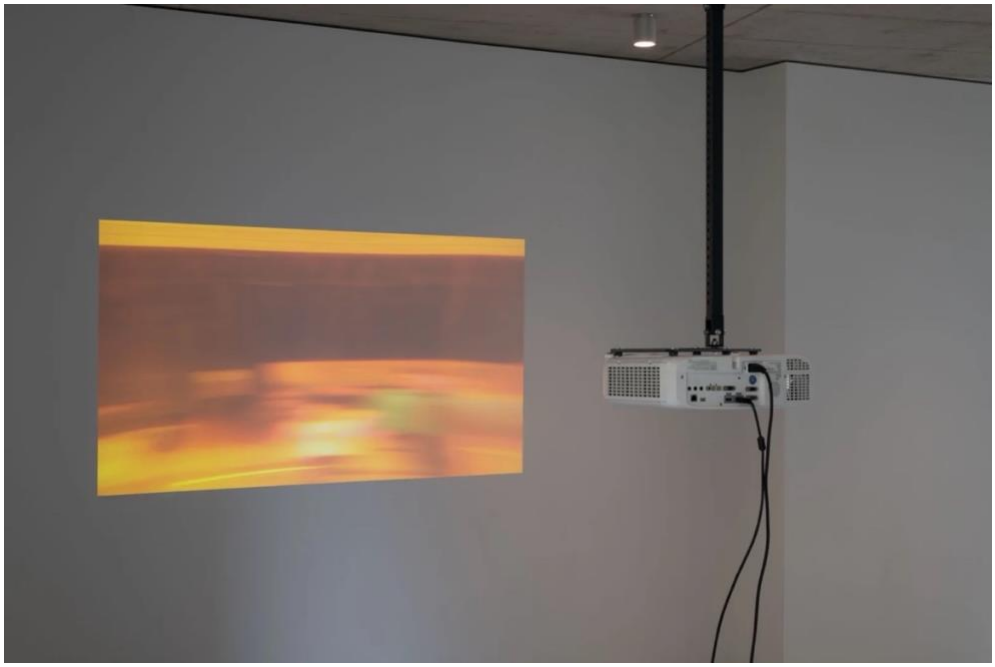

Figure 47 Dora Budor and Noah Barker, *Orange Film I* (2023). HD video, colour, sound 6 minutes 42 seconds. Image courtesy of Galerie Molitor, Berlin.

With the onset of modernism, the visual regime of titanium dioxide became less explicit, and over the course of the 20th century, it became almost entirely implicit due to the normalisation of the white-built environment and the pervasiveness of white pigment on most surfaces considered "grounds". The white substance is, in many ways, one of the most *mundane* pigments we encounter. Its ubiquity is further reinforced by the adjacent Troxler effect,[358] where visual phenomena we are overexposed to gradually disappear from our perception.

[356] See Halland and Johnslien, "With-On White", 2023; Ytreberg, Espen. "Networked Simultaneities in the Time of the Great Exhibitions: Media and the 1914 Oslo Centenary Jubilee Exhibition". *International Journal of Communication*, 2016; Ytreberg, Espen. "Et mediert nasjonsfellesskap [A Mediated Nation]". *Tidsskrift for kulturforskning*, 2013.
[357] Ross, *Fast Cars, Clean Bodies*, 7.
[358] Smith and Sliwinski, eds. *Photography and the Optical Unconscious*, 2017, 265.

It is not only metaphorically that the white material has become increasingly "naturalised", unremarked and internalised. Halland and Johnslien[359] argue that changes in pigment technology also contributed to this shift: when titanium dioxide was engineered into a colouring additive in the 1920s and 1930s, to maximise its brightness and opacifying properties, the material no longer merely covered surfaces, but penetrated deep into the very core of materials. I would add that after the 2000s, with the invention and widespread use of nanosized titanium dioxide particles, the white material has become even more pervasive,[360] "saturating" our materials and products to the point where the pigment is believed to penetrate the cell walls of humans and other organisms, dispersing through the tissues and fabrics of our bodies.[361]

Material residues in site and image

While filming *The Opacifier (Erased White City)* in the streets of the former proto-modernist imperial site of the 1908 Franco-British Exhibition, now a shopping centre, I considered myself to be engaged in a psychogeographic dérive through the area. With the work, I aimed to explore the space and the image between concept and perception, the conscious and the unconscious, and interrogate the gap between physicality and the disembodied, representational moving image. I was also interested in exploring which inheritances are made visible and which remain hidden.

While filming, I searched for remnants of the original White City, but I found that only the streets – named after various colonies (Australia Road, New Zealand Way, Canada Way, South Africa Road) – still bared traces of the colonial exposition. Beyond that, little remained. My focus while making the video was less on narrative and more on the movement and texture of the images, as well as on how my body and camera responded to the site. In other words, the site as semi-produced through images remained important to me. While developing *The Opacifier*, I was concerned with how a composition within a moving image work could foreground the relations between the temporal, material, fantasy and the unconscious, and speak to the extractive-economic conditions of a pigment industry that emerged at a particular stage of colonial modernity. These are all concerns that I found to be generative in relation to my research question.

In other words, I see the work as engaging with the material conditions of chromatic whiteness within the production of images and the specific material residues of 1908, both within the

[359] Halland and Johnslien, "With-On White", 2023.
[360] As previously mentioned, the number of everyday products containing nanomaterials has increased from 54 in 2005 to 3639 in 2020, and titanium dioxide nanoparticles appear in about 25 per cent of these. See Larue, Camille, ed. "Ecotoxicity of Titanium Dioxide Nanoparticles". *Nanomaterials*. Special issue (Forthcoming).
[361] White nanosized pigments are believed to penetrate cell walls in humans and other organisms, yet their implications for human health and ecologies and the scale of their impact are not fully understood. In the summer of 2022, E171 may no longer be used as a food additive in the European Union but is still in most parts of the world, including the UK. See Shi, W., Han, Y., Guo, C. et al., 2019; Conference, Goldschmidt, 2021; Tyner, K. M., A. M. Wokovich, D. E. Godar, W. H. Doub, and N. Sadrieh. 2011; Jovanović, Boris, and Héctor Guzmán, June 2014; Larue, Camille, ed. "Ecotoxicity of Titanium Dioxide Nanoparticles". *Nanomaterials MDPI*, no. Special issue (Forthcoming).

image and in the site. But it also addresses something more; I viewed the mechanical filter as a porous boundary, "from which something begins its *presencing*".[362]

I also see *The Opacifier (Erased White City)* as both drawing from and contributing to Dora Budor's and Noah Barker's *Orange Film I and II* (2023) (Figure 47), videos in which the artists film urban development sites in New York City through a glass of orange wine, where both the site and material reference new forms of psychosocial control and gentrification. Budor, whom I have previously grouped under a category of artists who engage in molecular practices may, with this work, be more accurately seen as working within the lineage of poststructuralist film, in which she applies a "recipe" for a filmic event to take place (wine, camera, city). In my work, I do something similar, but I expand on this strategy by exploring a different site and material: I apply a found pigment/semi-opaque filter to examine the relationship between the remnants of a proto-modernist, all-white city and the material substance that, I propose, emerged and dispersed as a consequence of such a site – using both elements in tension to explore whether this strategy could generate something new.

While making *The Opacifier (Erased White City)*, I was also thinking of the all-white screen, which may evoke the "White Screen of Death" that appears when the networked image fails or breaks down on popular devices like the iPhone. However, in the video, the screen is never truly white. One might even question if there is much chromatic white in the video at all. Wittgenstein famously declared that there cannot be a transparent white.[363] If we accept this proposition, a semi-opaque chromatic white filter becomes a contradiction in terms. I chose to let this paradox remain within the work for the viewer to decipher.

At one point in the video piece – which is intended to be presented as a loop when installed in an exhibition space – the washed-out footage abruptly transitions into a sequence of rapidly flashing colours. I filmed this section after encountering a location in White City where these flashing colours were visible; during editing, I extended, repeated and enhanced the footage. The moment of flashing colours contrasts with the washed-out, whitish images, and I have intentionally left this contrast open to the viewer's interpretation.

[362] To paraphrase Heidegger via Richard Martin. See Martin, *The Architecture of David Lynch*, 2014, 142-143.
[363] Wittgenstein, Ludwig. *Remarks on Colour*. Berkeley: University of California Press, 1977.

Figure 48 Still 1-2 from *The Opacifier (Erased White City)* (2024), 4K video, colour, sound, 06:48 min.

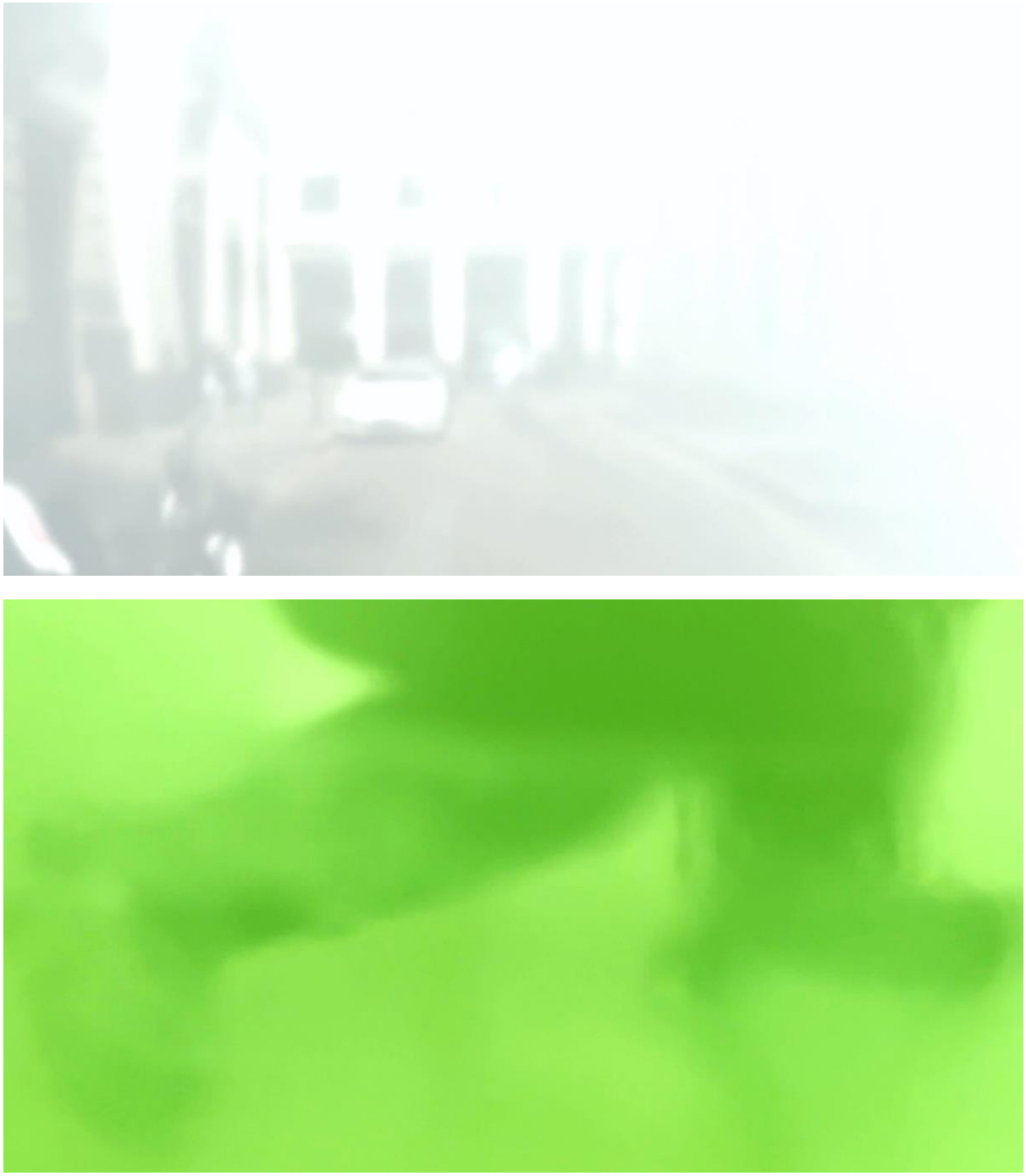

Figure 49 Still 3-4 from *The Opacifier (Erased White City)* (2024), 4K video, colour, sound, 06:48 min.

Figure 50 Still 5-6 from *The Opacifier (Erased White City)* (2024), 4K video, colour, sound, 06:48 min.

Figure 51 Still 7 from *The Opacifier* (2024), 4K video, colour, sound, 06:48 min.

Notes on opacity and erasure

As one of the most photo-luminous substances invented[364] by humans, titanium dioxide is highly reflective due to its opacity. Everything the pigment touches is enveloped in a glutinous, metallic and overpowering whiteness that obliterates other colours, creating an impenetrable surface. For this reason, the material is also referred to as an *opacifier*. If I stay with a notion of opacity in the context of optical theory, in many applications of titanium dioxide, maximised visibility and opacity are essentially one and the same. The luminous yet opaque quality of the pigment has prompted me to rethink visibility and opacity as interrelated and existing simultaneously – something is made visible and at the same time it is also obscured.

Opacity as a metaphor for aesthetic strategies has recently gained influence in contemporary art, where it is employed as a strategy of refusal and subversion against political and optical regimes that demand visibility and transparency from their subjects.[365] For example, the politics of whiteness routinely seeks to erase the Other, while simultaneously often demanding transparency from that very Other, philosopher and poet Édouard Glissant has observed. In response, Glissant famously argued for the "right to opacity".[366] Glissant contested the ideals of transparency in politics and

[364] Titanium white pigment is never encountered in its pure form in our environment; in that sense, I refer to it as an invention.
[365] See, for instance, Wu, Simon. "On Opacity: How Artists Resist 'Representation' and Legibility". Art in America, 2022; Loock, Ulrich. "Opacity". *Frieze*, 2012.
[366] Opacity in Glissant's writings was a term taken from optical theory and repurposed as a metaphor to "[i]magin[e] the world in terms of opacity as a chaotically resonating whole" in which difference, non-transparency and non-understanding will and should abound. See Glissant, Édouard. *Poetics of Relation*. Ann Arbor: University of Michigan Press, 1997.

aesthetics, which he asserts have long dominated Western relations with the Other, as well as representation and thought inherited from Western epistemology. Opacity has also been embraced as a queer strategy, following the writings of Barthes.[367]

Such strategies of refusal or subversion through opacity differ significantly from the opacity encountered in, for example, extractive industries. The various forms of opacity I was presented with during my study of titanium dioxide – including the structural opacity imposed on my research following the shutdown, the general opacity that characterises the industry and the specific opaque properties of the white material itself – required a different set of strategies for my practice and thesis than simply declaring a right to opacity. In my research, I have often been tasked with making visible what was previously unseen; at other times, my practice has required me to develop strategies to identify or create gaps within the visual regime of the white material that might point to or reveal its broader structure. I have relied on methods of shifting, states of semi-opacity and in-betweenness to create moving image works that explore the material residues of the white substance in both site and image.

Although I found *The Opacifier (Erased White City)* to be generative in responding to my research question, certain aspects of the work remain unresolved. One key issue is the risk of recentring chromatic whiteness through my critical engagement with it, which is a broader challenge for this project as a whole. The colour section in the piece serves to counteract this recentring. As the piece oscillates between erasure and revelation, it could be seen as re-enacting, in different ways, the very functions and effects of titanium pigment, whose covering properties derive from its opacity and its reflective luminosity. By simultaneously drawing attention to and erasing the forgotten imperial origins of White City, the work might also be viewed as performing a form of historical erasure – albeit one intended to provoke the viewer's curiosity about and awareness of that which is being concealed. Less importantly, but still worth mentioning, is that *The Opacifier (Erased White City)*, like Rauschenberg's erased drawing, relies on a contextualising statement to help the viewer understand key aspects of the work – in my case, the historical and material frameworks I examine in this project.

On a technical level, the images are washed out and overexposed, resulting in visuals that are, at times, technically subpar. The work is often not particularly visually engaging, and even somewhat dull, which is intentional. The section with rapid colour *shifts* once again, and so it serves as a contrast. However, this means that I find the work more successful conceptually than visually. Ideally, I would have liked to create a moving image piece that drew the viewer in with more seductive imagery, which would, on closer inspection, reveal my critical concerns.

[367] Barthes also proposed strategies of opacity that have been interpreted as queer literary tactics. See Heathcote, Owen. "Opacity and the Closet: Queer Tactics in Foucault, Barthes, and Warhol". *French Studies* 67, no. 2 (2013): 276–77; Barthes, Roland. *The Neutral: Lecture Course at the Collège de France, 1977-1978*. New York; Chichester: Columbia University Press, 2002.

Before the shutdown

June 2022, Southwestern Norway: We arrive in Sogndalstrand, a village perched above a fjord, with its wooden houses gathered in a small cluster. The houses are white, like most buildings in the region. Their miniature entrances reveal their old age. In the past, it is likely that these façades appeared in deep shades of ochre, red and green. In the 1920s, the titanium industry successfully promoted its white paints, establishing a new norm that today evokes a bleached Midsommar aesthetic.[368] *In front of the houses are well-kept flower beds, and in the windows hang embroidered white curtains which divide the glass squares into two separate segments. The village is a tourist destination, yet neither local inhabitants nor tourists are currently in sight. The most important clients are placed in rooms in an independent hotel in the village (at least this is how I interpret the hierarchy; however, it could also be the opposite, or entirely insignificant, as I am unfamiliar with the unspoken codes of the pigment industry milieu).*[369] *The clients step out of the car.*

The remaining clients and I continue to Sokndal. This town has a rougher edge than the village, with a few abandoned houses and shops with sun-bleached window fronts and obscure opening hours. The town's hot asphalt is enclosed by sloping grey hills and birch trees. We drive past Sokndal church, a cruciform church built of wood. It is also white. Outside the church, in front of a large window with carved ornaments, there is a bright red Yahama motorbike, placed as if the driver parked in a rush. Once again, no one is in sight.

Our driver parks the car outside our hotel, which caters to international clients and visitors like us. It is owned and operated by the company – a rarity these days for a hotel to be run solely for this purpose. The large wooden building features a spacious lounge, an adjacent dining room, several meeting rooms, a small green garden and a terrace with heavy garden furniture and buzzing wasps. Two women with round southwestern accents, possibly sisters, welcome guests with smiles and firm handshakes. They have slim figures and are dressed in aprons and comfortable shoes – I imagine them continuing the work their mothers did before them. I withdraw from the group and lie down on my bed. The hotel room is clean, with a single bed, an ensuite bathroom, crêpe bedding and a voluminous duvet. The window opens onto views of the town's rooftops and surrounding hillsides. The bed smells of detergent – a familiar scent, yet today, it also feels foreign.

I explore the building while the clients socialise on the terrace. White orchids have been placed on top of the grand piano in the lounge room, next to a white floral-patterned couch and an in-built teak flower bed, also filled with white orchids. The uniform whiteness of the potted flowers and bouquets throughout the building evokes the atmosphere of a funeral reception, though it may

[368] As made known to an international audience through the folk-horror film of the same name, written and directed by Ari Aster. See *MIDSOMMAR*. B-reel films, 2019.

[369] Please note that certain details in these field notes have been intentionally changed or omitted to protect the anonymity of the individuals I encountered on my research trips.

also be attributed to local customs. I try to recall my southwestern grandmother's floral preferences, and see bright yellow, red, orange, pink and dark purple; I realise that the choice of colour may simply reflect the mining company's main enterprise.

At 11 PM, after dinner, bright light pierces horizontally through the windows, illuminating the empty crystal wine glasses and a lightly stained white linen tablecloth left on the dining table. The sun seemingly never sets tonight; it is mid-June. In the garden, the clients are drinking wine and beer. A French chemist, wearing a turtleneck sweater and tinted purple sunglasses, sits cross-legged on a chair next to a younger, suntanned Swiss man. Initially, I assume the younger man is a chemical engineer, but he introduces himself as responsible for sales at the company they both represent – a Belgian global provider of printing inks and coatings for packaging and labels. The Swiss man studied in Dallas, Texas. The Frenchman speaks about the challenges of avoiding toxicity when printing cigarette paper and asks if I smoke. Their company prints in all colours, but the Frenchman and his colleague work exclusively with white pigments, primarily titanium dioxide. The Swiss man explains that for every label you print, you need about four times more white pigment than other colours due to titanium dioxide's properties as an opacifier. This statement gives their white pigment department an air of great significance.

There is also a slightly older man with a distinct accent – somewhat Swiss-German, somewhat South African English – who works for another company, though its business model eludes me. It may involve some aspect of pigment processing or paint making, possibly based in Germany or the Netherlands. He talks about his childhood in a former colony. Before going on this site visit, I had learned that, although South Africa[370] has one of the largest reserves of raw titanium in the world, like the rest of the African continent, it imports all its titanium dioxide pigments. As of today, no plants on the African continent provide the costly chemical process of turning raw titanium into white pigment, forcing African countries to export their raw titanium to the West for processing, where the value addition occurs, before re-importing it as refined pigment at a high price.[371]

In contrast, the Norwegian pigment branch refines minerals exclusively extracted in Norway, maintaining an intact value chain from pit to plant. The Belgian and German branches of the company, however, receive titanium slag from the troubled Richards Bay mining region in South Africa.[372] When I asked the host about the company's ties to the South African mining region, he

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[370] In the early 2000s, a British arms company promised to facilitate the building of a "world-class" titanium pigment factory in return for a major arms deal with the South African government. The plant would be run by the mother company of the Norwegian subdivision: Kronos Worldwide, Inc. The plant never materialised; the arms deal proceeded. See Leigh, David. "The Sordid Truth Behind an Arms Deal". *The Guardian*, 2002.

[371] Roux, R.N., E. Van der Lingen, A.P. Botha, and A.E. Botes. "The Fragmented Nature of the Titanium Metal Value Chain". *Journal of the Southern African Institute of Mining and Metallurgy* 120, no. 11 (2020); TiO2.Info. "Africa's First Titanium Dioxide Plant Is Scheduled to Be Completed and Put into Operation in 2023 - TiO2 Info".

[372] In Richards Bay, violent clashes between the community and the industry are frequent. In 2021, the titanium slag provider had to shut down after the CEO was murdered and heavy earth-moving machinery was torched and destroyed. The company had impinged on indigenous territory, destroyed a grave site, and refused to hire locals as their workforce; violence ensued. I have investigated the ongoing turbulence in this region, but to include an extended study of this location falls outside the scope of this thesis. I identify this as an area for further research. See McDiarmid, Ngaire. "Violence at Rio

appeared surprised and mentioned that he believed the titanium slag mine was in Mozambique. The Norwegian titanium industry seems to enjoy the privilege of participating in transnational flows of pigments and chemicals while remaining relatively insulated from their more brutal global consequences. The client with the peculiar accent offers to refill my glass with white wine, which I accept out of politeness and drink slowly. The wine is cold, and condensation forms on the glass.

A blonde American woman, representing a foreign branch of the company and who acts as the group's second host, has changed into evening attire – a knee-length skirt, high heels and something in leopard print. An energetic and professional British man in a beige outfit, also from the pigment industry and based in Luxembourg, joins the party late due to a series of flight cancellations. Despite the discomfort of his journey, he is in good spirits. The Brit quickly assumes the role of asking challenging questions about the company's sustainability model, its commitment to green solutions and circularity. The young Swiss enquires about my research, mentioning that it was "not entirely clear" to him. I attempt an explanation. The clients pick up on the words "materiality" and "whiteness". The Swiss does not seem satisfied with my response, but the conversation moves on.

It is mentioned that the company that has owned the Norwegian titanium mining operation since the 1920s was formerly known as the National Lead Company. The American woman smiles as she shares this, as though it is a piece of risqué information. When midnight approaches, I leave the clients and return to my room, where I will learn that, in addition to producing toxic paint,[373] the National Lead Company holds the dubious distinction of being the most heavily fined polluter in the state of New Jersey – a title I assume was hard-won. National Lead produced lead white for decades before transitioning to titanium dioxide.[374]

In the wake of the 1927 financial crisis, the Norwegian company Titan Co AS, a forerunner of the Norwegian subdivision of Kronos, was acquired by National Lead. In collaboration with the infamous German chemical giant I.G. Farbenindustrie (IG Farben), the group (Titan Co AS and

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Tinto's Richards Bay Minerals 'out of Hand'". *Mining Journal*, 2021; Harper, Paddy. "RBM Cuts Production over New Wave of Protests". *The Mail & Guardian*, 2022.

[373] To this day, there is still a high risk of lead poisoning in American homes – a risk that disproportionately affects black families. See Farquhar, Dave. "National Lead Co, St Louis", 2022; Rosner, David, and Gerald Markowitz. *Lead Wars - The Politics of Science and the Fate of America's Children*. California/Milbank Books on Health and the Public. Oakland, California.: University of California Press, 2014; Christian Warren. "Old Situations, New Complications: Lead and Lead Poisoning in a Changing World". In *Hazardous Chemicals*, 1st ed. Vol. 17. Berghahn Books, 2019; CityLab, and Laura Bliss. "An American History of Lead Poisoning". *The Atlantic*, 2016.

[374] I have investigated the ties between the National Lead Company and the Norwegian branch of Kronos, but an extended study of this connection falls outside the scope of this thesis. I identify it as an area for further research. By the early 1980s, National Lead had shut down all its controversial operations, including the titanium dioxide plants in New Jersey and St. Louis, Missouri. Although the company had erased its production footprint from American geography, it renamed itself NL Industries and remained in the business of chromatic whiteness by focusing on acquisitions. Today, what remains of the former National Lead site in Lemay, St. Louis – a lower-middle-class, majority white neighbourhood – has been incorporated into an immense building, erected in the style of "1904 World's Fair", which now functions as a casino. The River City Casino sits along the banks of the Mississippi River, a body of water that contains arsenic, benzene, mercury, and nitrates. In images online, the casino's interior appears to have shiny white marble floors, palm trees, red carpets and presumably crisp, air-conditioned air. No windows. There are no people in any of the pictures, and I imagine it as permanently uninhabited.

National Lead)[375] *established a German pigment plant in Leverkusen, and the Norwegian titanium company became part of NL Chemicals' European division. During the Second World War, IG Farben adapted its operations and employed slave labour from concentration camps to produce various chemicals, including Zyklon-B, which was later used in the extermination camps to kill the very prisoners who had been forced to produce the deadly substance.*[376] *After the war, IG Farben was dissolved, and several of its directors were convicted of war crimes during the Nuremberg trials. What remained of the company was divided into six constituent companies.*

I look up IG Farben online and find drawings and images of a monumental building that was purpose-built as the company's headquarters in Frankfurt. Nicknamed the "Pentagon of Europe", the "Palace of Money", and "Frankfurt City's Crown", the massive structure features a slightly concave form and is clad in light beige travertine marble. In the images, its pillars and façade are draped in greenery and red Nazi flags. The building feels strangely familiar. It dawns on me that I had been there recently. Now home to Goethe University and an art gallery, the building had hosted an exhibition of my video work I produced while working on this research project, though unrelated to it. At the time, I was unaware of the building's Nazi past until I arrived on site, and even then, I failed to notice the connection to IG Farben. The boundaries between art, chemistry, industry, violence and myself began to feel increasingly porous.

Outside my window, the sky has turned light blue. Below, I can hear the clients becoming more intoxicated; the woman is laughing. There is the sound of a motorbike going full speed. The next day, the clients and I share an early breakfast, marked by prolonged silences in the dining room, before being taken to the quarry.

[375] Relating to a different matter, on the organisation of a cartel to protect pigment markets, the ties between the National Lead and the Norwegian Titan Co companies are documented in this legal document: Supreme Court. "UNITED STATES v. NATIONAL LEAD CO. et al. NATIONAL LEAD CO. et al. v. UNITED STATES. E. I. DU PONT DE NEMOURS & CO. v. SAME." Cornwell Law, 1947

[376] Leslie, *Synthetic Worlds*, 2005; Jessberger, F. "On the Origins of Individual Criminal Responsibility under International Law for Business Activity: IG Farben on Trial". *Journal of International Criminal Justice* 8, no. 3 (1 July 2010): 783–802.

Chapter 5:
Chemical Wedding

There is an ecology of bad ideas, just as there is an ecology of weeds.
– Gregory Bateson. *Steps to an Ecology of Mind*, 1972.

[A]fter a fall by which an eye was bruised, [a lady] saw all objects, but especially white objects, glittering in colours, even to an intolerable degree.
– Johann Wolfgang von Goethe, *Goethe's Theory of Colours*, 1810.

Transmutation

August 2022, Southeastern Norway: The pigment processing plant[377] is divided into a black and a white wing, terms also used by the workers to describe their workplace. Both sections are covered in a fine black and white layer of dust from wall to ceiling that contaminates everything and everyone that passes through. The white powder is particularly unforgiving. Across the two sections of the plant, the transmuting material embodies a variety of forms: here, steaming gravel, there, a pool of black ink with green clouds floating on its surface; then, a milk-filled jacuzzi, before large snow-white cheese blocks appear, that are to be transformed into a rough, viscous grey dough, which then is pulverised again into the final, dry, "total white" powder. There are two different versions of white pigment manufactured in the plant, and both absorb more of one hue than other hues on the colour spectrum, causing the first powder (rutile) to appear white with a slight orange tinge and the other powder (anatase) as white with a hint of blue. This effect is particularly noticeable when an entire room is covered in pigment residue. I conclude that the idea of a "whitest" white once again lacks real-life attainability.

In this chapter, I argue that the chemical processes that occur between the white and black sections of the plant produces a paradoxical material: an immaterial material. I propose that the perceived

[377] While visiting the site, I questioned the pigment company's use of the word "plant" instead of "factory" to describe the facility where the pigment processing takes place. I have always found it curious that the word for both a factory and a photosynthetic organism are used interchangeably in English. Later, I discovered that the etymology of "plant" likely derives from "plantation", although I have been unable to locate any academic sources for this information, which circulates on various online message boards. In these forums, it is proposed that "plant" in its shortened modern form, with the colonial tail concealed, refers to a facility where a process takes place, while "factory" designates a place where something new is produced. This means I visited a plant, not a factory, in Southeastern Norway.

disembodiment and neutrality of the white material – qualities that contribute to various modern Western myths and imaginaries with real, lived effects – arise from conceptualising the substance as separate from its material entanglements and earthly origins. I suggest that the *dematerialisation* of titanium dioxide first occurs in the pigment plant through a chemical and symbolic process known as "washing". This process of dematerialisation is spatially represented in the pigment facility through its binary division: the black wing represents what is still considered materiality, while the white wing produces immateriality.

These observations lead to a discussion of how in this research project I adopt a cross-scalar approach in my situated engagement with how materiality, image and meaning interrelate within titanium dioxide's visual regime. In other words, I aim to explore how to *cut through* the binary division present in the pigment facility. To explore this trans-scalar perspective on the white material and its visual regime, I draw on ideas from the alchemical dual-nondual tradition and Guattari's ecosophical aesthetics, leading me to propose the concept of the *homeorhetic*. I then proceed to discuss how the primary strategies and practice methods I developed as part of this study attempt to intervene homeorhetically within titanium dioxide's visual regime by identifying and creating gaps that may point to its wider structure. I propose that these methods have the potential to activate an awareness of a phenomenon that has receded into the optical unconscious of the West's visual field: as something ubiquitous yet taken for granted. The chapter corresponds to my final research sub-question*: how might one conceptualise and measure what my research and practice are doing?*[378]

Cleansed matter

A large metal tube, perhaps two metres wide and 10-15 metres long, positioned at head height, reveals itself to be an oven. As I move around the industrial structure, I find myself in front of a window looking into the inferno behind it. At the centre of a glowing orange outline, purple flames move in a circular pattern. In the pigment processing plant in Southeastern Norway, burning rocks at 1,000 degrees Celsius is a crucial step in transforming black ilmenite sand into white titanium dioxide pigment – one of the many stages of metamorphosis involved in the production of the white material. The manufacturing plant is a hot and loud environment, and the smell of sulphur creeps in the air. In the hall where the ovens are located, the indoor temperature easily exceeds 55 degrees, as it does on this hot August day. I am cautioned against staying too long in the sweltering space. In front of the ovens, the heat is even more punishing, and as I film the dancing purple flames, my camera overheats and shuts down – I cannot continue shooting until it cools.

On my visit to the plant, I am accompanied by the host and another man who has been a supervisor at the facility for over four decades; here I refer to him as the plant manager. The plant

[378] This question, in turn, corresponds to the overarching research question: *how might image-making processes be rethought using theoretical and artistic research on titanium dioxide, with a focus on its material specificity and the Norwegian experience?*

manager is a welcoming man with large, rough hands, which he uses to touch most of the materials we encounter, confidently squishing the moister substances and sprinkling the drier ones with his bare hands. The question of toxicity seems irrelevant. The men guide me along what appears to be a well-rehearsed route through the facility, patiently waiting while I conduct my inspection and film at each station. As in the mine, any equipment owned by the company's parent branch cannot be filmed or photographed – American rules apply – but otherwise, everything else seems to be permitted. The chemical transmutation method I observe is the sulphate technique, invented in Bergen, Norway, in 1908. It is more labour, energy and capital intensive, as well as more ecologically damaging, than the chlorine method. At the Norwegian plant, everything is set up for the sulphate process, and a shift to the chlorine method is unlikely.

By lunchtime, I have spent hours walking through the facility, observing the more than 60 stages of transformation, both mechanical and chemical, involved in the sulphate technique. I ask the plant manager if he can explain the sulphate process in the simplest terms possible. He replies that they often say the black section is "all about grinding, grinding, grinding", while the white section is "all about washing, washing, washing". I note how the chemical transmutation is framed as a breakdown of a black material into manageable particles, which, as it is turned white, is subjected to cleansing – a literal whitewashing. The association between chromatic whiteness, cleanliness and hygiene is already produced in the pigment processing plant. In other words, the material undergoes not only a literal but also a symbolic cleansing, thereby acquiring chromatic qualities that endow it with the capacity – and power – to make surfaces and spaces appear clean and pure, marked by the absence of "anything".

I follow up with the question of whether it is possible to reverse the sulphate process, transmuting the white pigment back into black ilmenite. "Can the plant go backwards?" I ask. The plant manager, mildly puzzled, repeats my question. "Can one turn the plant on its head, so to speak?" I add. He admits to never having considered the possibility of reversing the pigment processing facility and believes no one has ever attempted it. The host, a reserved and factual man, speculates that they likely have the technology for it but notes that it would be costly. He does not see the necessity for it, as there is still plenty of raw material left in the world, particularly deeper in the earth's crust – vast ores of shimmering black rock, currently unreachable yet full of promise. "So, we will just have to dig deeper and deeper?" I ask. The host and plant manager affirm.

As we walk past large industrial buildings between destinations, the host reveals that the company is having difficulties shipping their pigments across Europe. An unusually warm summer and low water levels in the Rhine have prevented their vessels from navigating the shipping route fully loaded. In the worst-case scenario, they may have to revert to using trucks, which would drastically reduce production volumes. The pigment plant, inaugurated in 1916, is surrounded by a flat, industrial landscape. The sky, that seemingly opens wider than usual, is patterned with steam and smoke from the plant and a nearby incinerator. This region of Norway, bordering Sweden,

features endless agricultural fields, and the locals speak with broad, back-heavy accents. On a table in the waiting room in the plant's administration office, a local newspaper recounts the time when French-American singer and dancer Josephine Baker performed in a nearby concert hall in 1933 for an audience of plant workers and locals. I wonder how this quiet corner of inland Norway must have appeared to a worldly woman like her. Eventually, we arrive at the warehouse, where large white sandbags of pigment, bearing the blue Titan logo, are stacked symmetrically, awaiting departure.

Despite the openness of the hosts and company representatives at the plant – the visit took place before the shutdown – I have no luck in uncovering the specific movements of the pigments once they leave the production site. The global pigment market is immense and impenetrable, and no one seems to know, or is willing to tell me, what happens after the titanium dioxide pigments are shipped off towards the River Rhine, perhaps for competitive reasons. I picture the globe wrapped in a network of titanium white streaks, resembling expanding slime mould used to design subway systems – not unlike the promotional imagery produced by the industry. This imagery seems to have crept into my subconscious.

As I leave the plant for the day, my clothes and hands are covered in white and black dust, which has blended into a matte grey.

Immaterial material

Schuppli has advanced a notion of materials as expressive rather than inert, capable of archiving their complex interactions with the world, which can later be decoded and reassembled back into histories.[379] However, in the case of heavily treated titanium dioxide, any traces of its origin are erased during the pigment production process, effectively cleansing the substance of its extractive and material history, and thus leaving no stories for us to reconstruct. In other words, one might say that the "forensic" story the substance has to tell is, in fact, the absence of such a story. According to chemist and art conservator Birgit Anne Van Driel, an analytical chemist could assist in determining the geographical origin of a titanium pigment; however, the results would be imprecise, with any traces more likely originating from the production plant rather than their geological provenance.[380] A paradoxical substance emerges from the pigment production facility: a material that, through chemical processes, is turned *immaterial*.

I propose that the perceived neutrality of the white material, which supports a range of modern Western myths and imaginaries, is derived from the conceptualisation of the substance as separate from material entanglements and mineral, earthly origins, and that this dematerialisation of the substance begins in the pigment plant. It is in the pigment processing facility that the white material also becomes an *atemporal* substance. Yusoff argues that the semiotics of White Geology

[379] Schuppli, *MATERIAL WITNESS*, 2020.
[380] Birgit Anne Van Driel, Interview with author, London/Amsterdam, March 2021.

so often disassociates matter from time and place and its local languages of description, social relations and historical inheritances.[381] I suggest that what occurs in the pigment plant can be perceived as a case of *White Geo-Chemistry*, which does much of the same "work" as Yusoff's White Geology, albeit with the added specifics of applying chemical processes to produce a chromatic white chemical compound, which is, as opposed to other colours, conceptualised as the absence of materiality – as the absence of *anything.*[382]

When titanium pigments are subsequently absorbed into the global pigment trade, titanium dioxide disperses through our biological, ecological, aesthetic and economic systems as *one* substance. When the ilmenite has been transmuted into its "final" form – a pigment *product* – titanium dioxide becomes, both materially and symbolically, a "generalised white", as Batchelor refers to it.[383] According to Batchelor, the notion of a generalised white, as opposed to a multiplicity of whites, is a Western invention and a "Western problem".[384] The generalised white is a white that no longer wants to be a colour. It seeks to become a "bleached screen", pierced by a million instances of white things that appear as one.[385] This generalised white encapsulates the idea of chromatic whiteness as an absolute whole, which holds the power to efface difference. In the visual regime of the white material, it can be imagined as subsuming millions of instances of titanium white objects into a complete, impenetrable wholeness. Albeit in this case, generalised white is not merely an idea or a conceptualisation of chromatic whiteness prevalent in the Western imaginary – the focus of Batchelor's study – but a material invention with a recent history, originating in a specific location and facilitated by specific agents and circumstances, *when the time was ripe for the invention.*[386]

Chemical Wedding

While visiting the pigment plant, I filmed the various stages of material transmutation that take place in the facility – materials that are put under different forms of pressure: stretched, crushed, poured, boiled, spun and subjected to heat, light and fire. Ultimately, I chose to include little or none of this footage in the final version of *Chemical Wedding* (2022–2024), as I felt the imagery risked aestheticising what I had witnessed without being photogenic in the sense Nguyen uses the term: photogenic as something that evokes the *unexpected* through its exploration of the states between pre-verbal materialities and fully formed images.[387] Although I found the footage explored various

[381] Here I rephrase Yusoff's words. Yusoff, *A Billion Black Anthropocenes or None*, 5.
[382] Dyer, *White*, 1997.
[383] This is my reformulation and adaptation of Batchelor's phrase rather than Batchelor's argument. Batchelor, *Chromophobia*, 2000.
[384] Batchelor, *Chromophobia*, 2000.
[385] Batchelor, *Chromophobia*, 8, 9
[386] Benjamin, "Little History of Photography", 240.
[387] The full quote by Nguyen: "I am always searching for materials and objects that echo the state of the photograph, that are somehow in-between a fully signified ready-made object and something that's pure substance. It's pretty intuitive – mostly an awareness that certain things are inherently more photographable or photogenic in a way that's unexpected. I'm very interested in the transfiguration of something through the lens." See Melendez, "MICRO. DRAMAS. Interview with Diane Severin Nguyen", 2020.

materialities in the process of transformation, I did not feel it precisely addressed a gap within the visual regime of titanium dioxide that could reveal its broader structure, nor did it highlight instances where the white material failed to perform as expected. The footage seemed to merely document the numerous stages of *crushing, crushing, crushing* and *washing, washing, washin*g that take place in the plant – footage that, potentially, could have featured in a contemporary informational film advert for titanium dioxide.

Instead, in the moving image work *Chemical Wedding*, I include what I consider a key image: a video clip and a piece of historical footage produced by the titanium industry, which I found interesting for the way it concentrates the processes occurring in the pigment plant. The video clip, which I culled from a longer informational advert film made in 1954, depicts a laboratory beaker flask containing a black liquid. The flask spins, and its solution gradually lightens until, suddenly – a bit too abruptly – it turns bright white. A subtle jump cut suggests that two or several pieces of film footage have been co-joined. On my visit to the plant, this simplified technique for pigment distillation was never demonstrated; for the black sand to become a white substance, a complex series of tenfold processes, both wet and dry, must first take place. The sequence is likely staged.

In *Chemical Wedding*, I accelerated and repeated the short, fabricated sequence, as I believed it could help me explore imaginaries central to the visual regime of the white material. Early titanium dioxide adverts often promoted the "miraculous" chemical refinement process of turning chromatic black sand into white pigment. Especially in the mid-20th century, the image of a modern industrial process that transforms a black substance into a brilliant white powder was heavily featured in informational advertisements for the titanium industry (as discussed in Chapter 3, this is no longer the case today).

Historical corporate and state information films about extractive industries produced during this era often created a notion of the "colonial sublime", as Larkin has discussed.[388] In titanium informational adverts, by contrast, an image of chromatic whiteness is produced – and often paired with an image of whiteness that constructs white identity – that references chemical and material processes in which a black raw material is presented as a precondition for a white material. I propose that the staged nature of the clip condenses imaginaries prevalent in the visual regime of titanium dioxide and points to the moment when the production of meaning and myth emerges from a process of chemical transmutation.

[388] See Brian Larkin's work on the "colonial sublime" of British information films about extractives in Nigeria. Larkin, Brian. "Infrastructure, the Colonial Sublime, and Indirect Rule". In *Signal and Noise: Media, Infrastructure, and Urban Culture in Nigeria*. Duke University Press, 2008.

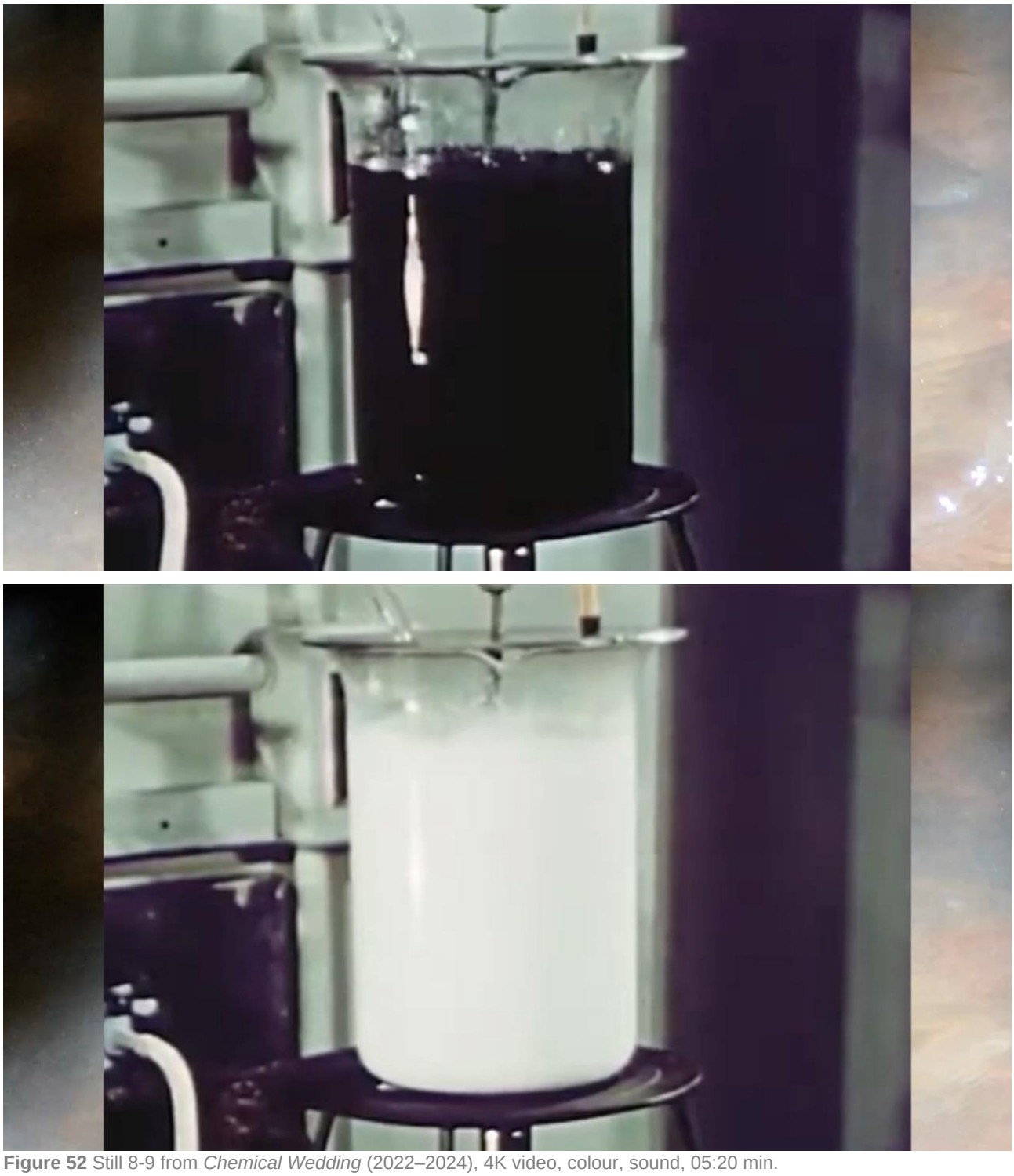

Figure 52 Still 8-9 from *Chemical Wedding* (2022–2024), 4K video, colour, sound, 05:20 min.

In an early version of *Chemical Wedding*, I experimented with editing footage from the pigment plant and the mine by reversing the chronology of the refinement process. I began with the white material – or rather, close-up shots of substances whitened with titanium dioxide – and then moved backwards through the material processes in the pigment processing plant, ultimately arriving at the mine, the fjord and the lunar landscape of Dalane. However, I found that this method risked affirming the industrial-chemical processes through simple reversal – it was not enough of an intervention. It also too closely resembled the informational film adverts that I had located in the titanium company's business archive. While the work made visible the largely unknown processes involved in producing a chromatic white material, it did not identify a gap.

In the final iteration of *Chemical Wedding*, I focus on the waste site rather than the mining facilities – the alien, grey desert of unwanted surplus material generated by the ilmenite mine – a scenario the industry is less likely to promote than its refinement facilities. The video directs our gaze downwards, emphasising the waste material produced by titanium production as it disperses into air and water. I have combined this scenario with a sludge section of found images that I suggest are made possible by the mining site, which I found useful in exploring how the white material impacts visual registers. In the sludge section, I focus on photographic moments when the white material fails to perform as expected or when its uncanniness and strangeness are foregrounded. Finally, I included the fabricated, found historical clip of the "magic" laboratory flask to explore this concentrated image of the material and mythological processes that take place in the pigment processing plant, which I believed could foreground the alchemical undercurrent in the visual regime of titanium dioxide.

Alchemical dual-nonduality

The chemical act of producing synthetic pigment appears in this clip akin to a modern alchemical practice of transmuting one substance into its opposite. Alchemy is, as many would know, the forerunner to modern chemistry. According to alchemy, every substance contains its opposite. Like the alchemist who assists a marriage of opposites in turning lead into gold, the pigment chemist is, in the footage produced by the titanium industry, depicted as someone who derives a desired substance, the white material, from its alleged opposite,[389] the black sand, through the power of chemical reaction in the laboratory flask.[390] While I would argue that the predominant view conveyed by the promotional materials produced by the industry is a Western, scientific worldview with remnants of traditional Christianity – and that it aspires to and is contingent upon notions of modern progress – I also find traces of an alchemical imaginary within these materials. This interests me, as

[389] I would like to acknowledge that there are many arguments to be made that suggest black and white have more in common than not – a notion that the material processes in the titanium industry itself can attest to. However, for the sake of argument, let us, for now, stay with the idea of chromatic black and white as binary opposites, since this appears to be the presupposition in these adverts.
[390] Phrase adapted from Leslie, *Synthetic Worlds,* 8.

the alchemical tradition offers a framework for considering how the immaterial or transcendental might be produced through material processes. In alchemy, the transfiguration of the transcendental and the transmutation of matter occur through one another, with both processes viewed as interdependent and equal, though not reducible to one another:

> The essence of the Gnostic/Hermetic tradition is that it is dual-nondual: i.e., it can distinguish between God, human beings, and the world, while simultaneously asserting that all three are modalities of the same thing, and that it is humanity's objective to surmount these permeable boundaries. This is where the Gnostic/Hermetic tradition diverges subversively and radically from the conventional, officially sanctioned religious movements of various eras, particularly European Christianity. The latter posits an insurmountable chasm between God and man, Creator and creature, and the correlative indelible duality, wherein the transcendent will always remain superior to the immanent. Needless to say, this state of affairs offers a convenient template for earthly power: rulers and the official church, i.e., representatives of the indelibly transcendent God on earth, will always remain in a superior position vis-à-vis their subjects. In institutional, conventional Christianity, the gap between the authorities and the people is as insurmountable and ontological as that between God and creation.[391]

There is an important distinction between a dual tradition, which implies a hierarchy (God above, human below; ruler above, subjects below), and the dual-nondual tradition, in which such a hierarchy is not posited. The dual-nondual tradition can still make distinctions, but it approaches these as modalities within the same fabric of reality. In a visual regime that presents titanium dioxide as immaterial, transcendental, aspiring to an upward movement and associated with the sky and light, this imaginary likely draws on a dual tradition, inheriting elements from traditional Christianity alongside a modernist notion of chromatic white. This perspective invariably implies an opposite: the dark, the black, the earthly, the material.

The relationship between Western notions of whiteness and Christianity is something Dyer explores at length in his work on the production and reproduction of white racialisation in film and image-making technologies. Dyer argues that chromatic whiteness in the West has often been related to the divine, and that the Christian notion of divine incarnation allows white people to associate themselves with and embody a transcendental, immaterial position of whiteness, while racialising everyone else.[392] I propose that the contemporary imagery produced by the titanium industry relies on ideas of such a dual tradition, as there is an implied hierarchy, one that was made explicit in earlier historical materials, and later has become implicit. A dual approach to chromatic whiteness lends itself to establishing hierarchies when it is compared to other colours, especially chromatic black, which is often conceptualised as the binary opposite of chromatic white. In this

[391] *E-flux*, "Marx, the Alchemist", February 2022.

[392] Dyer argues that whiteness becomes embodied in the West through three elements: when chromatic whiteness is associated with Christianity, it represents being in the body but not of it, symbolising the incarnation of divine or transcendental whiteness. In the context of race, whiteness is seen as transcending the corporeal, and all other races are racialised, while whites are perceived as embodying this divine neutrality. In terms of imperialism, this notion of whiteness as "something else" enabled white people to establish an expansive relationship with the physical world, facilitating settler activities and the violence that accompanied them towards both people and environments. See Dyer, *White*, 14-15.

framework, chromatic white is positioned as immaterial and superior, while chromatic black[393] is associated with the earth and "inferiority".

However, to highlight the alchemical undercurrent in the images produced by the titanium industry – for instance, through the fabricated black/white liquid clip that, when separated from its original context in an informational advert (where it was associated with an image of whiteness – a scenario featuring a white housewife in her home with her white objects, similar, though not identical, to the scene discussed in Chapter 2) – I found it could explore a gap within the visual regime of titanium dioxide. By detaching the video clip, where an image of chemical transformation is linked to an image of whiteness – which serves as a material construction of whiteness within an informational advert – and transposing it into a moving image artwork, I instead explore and foreground the alchemical undertones of the same imagery. I believed this strategy could help reveal a gap in the visual regime of the white material by bringing out other imaginaries and worldviews. This aspect of my practice addresses my sub-research question regarding how the white material is used to construct white identity in images, which, in turn, responds to my main research question: *how might image-making processes be rethought using theoretical and artistic research on titanium dioxide, with a focus on its material specificity and the Norwegian experience*?

By using this clip, I aimed to investigate how the "material" and "immaterial" could be conceived as separate yet part of the same, where the refined product and the raw material – or where white and black – are seen as one and the same, yet distinct. From this perspective, a reconnection between the raw material and the final refined product could be established, thus dissolving the hierarchy of the dual approach and instead introducing a dual-nondual one – what might be termed a *chemical wedding*.

The title of the work, *Chemical Wedding*, is a direct reference to alchemy. The title is taken from Christian Rosenkreutz's book *Cymical Wedding,* an alchemical story from 1616, which follows the advent of a chemical wedding. Wedding or marriage is often considered the most powerful of unions, a union of dualities, of the material and the immaterial, within the dual-nondual tradition of alchemy.[394] This alchemical book is shrouded in mystery, and there are multiple accounts of its genesis of questionable veracity. Christian Rosenkreutz is likely a penname for Johann Valentin Andrea. The story of the *Chymical*, or Chemical Wedding, is known not only for exploring the theme of alchemical marriage, but also for the unclear motivations behind its creation. Piepenbring writes: "When Andreae confessed late in life to writing [Cymical Wedding] he called it a *ludibrium* – a Latin word that can mean a joke, a skit, a jeux d'esprit, or a hoax. I don't think he was trying to disown it,

[393] What is interesting to note about chromatic black as it is conceptualised within Western imaginaries is that when approached by itself, outside of the binary with chromatic whiteness – in which it would, for instance, be approached as darkness versus light, evil versus good – it takes on other meanings. Chromatic black is considered a marker of sophistication, prestige, formality and wealth – think of black tuxedos and shiny, black luxury cars. In other words, it is perceived as an elegant, intimidating and powerful colour.
[394] *E-flux*. "Marx, the Alchemist". February 2022.

but he certainly didn't seem to want it taken with full seriousness."[395] The book's sincerity aside – after all, the consequences of its ideas remain the same – I included the reference as something that could evoke the alchemical dual-nondual tradition in relation to the visual regime of the white material.

So far in this chapter, I have focused on perspectives generated through my ethnographic writing, as well as my art practice, in which I attempt to assess the effects of the chemical transmutation occurring in the pigment plant facility as they relate to, and are produced by, image-making processes. I have argued that this chemical transmutation fabricates an immaterial material, which lends itself to and facilitates various imaginaries and mythologies related to chromatic whiteness prevalent in the modern West.

In the next section of the chapter, I broaden the scope of my study and apply perspectives from Guattari (1989) to explore how my research and practice approach the white material as operating on different scales – what I refer to as a cross-scalar or trans-scalar approach. I then discuss how with the primary strategies and methods developed in this study I aim to intervene transversally within titanium dioxide's visual regime by identifying and creating gaps that may point to its broader structure. Building on this discussion, I propose the term *homeorhetic* to describe how my artistic research practice evolves through moments of failure and flow, rather than stasis.

The three ecologies of a white material

This research project operates across seemingly disparate scales and domains, bringing together themes of extractivism, mass image circulation, chemistry, alchemy, the optical unconscious and the aesthetics and history of colonial modernism. With Guattari, I approach the white material and its visual regime *transversally*. Transversality is a Guattarian term for something that cuts through established and stabilised fields, scales and binaries and which may forge new connections and flows.[396]

In the late 1980s, while climate breakdown had already been ongoing for decades, and the critical theories had yet to catch up, Guattari presented his expanded notion of ecology in *The Three Ecologies* (1989) alongside an adjacent theory of aesthetics – what he terms *ecosophy*. Drawing on the work of Gregory Bateson, who declared that "there is an ecology of bad ideas, just as there is an ecology of weeds",[397] Guattari invites us to conceive of an aesthetic paradigm that cuts across what he refers to as the three ecologies: the environmental, the social and the mental ecology. In recent years, there has been a renewed interest in taking up Guattari's ideas on ecology. However, his writing is both characteristically abstract, complex and, in more than one way, dated. I propose

[395] Piepenbring, Dan. "My Chemical Romance, and Other News". *The Paris Review*, 2016.
[396] Guattari, *The Three Ecologies*, 168; MacCormack, Patricia, and Colin Gardner. *Ecosophical Aesthetics: Art, Ethics and Ecology with Guattari*. London: Bloomsbury Academic, 2018, 3.
[397] Bateson, Gregory. *Steps to an Ecology of Mind*. University of Chicago Press edition. Chicago: University of Chicago Press, 1972.

that the white material's visual regime offers a tangible case study to test his ideas, rather than remaining within a general discussion of transversality, ecologies and scale.

In Guattari's threefold ecology, the thinking being or subject – considered both as a distinct subjectivity and as partial components of subjectivity – occupies the mental ecology. The mental ecology relates to a collective social ecology. Both the mental ecology and the social ecology are interconnected with the broader web of life, which Guattari refers to as the environmental ecology. By proposing a threefold ecology, Guattari challenges an anthropocentric worldview and aesthetics, urging us to incorporate and consider the environmental effects caused by various developments in technology, science and extractivist modes of production within these perspectives. I was drawn to Guattari's theory of ecology because it also takes into account the psychological and even the unconscious. If we restructure individual and social practices along Guattari's three ecological lines, which he describes as interchangeable lenses, we see that they relate and respond to one another, but they cannot be reduced to one another.

Guattari's ecology is also a theory of the consequences of capitalism.[398] Across the three ecologies, he places the unifying force of Integrated World Capitalism (IWC). IWC operates by intertwining exchanges and hierarchies of extraction and production in the name of profit, yet it also stabilises and isolates the relationships between psyche, society and environment.[399]

At first glance, Guattari's argument does not differ drastically from various new materialist contributions that emphasise intra-active relations and the interconnectedness of all things: such as between nature and culture, the human and the non-human and matter and meaning. Guattari writes:

> Now more than ever, nature cannot be separated from culture; in order to comprehend the interactions between ecosystems, the mechanosphere and the social and individual Universes of reference, we must learn to think 'transversally'. Just as monstrous and mutant algae invade the lagoon of Venice, so our television screens are populated, saturated, by 'degenerate' images and statements.[400]

Not only does Guattari liken algae to images, but he also compares monstrous and mutant algae to Donald Trump, who, through his development activities in New York City and Atlantic City in the 1980s, turned citizens, according to Guattari, into the equivalent of the "dead fish of environmental ecology".[401] In short, in Guattari's perspective, it is "quite wrong" to make a distinction between actions on the psyche, politics, culture and the environment.[402] As mentioned before, Guattari perceives human subjects, like environments, to be grasped not as "totalised bodies" but as "partial

[398] A common critique of the Anthropocene concept is its failure to acknowledge capitalism as the central driver of environmental breakdown. As a result, some scholars have proposed the term "Capitalocene" and "Racial Capitalocene" as more precise alternatives. See for instance Vergés, "Racial Capitalocene", 2017.
[399] Guattari, *The Three Ecologies*, 1989; Horton in MacCormack, Patricia, and Colin Gardner. *Ecosophical Aesthetics: Art, Ethics and Ecology with Guattari*. London: Bloomsbury Academic, 2018, 166.
[400] Guattari, *The Three Ecologies*, 29.
[401] Guattari, *The Three Ecologies*, 40.
[402] Guattari, *The Three Ecologies*, 40.

transitional objects".[403] To put it differently: there are faces and there are landscapes, and both have transitional effects.

If we return to the entanglement theorists – and I will now generalise their many varied contributions for the sake of my argument – who consider everything as connected in endless complexity, the question remains: how can we account for and generate awareness towards what is excluded – in politics, in aesthetics and in visual regimes? Exclusions that, according to Giraud, "play an equally constitutive role in materialising particular realities at the expense of others".[404] As Strathern reminds us, any relation simultaneously connects and divides.[405] In my exploration of the visual regime of the white material and how its invisibility is produced, locating exclusions and absences has often precisely been the task at hand. I propose that Guattari offers a set of concepts that point to how interrelations not only interact and processually emerge, but how they are also stabilised and form separations and exclusions.

In the following paragraphs, I apply Guattari's ideas to the visual regime of the white material, proposing that titanium dioxide can be approached as operating alongside IWC, with its effects rippling through mental, social, and environmental ecologies.

The mental ecology is the space of the pre-verbal and pre-objective state, which is characterised by the logic of the "included middle". This is the domain before, but from which, perceptions form. Here, notions such as inside and outside, black and white and good and bad are indistinct.[406] In the mental ecology, neither the notion of chromatic white nor chromatic black or any other colour has yet been formed. In the social ecology,[407] on the other hand, differentiation takes place. Here, notions of colour are constructed, as well as social groups. Guattari writes: "The principle of social ecology concerns the affective and pragmatic allocation of mental and emotional energy to a group (group eros). […] This 'group Eros' doesn't present itself as an abstract quantity but corresponds to a specifically qualitative reorganisation [reconversion] of primary subjectivity as it relates to mental ecology."[408]

In the social ecology, one could argue that the visual regime of titanium dioxide stabilises ideas relating to hygiene, control, neutrality, light, absence, beauty and historical colonial and

[403] Guattari, *The Three Ecologies*, 30.
[404] Here I repeat the quote by Giraud, also mentioned in Chapter 1: "Perhaps, then, asking what sort of ethics and politics can emerge from entanglement is the wrong framing of the question. Although some things are impossible to disentangle, recognition of this complexity does not capture everything about material reality, and, as such, this emphasis does not offer as helpful a foundation for ethics and politics as it might seem. Instead, more concerted efforts need to be made to render visible – and assume ethical responsibility for – the exclusions that play an equally constitutive role in materialising particular realities at the expense of others." And: "It is nonetheless vital to find far clearer ways of fostering obligations toward these exclusions. What I elucidate throughout the book is that the recognition of entanglement – in particular, the entanglement of humans and other actors – does not intrinsically create room for such obligations or necessarily give rise to less anthropocentric ways of thinking and acting in the world. Indeed, in some instances, affective relations and entanglements can be instrumentalised or can marginalise critical perspectives." See Giraud, *What Comes After Entanglement?*, 19-20.
[405] Strathern, "Cutting the Network", 1996.
[406] Guattari, *The Three Ecologies*, 54.
[407] Guattari, *The Three Ecologies*, 60.
[408] Guattari, *The Three Ecologies*, 60.

racialised imaginations, which both shape and are shaped by social hierarchies. Between the social and mental ecologies, I propose we find the optical unconscious of the visual regime of the white material, where the regime and the material are seen and known, yet remain largely unthought.

In environmental ecology, as outlined by Guattari, various ecological and material processes take place. This is where the visual regime of the white material affects different equilibriums, leaving behind upturned earth, leaking heavy metals, circulating images, sand waste, painted and printed surfaces, dust-filled fjords and nanoparticles dispersing through matter and bodies to unknown effects. In Guattari's view, the ecological is the domain where everything is possible, from the "worst catastrophes" to the "smoothest, most flexible solutions".[409] Between the environmental ecology and the social ecology, I propose that we find the transmutation of a (black) material and a grey landscape into (white) aesthetics. This eco-social process contributes to allocating mental and emotional energies within the social ecology. When the eco-social material of titanium dioxide is linked to certain aspects of subjectivities, groups form within the social ecology; for instance, a white social identity is established and stabilised through its association with the conceptualisation of a chromatic white material.

I consider the previous paragraphs an experiment in thought, bringing together connections discovered through my research and practice via Guattari's ideas, rather than presenting a fixed map of how the visual regime of the white material consistently operates. In the following paragraph, I will speculate on how the role and effects of aesthetics, art and art research methods can be perceived in relation to Guattari's threefold ecology and the aesthetic category of ecosophy. I will reference my own practice in this discussion and, ultimately, propose a term for how transversality and flow manifest in my research practice: the homeorhetic.

Cross-scalar aesthetics

Under the conditions of Integrated World Capitalism, Guattari posits that human efforts are limited to intervening within only one scale and one ecology at a time – efforts which prove futile when confronted with a globally unifying structure such as IWC. According to Guattari, our inefficiency in combatting IWC in the domains of the environment, the commons and the arts is due to our failure to integrate these domains into one consistent plane that is "broad and transcalar" like IWC itself.[410]

Against IWC, Guattari wishes to mobilise an alternative logic, which may generate connections transversally, to rewrite the system's stabilising circuits.[411] As previously mentioned, transversality refers to the action of cutting across fixed and established scales, fields and binaries.

[409] The full quote by Guattari states: "There is a principle specific to environmental ecology: it states that anything is possible – the worst disasters or the most flexible evolutions [evolutions en souplesse]. The natural equilibriums will be increasingly reliant upon human intervention, and a time will come when vast programmes will need to be set up in order to regulate the relationship between oxygen, ozone and carbon dioxide in the earth's atmosphere." Guattari, *The Three Ecologies*, 66.
[410] Horton in MacCormack and Gardner, *Ecosophical Aesthetics*, 66-167.
[411] Horton in MacCormack and Gardner, *Ecosophical Aesthetics*, 167.

The term signifies the dismantling of stratified orders and highlights how all things operate ecosophically.[412] Rewriting the self-reinforcing circuits of IWC, as Guattari suggests, demands efforts that engage not only with the large-scale relations of power within the political, social, aesthetic and mental realms, but also with the "molecular domains of sensibility, intelligence, and desire".[413] To combat IWC, Guattari urges us to mobilise "transversal tools" in which subjectivity can install itself simultaneously in the realms of the environment, in the social and in the *fantasies* of the intimate spheres of the individual. Guattari argues that obtaining a degree of creative autonomy in one ecology will allow for the same in other domains, and the catalyst for such change can begin at the most "minuscule level".[414]

In other words, Guattari declares that climate breakdown cannot be addressed through a compartmentalised notion of ecology (separated from politics, psyche and aesthetics) and without recognising capitalism as fully embedded along and across the different ecological lines. He writes: "Ecology, in my sense, questions the whole of subjectivity of capitalistic power formations, whose sweeping progress cannot be guaranteed to continue as it has for the past decade."[415]

Before I proceed, a brief note on Guattari's observations on capitalism. Reflecting on the context in which he was writing, at the height of postmodernism, Guattari expresses a particular concern with neoliberalism's production of signs and subjectivity: "IWC tends to increasingly decentre its sites of power, moving away from structures producing goods and services towards structures producing signs, syntax and subjectivity".[416] This observation overlooks what consistently underpins the virtual circulation of capital: the extractive industries. Central to this study is the recognition that seemingly "dematerialised" flows of capital, products and aesthetic regimes are always sustained by the material underpinnings of extraction, which are expanding at an unprecedented rate. As noted in Chapter 4, in 2019 alone, more resources were extracted than throughout most of human history – from the earliest days of mining to the industrial revolution, the world wars, and beyond."[417] For instance, virtual generative AI assistants like ChatGPT "consume" approximately 500 litres of water for every 20 prompts entered by users.[418] In other words, no circulation of images, content, tag clouds on the internet, or other virtual expressions of networked capital is without a carbon footprint.

A repeated theme in *The Three Ecologies* is that we must abstain from scientific and "pseudo-scientific" paradigms and instead foreground aesthetics. Indeed, the title of Guttari's essay might suggest that he is primarily concerned with what is commonly understood as environmental ecology.

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[412] MacCormack and Gardner, *Ecosophical Aesthetics*, 3.
[413] Guattari, *The Three Ecologies*, 24.
[414] Guattari, *The Three Ecologies*, 69.
[415] Guattari, *The Three Ecologies*, 52.
[416] Guattari, *The Three Ecologies*, 32.
[417] Conway, *Material World*, 15.
[418] Li, Pengfei, Jianyi Yang, Mohammad A. Islam, and Shaolei Ren. "Making AI Less 'Thirsty': Uncovering and Addressing the Secret Water Footprint of AI Models". arXiv, 29 October 2023.

However, Guattari's efforts are primarily directed at proposing a new "ethico-aesthetic" paradigm, which he also calls *ecosophy*. Guattari seeks to reconceptualise aesthetics beyond its modern compartmentalisation, as detached from the environment, as he reminds us that the "relegation of […] aesthetic[s] to a special realm of society happened only very late in Western history".[419] For Guattari, aesthetics and the arts occupy a privileged position that allows for the remodelling of contemporary habits and modes of thought, enabling one to traverse sedimented compartmentalisations.[420]

I incorporate Guattari's writing on Integrated World Capitalism and ecosophical aesthetics here because his ideas have been instrumental in helping me reflect on my practice and research-based engagement with the effects of the visual regime of the white material – an extractive industry with ecological impacts, and whose primary product, in addition to profit, is aesthetics, shaped by a set of new mythologies that emerged in Western colonial and neo-colonial modernism at the beginning of the 20th century.

While I find that Guattari occasionally overstates the capacity of the art-maker to subvert global capitalism – primarily because art-makers themselves operate within a field deeply embedded in this economic system – his ideas have nonetheless been instrumental in shaping my understanding of the role of my art research practice, which seeks to intervene in the various ways titanium dioxide influences visual and cultural registers. In ecosophy, Guattari situates the artist within a distinct domain, specifically within the "praxis of media art in the territory of the environment".[421] Yet, the art-maker is also repeatedly foregrounded throughout his book as a figure equipped with a unique potential for inventing transversal tools that may cut across the ecological lines and produce counter-imaginaries, or counter-repetitions, within and against Integrated World Capitalism.

In short, Guattari suggests that the practices of an artist may activate singularities and potentials within ongoing processes, which otherwise would be repressed or excluded.[422] Such practices "seek something that runs counter to the 'normal' order of things, a counter-repetition, an intensive given which invokes other intensities to form new existential configurations".[423] Artistic practices can, according to Guattari, contribute to *heterogenesis.*[424] Heterogenesis is a continuous process of re-singularisation, where subjects become simultaneously more united and increasingly different.[425] "We will only escape from the major crises of our era", Guattari declares, through the articulation of "a nascent subjectivity, a constantly mutating socius and an environment in the

[419] Michael, Mike, Michael Halewood, Thomas P. Keating, Alexander Damianos, Michael L. Thomas, Martin Savransky, Cecile Malaspina, et al. *More-Than-Human Aesthetics: Venturing Beyond the Bifurcation of Nature*. Edited by Melanie Sehgal and Alex Wilkie. Bristol University Press, 2024, 3-4.
[420] Michael et al., *More-Than-Human Aesthetics*, 3-4.
[421] Horton in MacCormack and Gardner, *Ecosophical Aesthetics*, 165.
[422] Guattari, The Three Ecologies, 12.
[423] Guattari, *The Three Ecologies*, 45.
[424] Guattari, *The Three Ecologies*, 34.
[425] Guattari, *The Three Ecologies*, 69.

process of being reinvented."[426] Guattari's efforts aim neither at a past, pristine wilderness nor at a future optimised, ideal ecosystem. Instead, he calls for an "Infra-Quark Universe, forever in the process of composing itself."[427]

Here, I will not elaborate on the issue of whether the continual invention of new intensities and shifts may automatically bring forth a new *politics* of ecology;[428] instead, I will keep my focus on the domain of art and aesthetics.

The homeorhetic: deviation and flow

The notion of something "failing" to perform as intended, or "productive failure", has consistently emerged as a significant aspect of the methods and strategies I have developed throughout this research project. Ecosophy can also be likened to a kind of productive failure, Guattari contends. He writes: "This new ecosophical logic […] resembles the manner in which an artist may be led to alter his work after the intrusion of some accidental detail, an event-incident that suddenly makes his initial project bifurcate, making it drift (dérive) far from its previous path, however certain it had once appeared to be."[429] In writing on Guattari's ecosophy, media and environmental scholar Zach Horton foregrounds failure as a dynamic rather than static mode. If an established line of flight is blocked or stunted through *failure*, "another opens up and forges new, hitherto unprecedented connectives",[430] he writes. Horton also references Halberstam, who asserts that "failure" signifies a rejection of neoliberalism and Integrated World Capitalism, in contrast to "success", which would indicate conformity to dominant forms of neoliberal subjectivity.[431]

Of course, not knowing the outcome of ongoing experiments in the studio, and making multiple mistakes as part of this process, is central to most art-making practices,[432] but failure has emerged in a more specific way as a key aspect of my methods of shifting and sludging. First, there is the case of the flashback failure paparazzi images of Angelina Jolie and Nicole Kidman, discussed in Chapter 2 – central to the sludge section of the video work *Chemical Wedding* – where the white material fails to perform as intended in a photographic moment, rendering not only the hegemonic white world of Hollywood but also, I argue, the visual regime of titanium dioxide *strange*. Second, there is the poetic practice of productive failure associated with the stock character Pierrot, the sad clown with the exaggerated white face, made white with dense titanium pigments. As discussed in

[426] Guattari, *The Three Ecologies*, 68.
[427] Horton in MacCormack and Gardner, *Ecosophical Aesthetics*, 169.
[428] One can anticipate that such intensities may be co-opted by right-wing or regressive forces as much as by progressive ones. Guattari does not problematise this. Addressing this issue falls outside the scope of this research project, but I would like to note it as an area for further study.
[429] Guattari, *The Three Ecologies*, 52.
[430] Horton, Zach. "The Guattarian Art of Failure: An Ecosophical Portrait". In MacCormack and Gardner, *Ecosophical Aesthetics*, 2018, 18.
[431] Halberstam in Horton, "The Guattarian Art of Failure", 19.
[432] Fisher writes that engaging with the unknown is central to the artistic process. She describes art-making as typically involving both a strong sense of direction and a state of exploration, which often cannot be easily articulated while it is ongoing. See Fisher, *On Not Knowing*, 2013.

Chapter 2, images of various iterations of Pierrot are included in the sludge section of *Chemical Wedding*, as I believe they make explicit various aspects of imaginaries related to the white face, which have otherwise receded into the West's optical unconscious.

Additionally, there is the "failure" of the laboratory flask film clip, where the jump cut – likely intended by the titanium industry filmmakers to remain unnoticeable – exposes the clip as a fabricated concoction of image, material processes and the symbolic. Lastly, I employ a strategy of productive failure in the works *Portal/Terrain* and the video *The Opacifier*, using ilmenite and found titanium pigments in ways that subvert their intended uses. Specifically, I have come to understand my inclination towards moments of failure and deviation in the visual regime of titanium dioxide as driven by a desire to locate gaps within its structure. In exploring these moments when the white material comes undone or fails to perform as expected, I was interested in how these gaps reveal relationships across the visual regime's eco-social and material-symbolic dimensions that might otherwise remain unnoticed.

The concept of the homeorhetic refers to how an artistic research project can develop by foregrounding and amplifying deviation and failure within a system or phenomenon. I suggest that this approach can reveal gaps within a structure, which may, in turn, point towards a way beyond that structure. I propose that the homeorhetic approach can intervene in entrenched structures and "unthought" phenomena by instigating movement and flow, thereby functioning as a transversal tool.

I have borrowed the term homeorhesis from the fields of ecology and developmental biology, while also drawing on artist Dora Budor's use of it to describe how an artwork can function as a "deviation amplifying system"[433] that generates or facilitates flow rather than maintaining homeostasis – that is, stabilising current conditions. Homeorhetic is the adjectival form of homeorhesis, derived from the Greek for "flow" or "movement". The term refers to systems, processes, or states that exhibit dynamic properties that evolve and adjust along a trajectory of flow while continuously responding to shifts and altering conditions. In contrast, systems that return to a fixed or stable state are described as exhibiting homeostasis. I propose the concept of the homeorhetic to consider and conceptualise how my art research practice has sought to develop methods that address the effects of the white material across various scales by breaking down established binaries, often through recognising moments of failure or deviation and foregrounding these via methods of sludging or shifting.

My concern with flow, as indicated by this term, also resonates with the statement by Diane Severin Nguyen, cited in the epigraph of Chapter 1, who notes: "a moment of rebirth relies on the possibility of everything shifting at once".[434] Nguyen seeks such moments by echoing and intensifying how "[m]aterials and bodies slip in and out of contexts, permeable to the elements but

[433] Filipovic, "On Being a "Deviation Amplifying" System", 2019.
[434] Nguyen in Blalock, "ANIMAL, VEGETABLE, MATERIAL", 2020.

also to political contexts".[435] In other words, Nguyen employs a cross-scalar, transversal approach. Vishmidt, also cited in the epigraph to Chapter 1,[436] more specifically links error with flow and speculation when she refers to the gap as an "errancy of a system – the negativity at the core of its positive appearance or structural integrity in the world".[437] Vishmidt views error or failure not merely as terminal or destructive, but primarily as a speculative gap, a space that incubates "possible forms in all their virtual actuality",[438] and thus as something that enables flow. In other words, it is a space that compels us to speculate on, or strive to move beyond, fixed relations, encouraging us to imagine new approaches.

The homeorhetic refers not only to the project in its "final" form, but also to the process of its making. The development of methods in this research project has often involved a strong sense of direction – shaped by the evolving research question and its sub-questions – while embracing open exploration, allowing unexpected elements to become crucial focal points and divert the project in new directions that I could not have anticipated in advance. The homeorhetic frames artistic research practice as a process of ongoing adaptation, where the researcher engages in a practice that strives to produce or locate moments of failure and flow, while maintaining a sense of direction.

Returning to the image of the divided pigment refinement facility, I propose that a homeorhetic approach may cut through the division between the black, earthly material wing and the white, immaterial wing, and create space for new relations to emerge.

[435] Nguyen in Blalock, "ANIMAL, VEGETABLE, MATERIAL", 2020.
[436] Vishmidt, "Basement Jazz", 2022.
[437] Vishmidt, "Basement Jazz", 2022.
[438] Vishmidt, "Basement Jazz", 2022.

Conclusion

To see the world in a grain of sand.
– William Blake, *Auguries of Innocence*, 1803

This new ocean.
– Lutz Bacher, *Open the Kimono*, 2018.

Material stories

In this study, I have sought to let the white material pose the questions and reveal the stories it has to tell – stories I had to learn to unpack, following the advice of Stengers.[439] Throughout the twists and turns of the resulting research project, I have framed a visual regime of chromatic whiteness as emerging from an extractive pigment industry, intertwined with image-making processes, traces of alchemical thought and the legacies of colonial and modernist aesthetics.

Through hybrid research methods that combine theory, ethnographic writing and artistic practice, this study connects elements that may initially appear disparate. I bring together pigment production, mining sites in rural Norway, mass-circulated images of white Hollywood stars with mineral residue on their faces, stills of seminal cinematic spaces, historical photographs of mime clowns and semi-opaque footage of forgotten sites of colonial exposition in the UK. With these elements, I propose that titanium dioxide is not only a chemical compound, pigment, and specific hue (the so-called "whitest" or most *absolute* white), but also, through its emergence within a historical and cultural constellation at the onset of modernism, a producer of a visual regime that continues to permeate environments and minds today.

In the Introduction, I suggested that most images we see are also simultaneously a titanium white square. Within this white image, which so often goes unnoticed, resides a realm of untold stories, imagined in modern and contemporary myths of neutrality, transcendence, control, light, cleanliness, beauty, emptiness and the absence of material reality. I have argued that, in the West, this white imaginary is often relegated to the collective optical unconscious, where things are typically seen yet not *known*.

I proposed that beneath the white image lies yet another surface, as most white squares we see are also a black square – composed of shimmering, black ilmenite. The black image carries its own stories: stories of a downwards movement below the ground, to the mine beneath the Earth's

[439] Stengers, *Power and Invention*, 126.

crust, to tales of extraction. The black image also extends beyond this, as I explore ilmenite's role as a portal to worlds beyond the modernist, white era and its legacies. The ilmenite, moreover, reveals how a black raw material, through the chemical and symbolic act of "washing" in the pigment manufacturing plant, is transmuted into a paradoxical substance: an immaterial material. This paradoxical material is endowed with the "magical" power to render most surfaces it touches, and the people who associate themselves with it, neutral, the *standard*, and thus invisible.

I suggest that the visual regime arising from this paradoxical substance, despite its bright white appearance, is perhaps one of the dullest inventions of modern Western culture, yet also one of its most folkloric. From this perspective, by "provincialising"[440] the visual regime of the white material, something more interesting emerges from within this dullness. How did a corner of the world come to attach so much meaning to something also considered empty, within a constellation of myths, ideas and norms that was later exported far and wide? With this observation, I expanded my research project into a transcalar study of how meaning and matter emerge in processes occurring between pre-verbal materiality and fully formed images, between perceived emptiness and chargedness.

A transversal approach to image, matter and synthetic white

My research project explores and expands image-making through the lens of this visual regime of titanium dioxide, specifically in relation to the pigment's material specificity and the Norwegian experience. I address my central research question – *How might image-making processes be rethought using theoretical and art research on titanium dioxide, with a focus on its material specificity and the Norwegian experience?* – through four sub-questions, each of which correspond to a chapter. My aim has been to develop new methods of image-making that interrogate and intervene in the cultural and material effects of the white pigment across various scales. Throughout the thesis, I propose that the criteria for evaluating my research and practice lie in their capacity to make a novel contribution to contemporary art and the interdisciplinary theoretical fields it engages with, by rethinking image-making processes in relation to a white substance.

To address my research tasks, I developed the methods of *sludging* and *shifting*. With sludging, I sought to repurpose montage. When employing this method, I juxtapose disparate historical and contemporary footage and found still images that, in different ways, relate to the white material, in order to explore how titanium dioxide affects various visual registers and supports white racialisation. Specifically, I focus on incidents where the white pigment fails to perform as expected. Through sludging, I aim to render the white material and its various manifestations across visual

[440] I borrow this phrase from Dipesh Chakrabarty. See Chakrabarty, Dipesh. *Provincializing Europe: Postcolonial Thought and Historical Difference*. Princeton Studies in Culture/Power/History. Princeton, N. J.; Oxford, Princeton, N.J.; Woodstock: Princeton University Press, 2000.

registers as strange or remarked – in other words, as something not given, as something that could be otherwise.

With shifting, on the other hand, I study states of in-betweenness. This method emerged from experiments involving “found” titanium pigments and ilmenite – the black sand precursor to titanium dioxide, which I also approach as a “portal” to realms beyond the Western tradition to which the visual regime of titanium dioxide belongs and contributes to. This method draws on strategies of productive failure by using the white and black materials against their intended purposes, which, I found, highlighted their functions in the world. Through shifting, I explore ilmenite’s shimmering properties, which I interpret as states of in-betweenness *made visible*, alongside semi-erasure in image-making – both are tactics I use to examine perception in its formation.

I used these methods to engage with my overarching aim to rethink image-making in relation to titanium dioxide’s material specificity and its role in shaping conceptualisations of chromatic whiteness within an extractive, visual regime. The project traces the white substance from its appearance in early 20th century photographs featuring the mime clown Pierrot to contemporary photo flashback failure images of Hollywood stars, and finally to its raw, unrefined form as black ilmenite rocks in a Norwegian open pit mine. This movement between scales – from raw material to photographic moments – highlights the broader implications of the white material for subjectivity and perception.

In Chapter 1, I situate my contribution within existing artistic and theoretical research fields. In Chapter 2, I address the question of how titanium dioxide becomes a material construction for white identity in photographic images, and by analysing photo flashback incidents and the figure of Pierrot, I foreground gaps in the visual regime of titanium whiteness. In Chapter 3 I shift my focus to titanium dioxide’s extractive histories, and I explore the black ilmenite sands that underpin the white pigment industry. This chapter reflects on my encounters with mining landscapes in Norway and my experiments with image-making methods that respond to the shimmering, material properties of ilmenite and its significance as a portal to other realms. Chapter 4 situates the white material within the cultural and political contexts of an alt-right backlash and examines how this viral incident affected my access to the Norwegian titanium industry, leading to a shift in my research and practice. In this chapter I also address the historical and colonial legacies of the titanium industry. Chapter 5 investigates the transmutation and dematerialisation of the white material during the pigment manufacturing process, which lead me to propose a cross-scalar approach to titanium dioxide framed by the concept of *homeorhesis*.

The term homeorhetic frames both the research and practice components of this project, and I use it to describe an artistic research practice that strives to instigate processes of adaptation and flow, rather than seeking a static endpoint. Borrowed from ecology and developmental biology, and developed in my own research via a statement by artist Dora Budor, I use the term homeorhesis to refer to artistic research strategies that amplify deviation and operate through productive failure,

initiating flow and transformation rather than maintaining homeostasis or control. In the context of this study, my proposal of a homeorhetic approach helps me conceptualise how I employ the methods of sludging and shifting to break down established binaries and foreground moments of productive failure within image-making as crucial points for intervening in the visual regime of titanium dioxide.

Through the lens of the homeorhetic, my research and practice are framed as engaging in a transversal[441] critique of extractive capitalism and the aesthetics, politics and images of whiteness, and I employ tactics of failure and flow to identify gaps within these sedimented structures. The project aims to offer new methods, knowledge and insights by engaging with both the material and symbolic dimensions of titanium dioxide, while also pointing to areas for further research and unresolved questions regarding the entanglements of whiteness, materiality, visual regimes and image-making.

Research impact

This research may impact several fields – including contemporary art, visual culture studies, critical theory and theoretical studies focused on image, matter, extractivism and ecology. By drawing on Stengers' idea of the material "asking the questions", I contribute to an expanding field of material-focused artistic practices. Moreover, my integration of what I refer to as critical whiteness studies with artistic material research and exploration as a means to expand image-making is an interdisciplinary contribution to both the fields of fine art and various sub-fields of critical theory. Likewise, my application of James's ideas of pragmatism and Guattari's ecosophy and the notion of transversality to artistic research is novel in that it highlights art-making's unique potential for cross-scalar research and for testing ideas, materials and images.

With this project, I propose a new set of methods for addressing chromatic whiteness and image-making processes in art, while also engaging with their wider socio-eco-political implications. By tracing the effects of a modern synthetic invention and pigment, which I frame as both material and cultural, the research offers artists and researchers new strategies and tactics for engaging with pigments, molecular resources and whiteness in image-making and other artistic mediums, while also encouraging a reconsideration of their role in perpetuating or intervening in visual regimes. In the practice component specifically, I contribute new methods for approaching image-making and image circulation as both networked, representational and material, and I pay particular attention to processes and states of in-betweenness. As such, the study adds to what I refer to as molecular practices in art, exemplified by Dora Budor and Pamela Rosenkranz, as well as by artists working with images and material exploration, such as Diane Severin Nguyen and Wolfgang Tillmans. The research also extends Steyerl's intervention on image circulation.

[441] Guattari, *The Three Ecologies*, 3.

In an era where the fields of art and the humanities have long addressed the conditions of extractive capitalism and, more recently, recognised the need for a sustained confrontation with the politics of whiteness, this research is timely in its integrated approach to both. The study thus builds on and extends the work of Dyer, Yancy, Wigley, Mirzoeff, Blight, and other scholars in the field of critical whiteness studies by connecting it to ecological concerns. The titanium dioxide industry exemplifies the entangled relationships between extractive capitalism, colonial modernity and visual regimes of whiteness that impact aesthetics, image circulation, environments and social justice. Conducting this research provided me with an opportunity not only to critically examine these inheritances, but also to reinvent and expand image-making tactics and strategies in relation to materiality in art. Moreover, as we increasingly rely on synthetic inventions and chemical compounds like titanium dioxide in daily life, it is vital to examine and explore their effects and consequences across ecology, politics, art and aesthetics.

With this research project, I present a new approach to ecology and mass image circulation by examining previously under-researched cross-scalar connections, such as the relationship between a mining pit and red-carpet images of Hollywood actresses like Angelina Jolie. As such, this study adds to and extends the field of critical theory concerned with entanglement and ecology. My research also contributes to the field of new materialism, particularly the work of Barad, by exploring how meaning, image, and matter come together co-constitutively within a visual regime – not as an abstract exercise, but within a specific case study.

My study contributes to the field of artistic practice that addresses ecology in relation to social justice, as exemplified by the ecofeminist film/photography-based exhibition *Re/Sisters – A Lens on Gender and Ecology* (2023). By engaging with the mass circulation of images, my artistic research practice adds to this area by drawing on a different lineage of artists that traces back to the Pictures Generation, alongside a reflexive concern for image-making processes. The project thus also engages with the field of post-structuralist film and contributes to the work of conceptual artists and filmmakers working with video fragments and montage, such as Lutz Bacher and Leslie Thornton.

Furthermore, the study contributes to interdisciplinary postcolonial studies by exploring the aesthetics and politics of a modern shade of whiteness in relation to modernist and colonial legacies, as well as global extractive industries. My research thus extends the work of Leslie by offering new theoretical frameworks for approaching the relationships between chemistry, the pigment industries, and art within a modern extractive regime of pigment production. It also adds to Yusoff's study on White Geology by researching what I refer to as a case of White Geo-Chemistry. In revisiting inheritances and interweaving personal questions into my research on titanium dioxide, photography, and the legacies of colonial modernity, this study also adds to the work of Davis, Azoulay, and Liboiron. Last, in its examination of a contemporary visual regime, the study extends beyond a modern Western history of ideas, uncovering connections to alchemical thought, Greek mythology, Mesoamerican practices and non-Western significances of shimmering materials.

The study should be of interest to contemporary artists, theorists and scholars concerned with the intersections of art, chemistry, materiality, extractivism and ecology. Future researchers and artists can build on my work by exploring how other materials related to image-making – beyond titanium dioxide – contribute to extractive visual regimes. For example, they could apply the methodologies of sludging and shifting to other substances or contexts, and thus further expand my study into the realms of materiality and image. Future researchers might also more thoroughly investigate the global titanium dioxide industry and its various sites of extraction in other contexts than Norway, which were beyond the scope of this research project. Additionally, artists could draw on this study to experiment with new approaches to examining other visual regimes that emerge from industrial processes.

Unresolved aspects

In my efforts to respond to and intervene in a visual regime shaped by the invention and widespread use of a synthetic white material, I sought to avoid replicating this phenomenon and thereby unintentionally recentring and reinforcing it. Nonetheless, this is a possibility that runs throughout my research, and it is one I have acknowledged as a necessary risk while developing my practice. I took on such a risk because it seemed a more generative challenge for a research project rather than choosing a field of enquiry in which my subjectivity could remain safe from problematic implication.

After initially incorporating titanium dioxide and other materials containing the white pigment in my practice, I abandoned this approach for an extended period, focusing instead on the raw material of ilmenite, as well as other colours, images and materials that I believed could nonetheless address titanium dioxide's visual regime. However, this shift created the problem that the primary object of study became distant and abstract – the work had to rely heavily on textual framing for the viewer to understand its context and object of enquiry. In some way, I needed to reintroduce the white material and emphasise its all-pervasiveness.

I returned to working with titanium dioxide when I developed an alternative approach, which involved using found titanium pigments (scratched, crushed and sanded off objects and surfaces) in my filmmaking. Extracting the material from its situated use in the world felt like a more generative gesture than using a product fresh from a pigment manufacturing plant, as it departed from the conventional understanding of the material and disrupted its industrial and commercial context – the found pigments were imperfect, no longer the whitest white, and they showed hints of grey, green and purple. I then blended the pigment into liquid, rendering it semi-transparent, which, following Wittgenstein's lesson,[442] might mean that the pigment was no longer chromatic white at all. I believe both aspects of this approach offered an intervention within the visual regime of the white material.

[442] As previously mentioned in Chapter 4, Wittgenstein argues that there is no such thing as transparent white. See Wittgenstein, *Remarks on Colour*, 1977.

The challenge particular to my project has been to direct awareness toward a ubiquitous yet inconspicuous phenomenon – in other words, to expose it – while simultaneously intervening in what I have exposed. Such a dual task will inevitably recentre the chromatic white material in one way or another. One could imagine an alternative approach, for example an artistic research project focused primarily on the raw material of ilmenite or local, premodern, non-industrial pigment techniques developed in the same area as the titanium mine, against the backdrop of the major white pigment industry. Alternatively, in a colourist approach, one might cultivate an artistic practice that explores a range of different nuances of chromatic white to challenge and undermine the notion of a "whitest white" or "generalised" white. However, this is not the task I have undertaken, because the primary focus of my research has been the mainstream nature of the titanium substance, particularly as it has emerged in relation to image-making processes.

In this study, I have focused on a Western conceptualisation of chromatic whiteness as it exists today, tracing its emergence in relation to image-making processes and through the legacies of colonial modernity since the invention of titanium dioxide. I have examined how the modernist, white-built environment was appropriated from vernacular Algerian architecture. Specifically, I have explored the modern Western realm of chroma and its relationship to the Western tradition of image circulation, aiming to intervene in this phenomenon from an implicated position within that tradition. Apart from my engagement with ilmenite, in which I trace the material's history to pre-colonial Mesoamerica, I have chosen to remain within a Western visual regime of chromatic whiteness, and I have focused on developing strategies to intervene and identify gaps within this regime, rather than incorporating perspectives from other cultures, cosmologies and worldviews.

It is worth noting that associations with chromatic white and other colours vary and are sometimes inverted in different cultures across the globe. For instance, white is the traditional colour for brides in many Western cultures and of mourning in many Eastern cultures, and black often serves the opposite function in these regions. Although engaging with other traditions would be highly interesting, such an exploration falls outside the scope of this study. While such an approach could have been generative, it might also risk cultural appropriation. This is particularly pertinent when drawing on non-Western cosmologies in research without the necessary ties or relevance to those worldviews, which I find essential for meaningfully performing such a critical gesture.

In my study and engagement with white titanium and black ilmenite, I have been cautious of the charged meanings attached to this colour combination and I have tried to not approach it as a direct opposition. Through this project, I have learned that the combination of black and white in Western contexts is often associated with race or a binary of good versus evil (as exemplified in the Introduction, in the example from my childhood, with the school play featuring a black demonic Lussi and a white Saint Lucia). Interestingly, when considered on its own, chromatic black does not necessarily evoke such connotations. In vernacular and commercial colour theory, black is often associated with prestige, intimidation, power, masculinity, sophistication and formality. However,

when paired with chromatic white, these connotations are quickly racialised. Dyer has traced the mapping of black and white onto good and evil in the West to the Manichean doctrine,[443] which Fanon used as an analogy for colonialism. Fanon argued that such a binary, relating to both colour and good/evil, reinforces racial divisions.[444] Dyer suggests that the true opposite of chromatic white is not black but red – the colour of blood.[445] In my study, I consider the opposite of white to be a rush and flux of colour.

Regarding geographic location, this study has focused on Europe's largest titanium dioxide mine in Norway and the pigment industry that has emerged in the Northern European region. Although the industry causes ecologically damaging consequences in areas local to the mine, the site nonetheless belongs to the privileged and prosperous social democracy of Norway. It may seem unnecessary to focus on this site, considering the extraction taking place on indigenous land, previously colonised, neo-colonised and underprivileged areas in other parts of the world – even within Norway. For instance, new copper mines are being built in the Sápmi territory of Northern Norway, despite protests from indigenous communities. However, this study has provided an opportunity to direct my gaze towards the privileged, and to examine the visual regime of whiteness produced within a privileged location, which is later exported to the rest of the world as both a product and a set of ideas that reinforce this privilege. I consider this a very necessary task. In other words, this study serves as a way of holding up a "disagreeable mirror"[446] to the privileged position of Norway, as well as to myself and my inheritances. The decision to focus on the mines in the area from which my mother hails was also partly influenced by dialogues with several Sámi artists and activists at the beginning of my research,[447] who encouraged me to explore the effects of extraction in a land to which I have a direct ancestral relation and history.

As the Norwegian mining and pigment company I studied has been under American ownership for a century as a subsidiary of the multinational pigment manufacturer Kronos Worldwide Inc. – headquartered in Dallas, Texas, with international branches in Germany, Belgium, and other locations – I extended my research to these sites and companies, following the long arms of international titanium pigment production. I noted how the value chain, from mining pit to plant, remains intact in Norway – a highly privileged situation that is rarely the case in other parts of the world. I uncovered connections between the parent company and a troubled titanium slag mine in Richards Bay, South Africa, and traced ownership structures to past toxic lead-based pigment

[443] Dyer writes: "Manicheism is based on the ideas of Persian philosopher Manes, which saw the world as polarised between forces of absolute good and evil, symbolised in the oppositions of light and darkness, black and white. While formally deemed a heresy by the Church, it has provided a moral framework, not least a powerfully simple symbolism, that has profoundly marked Christian/Western thought." See Dyer, *White*, 254.
[444] Fanon, Frantz. *The Wretched of the Earth*. New York: Grove, 1961.
[445] Dyer, *White*, 210.
[446] This is a phrase borrowed from Baldwin, who initially spoke of a "disagreeable mirror for whites" as a site of uncomfortable truth-telling for white people. See Baldwin in Blight, Daniel, ed., *The Image of Whiteness*, 198.
[447] Elin Már Øyen Vister, Aslak Heika Hætta, and Raisa Porsanger, Interviews by author, London/Oslo/Lofoten, October 2020.

production in the US and the war crime-charged pigment manufacturer IG Farben in Germany. A comprehensive study of these locations falls outside the scope of this research project, but I consider these areas and pathways to be of interest for further exploration by other researchers, or by myself in the future.

In the Introduction and Chapter 1, I stated that this research project's written thesis and artistic practice component inform one another, though they do not align in a one-to-one manner. Since the evaluation of this study is weighted equally between the two, neither the written component nor the practice should take precedence over the other. Both aspects are to be evaluated on whether they contribute an "original" addition to "knowledge", whether through new facts, methods or critical perspectives. I wish to highlight that, due to the hybrid nature of this project as a theory and practice-based PhD, there is a risk that the practice component could be interpreted as illustrative of the theoretical research concerns, rather than driving the research or being allowed to operate in a space of its own – or vice versa. It is not my role to assess whether this has occurred here; I only wish to acknowledge the potential risk. I consider both components of the study to be independent contributions that inform one another.

Lastly, I want to draw attention to how this study navigates between the metaphorical and the literal in its engagement with material and symbolic perspectives. I attribute this to my focus on the tipping point between the two. However, this approach might be perceived as a weakness or inconsistency in the project. Some may argue that I should have focused on one aspect – either on materiality and the extractive industry of titanium dioxide with its material implications, or the image, image circulation and the representations and imaginaries at play within the visual regime of the white material – rather than attempting to study both simultaneously. However, I contend that the contribution of my research and practice lies in the efforts I have taken to examine and explore both aspects concurrently within the same project, as this approach may reveal something new about each.

Transformation: against estrangement

This research study follows in Dyer's footsteps in attempting to render "whiteness strange".[448] It differs in that its primary object of study is not white racialisation, but a chromatic white material in relation to image-making processes, as it forms a visual regime that upholds chromatic whiteness as a broader norm and aspiration – yet it also contributes to the imagined construction of white people. This approach nonetheless runs the risk of what philosopher and social theorist Martin Savransky has referred to as an "ethics of estrangement".[449] When I claim that the white material is everywhere yet taken for granted, seen but unthought, that the white image or surface stands in for

[448] Dyer, *White*, 1997.
[449] Savransky, Martin. *The Adventure of Relevance*. London: Palgrave Macmillan UK, 2016.

various modern myths buried in a collective optical unconscious, it might seem like I am suggesting that I am the only one who has access to this knowledge. Some may think I am saying something like: "you think you know, but actually, you don't know and you don't *think*".[450]

The problem with the ethics of estrangement is that it translates into research methods the bifurcation of nature that philosopher Alfred North Whitehead denounced.[451] According to Savransky, the ethics of estrangement is a method of inquiry "that consists in becoming estranged from the realm of appearances made available by direct experience in order to gain access to a realm of facts and causes".[452] Such a bifurcation "involves a mode of understanding whereby experience only discloses that which is apparent, whereas the 'relevant' factors in the process of knowing the world must always lie, and be sought, somewhere else."[453] The issue lies in how to account for such access beyond one's own subjectivity.

Against this, Savransky suggests "relevance" as a guiding principle for research in lieu of "estrangement", where one attempts to establish, as a researcher, one's relevance to what is researched through a process of transformation. And this, Savransky proposes, can be done through articulating an "ethics of inheritance" paired with an "ethics of exposure", that is, the possibility for a change to come.[454] Savransky contends: "To inherit an event, to dare become children of the event, then, is to affirm that it is the latter that poses a problem, and it is this problem posed that transforms one into a researcher, into a developer of problems. Not the other way around."[455] Only through the transformation of oneself as a researcher can one become a developer of problems. This should not be conflated with a therapeutic model; it is a matter of inheritance that extends far beyond the therapeutic to encompass sociality, history and politics. In other words, one has to begin research *with the researcher* and then undergo "a transformation of one's own way of existing in the world", which in the next instance, may also "involve a transformation, however modest, of the world's own manner of existence".[456]

In some of the strategies and tactics I have developed as part of this research, I may have fallen into the trap of an ethics of estrangement. However, there are also numerous moments in this project where I reflect on the transformations I have undergone as a researcher and maker to further develop the study. These include revisiting my visceral attraction to a white room as a pre-teen and

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[450] Despret, Vinciane. "Out of The Books: Field Philosophy". *Parallax* 24, no. 4 (2 October 2018): 416–28.
[451] According to Whitehead, the bifurcation of nature – understood as the imposed division between the reality conceived by science and the subjective realities experienced by human beings – is one of the major epistemic fallacies of modernity, leading to an overemphasis on one perspective over the other. In response to this fallacy, Whitehead proposes process philosophy, which views reality as a network of processes rather than isolated objects. See Whitehead, Alfred North. *The Concept of Nature*. Dover Publications, 1920/2013.
[452] Savransky, *The Adventure of Relevance*, 15.
[453] Savransky, *The Adventure of Relevance*, 15.
[454] Savransky, *The Adventure of Relevance*, 172. When considering inheritance in relation to materials, Davis also serves as a key reference; see Davis, *Plastic Matter*, 2022, alongside Azoulay and Liboiron. See Azoulay, *Potential History*, 2019; Liboiron, *Pollution Is Colonialism*, 2021. Each provides perspectives on revisiting inheritances and interweaving personal questions into research on materiality, photography, pollution, and colonialism.
[455] Savransky, *The Adventure of Relevance*, 167.
[456] Savransky, *The Adventure of Relevance*, 11.

attempting to understand what inheritances had manifested in me at that time. It also involved questioning my own whiteness at the onset of the research in ways I had not done before. This meant examining my implicated position within a modern Northern European experience, which my project seeks to respond to and intervene in.

I have made several mistakes along the way. In an early version of the written thesis, I did not sufficiently problematise my whiteness. I struggled to find my way through the artistic practice, as I had set myself up to repeat the very problem I was studying. Eventually, I managed to resolve some aspects, although others remain unresolved. At the beginning of the project, I decided to research titanium dioxide because I realised that no one else was doing it. However, more than that is required to undertake research into a field that involves not only a history of aesthetics, but also a history of aesthetics intertwined with socio-political subjugation. I had to revisit and untangle the connections between material and chromatic whiteness, the image and the politics of whiteness to arrive at a more precise understanding of how they intersect.

The key was precisely a revisitation of my inheritances. This research project has profoundly transformed me, and I hope that, in its final form as presented here, it may also induce a form of transmutation, however large or small, in its readers and viewers.

August 2022, Southwestern Norway. Excerpt from my notes:

I HAVE RETURNED TO MY BORROWED HOME AFTER THE MOUNTAIN RESCUE INCIDENT. FOR ABOUT THIRTY MINUTES, I BELIEVED I WOULDN'T MAKE IT OUT ALIVE, AND THIS HAS TRANSLATED INTO A NUMB YET ECSTATIC SORENESS IN ALL MY LIMBS. I HAVE SWITCHED OFF THE LIGHTS, AND I AM SURROUNDED BY THE DARKNESS OF BOTH THE NIGHT AND THE ROOM. THERE IS A SHIMMERING IN THE DARK – PERHAPS IT IS WITHIN MY VISION. I HAVE NO IDEA IF IT PRESSES AGAINST ME OR THE WALLS; THE BOUNDARY BETWEEN ME AND THE IMAGE HAS DISSOLVED. THERE IS COLOUR AND NO COLOUR AT THE SAME TIME; IT SPARKLES AND SCINTILLATES. I AM STILL, YET NOTHING STANDS STILL.

On Library Deposit

The library deposit for this PhD will include the written thesis in PDF format, alongside the following practice-based artworks:

Chemical Wedding (2022–2024)
4K video, colour, sound, 05:20 min.

The Opacifier (Erased White City) (2024)
4K video, colour, sound, 06:48 min.

Portal/Terrain *(2024)*
Ilmenite on photo paper.
Series of wall-based works, dimensions variable.

These video and image-based works will be displayed in an installation at Goldsmiths College for the viva voce. The videos will be presented within an environment that supports their conceptual underpinnings. The work *Portal/Terrain* (2024) requires specific lighting conditions that are essential for fully experiencing the piece. I will video-document the installation, as this will better capture the material's shimmering effects.

Following the viva voce, comprehensive documentation of the practice component will be deposited in the Goldsmiths College library. This documentation will include physical copies of the videos, a video walkthrough of the installation, and photographic documentation of all final artworks. These materials will be archived on a USB drive.

The documentation, including the written thesis, will be accessible through the Goldsmiths College library, subject to the institution's access policies. Depending on the final terms of deposit, access may be restricted for a certain period or made publicly available in the digital repository.

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