INTERACTIVE DIGITAL MEDIA DISPLACEMENT: DIGITAL IMAGERY CONTEXTUALISED WITHIN DEEP REMIXABILITY AND REMEDIATION

By

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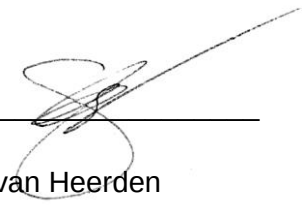

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TITLE

INTERACTIVE DIGITAL MEDIA DISPLACEMENT CONTEXTUALISED WITHIN DEEP REMIXABILITY AND REMEDIATION

SUMMARY

Digital image editing is rooted in the analog practices of photographic retouching from the late nineteenth century. This study interrogated how novel contributions of new media practice can inform understanding of the relationship between digital and analog media. The study also sought to explore new conceptual avenues in the creation of digital art that incorporates key aspects of both new and traditional media.

This study employed a literature review of selected discourses related to new media studies. Specifically, the work of scholars Lev Manovich, Jay David Bolter, Richard Grusin, and Filipe Pais on the interplay between traditional and new media formed the cornerstone of the analysis. These discourses contextualise an analysis of several contemporary case studies of digital artists, with a particular focus on John Craig Freeman and the Oddviz collective. These works were selected for the way in which they destabilise conventional notions of digital photography in new media and the way digital content can be ‘displaced’ into a physical space. From this analysis several concepts arise that serve as distinguishing markers for media displacement. These themes include embodiment, memory, identity formation, autotopography, and intermediality.

The dissertation concludes with an overview of my work that incorporates the concepts derived from my analysis of the case studies. It discusses how my exhibition *Digital Tourist*, a mixed media installation, makes use of photogrammetry and AR to displace the private connections of an individual life into the public space of the gallery.

LIST OF KEY TERMS

Immediacy, interactive art, hypermediacy, metalanguages, new media, photomontage, post-media, augmented reality, photogrammetry, photography, digital compositing, autotopography, memory, nostalgia, identity formation

ISIHLOKO

UKUSETSHENZISWA KOKUSUSWA KWEZITHOMBE ZEZINDABA ZOKUSAKAZA NGEDIJITHALI: UMFANEKISO WEDIGITHALI OWUMONGO OGXILE NGOKUXUTSHWA OKUJULILE NOKULUNGISA

ISIFINQO

Ukuhlelwa kwezithombe zezindaba zedijithali kususelwe emikhubeni ye-analokhu yokuthwebula kabusha izithombe kusukela ngasekupheleni kwekhulu leshumi nesishiyagalolunye leminyaka.. Lolu cwaningo luphenye ukuthi iminikelo yenoveli emisha yokwenziwa kwezezindaba ezintsha zingakwazisa kanjani ukuqonda kobudlelwano phakathi kwezindaba zedijithali ne-analokhu. Ucwaningo luphinde lwafuna ukubheka izindlela ezintsha zomqondo ekwakhiweni kobuciko bedijithali obufaka izinndaba ezibalulekile kokubili kwezokuxhumana nezendabuko ezintsha.

Izinkulumo ezikhethiwe ezihlobene nezifundo zezindaba ezintsha zibuyekeziwe. Ngokuqondile, umsebenzi wezazi uLev Manovich, Jay David Bolter, Richard Grusin noFilipe Pais ekusebenzisaneni phakathi kwabezindaba bendabuko nabasha kwakha okuzobhekwa ngqo uma kuhlaziywa. Lezi zinkulumo zigxila ekuhlaziyweni kwezifundo zamanje zamaciko edijithali, kugxilwe kakhulu kuJohn Craig Freeman kanye neqoqo le-Oddviz. Le misebenzi yakhethwa ngendlela yokuthi ingazinzisi imiqondo ejwayelekile yokuthwebula izithombe zedijithali emithonjeni emisha kanye nokuthi okuqukethwe kwedijithali "kungahanjiswa kanjani" endaweni ebonakalayo. Ukususka kulokhu kuhlaziywa kuvela imiqondo emininganaesebenza njengezimpawu ezihlukanisayo zokufuduswa kwabezindaba. Lezi zingqikithi zifaka phakathi ukwakheka, inkumbulo, ukwakheka kobunikazi, ukuziphendulela kanye nokuzibandakanya.

Idezetheyishini iphetha ngokubuka konke ngomsebenzi wami ohlanganisa imiqondo esuselwe ekuhlaziyweni kwami kwezifundo zocwaningo. Ingxoxo ihlanganisa ukuthi umbukiso wami *we-Zivakashi zeDijithali*, ukufakwa kwabezindaba okuxubile, isebenzisa uhlelo lokuthwebula olusebenzisa ulimi noma ifothogrametri ne-AR ukukhipha ukuxhumana kwangasese kwempilo yomuntu ngamunye endaweni yomphakathi yegalari.

UHLU LWAMAGAMA ABALULEKILE

Imidiyesi noma Ukulamula, ubuciko obusebenzisanayo, hayiphamediyesi, izilimi ezihlukene, izindaba ezintsha, amaseli noma ifothomtheji, ukujeqeza ngemuva kwezindab, iqiniso elingathandwa, uhlelo lokuthwebula olusebenzisa ulimi noma ifothogrametri, izithombe, ukuhlanganiswa kwedijithali, i-othothophografi noma ukuziphendulela, inkumbulo, isifiso noma inolstajiya, ukwakheka kobunikazi

ISIHLOKO

UKUSHENXISA IMIBONISO YEDIJITHALI NGENTSEBENZISWANO: IMBONAKALO YEDIJITHALI KWIMEKO YOKUXUBEKA NZULU NOKUHLAZIYWA

ISISHWANKATHELO

Ukuhlela imifanekiso yedijithali yinkqubo eyendeleyo, nowaqalwa kwiminyaka yokugqibela yenkulungwane yeshumi elinethoba, kwimisebenzi yezifaniso/yeanalogu ekuhlaziyweni kweefoto. Esi sifundo siphonononga ukuba igalelo elikhethekileyo leendlela ezintsha zonxibelelwano lwemiboniso/imidiya lingenza njani ukuqinisa ukuqonda unxulumano phakathi kwemiboniso yedijithali neyeanalogu. Kwakhona, esi sifundo sizama ukuphanda iindlela ezintsha ezisetyenziswa kubugcisa bedijithali neziquka imiba ephambili yemiboniso yale mihla neyakudala.

From this analysis several concepts arise that serve as distinguishing markers for media displacement. These themes include embodiment, memory, identity formation, autotopography and intermediality. Kuphononongwe iingxoxo ezithile ezimalunga nezifundo zemiboniso yale mihla. Kuqwalaselwe ngakumbi imisebenzi yeengcali ooLev Manovich, Jay David Bolter, Richard Grusin kunye noFilipe Pais malunga nonxulumano phakathi kwemiboniso yakudala neyale mihla njengesiseko solu hlalutyo. Ezi ngxoxo zifaka emxholweni uhlalutyo lwezifundo zokuzekelisa zale mihla malunga nabazobi bale mihla, kugxininiswa kwindibanisela ka John Craig Freeman nekaOddviz. Le misebenzi ikhethwe ngenxa yokuba iyazichitha iingcinga eziqhelekileyo malunga nokufota ngedijithali kwimiboniso yale mihla nangendlela iziqulatho zedijithali “zinokushenxiswa” zisiwe kwindawo ebambekayo. Olu hlalutyo luveze iingcinga eziliqela nezisebenza njengeempawu zoshenxiso lwemiboniso. Imixholo iquka imifuziselo, ukukhumbula, ukwenziwa kwesazisi, ukuzazisa ngezinto onazo, unxulumano phakathi kwemiboniso eyahlukeneyo

Le ngxelo yophando igqibela ngokushwankathela umsebenzi wam ohlanganisa iingcinga ezivele ekuhlalutyeni kwam izifundo ezingumzekelo. Ingxoxo ibonisa ukuba umboniso wengqokelela yemisebenzi yam owaziwa ngokuba yi*Digital Tourist*, ubusebenzise njani ubuchwepheshe ekuthiwa yifotogrametri (obokufumana ulwazi ngokuhlalutya imifanekiso) ekushenxiseni unxulumano lwabucala lobomi bomntu ibubeke kwindawo ebonwa nguwonkewonke apho kubukwa imifanekiso neefoto (igalari).

ULUHLU LWAMAGAMA APHAMBILI

Indibano yesiquphe, ubugcisa bentsebenziswano, ukuqwalasela nzulu, iilwimi zokucacisa ezinye iilwimi, imiboniso yale mihla, umfanekiso wezijungqe, emva kwemiboniso, ubunyaniso obongezelelweyo, ubuchwepheshe nenzululwazi yeefoto, ubugcisa bokufota, ukuyila ngobuchule bedijithali, iifoto ezivuselela inkumbulo, inkumbulo, inkumbulo yendawo ngothando, ukwenziwa kwesazisi

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PREFACE

I work as a lecturer in visual studies, a freelance photographer, and digital artist. My education was exclusively on the digital form of photography, but by professionals who had spent most of their careers as photographers working with film cameras. I was always fascinated by how closely linked the analogue and digital forms of photography were, but as my career progressed, I became increasingly suspicious of this conflation. Mainly, my knowledge of digital image manipulation led me to explore new conceptual avenues distinct from those rooted in the traditions of film retouching.

The genesis of this dissertation lay in that original suspicion. I was curious to find out what I would uncover when aspects unique to digital forms of image manipulation, particularly digital photogrammetry, are sufficiently identified. This dissertation is the culmination of that research. The distinctions I identified have established a conceptual framework from within which I can work to explore the novel aspects of new media in the creation of my art.

My evolving understanding of the relationship between analogue and digital media has affected the way in which I educate my students. It has made me more aware of the critical role film new media plays in the contemporary field of visual studies, and led me to encourage my students to explore the outermost boundaries of their artmaking practice.

LIST OF ILLUSTRATIONS

LIST OF ABBREVIATIONS

AR:	Augmented reality
CGI:	Computer generated imagery
GUI:	Graphical User Interface
GPS:	Global Positioning System
MR:	Mixed Reality
PLY:	Polygon file format
RGB / RGBA:	Red, Green, and Blue / Red, Green, Blue, Alpha
VR:	Virtual Reality

AR: Augmented reality

CGI: Computer generated imagery

GUI: Graphical user interface

GPS: Global positioning system

MR: Mixed reality

PLY: Polygon file format

RGB / RGBA: Red, Green, and Blue / Red, Green, Blue, Alpha

VR: Virtual reality

GLOSSARY OF TERMS

Analogue

The term analogue refers to the use of media in the creation of artworks that employ continuous tones, or samples, in the recording of the work. Analogue media is opposed to the use of computer software to create imagery, sound, and text for display on electronic devices in a digital, or binary, fashion (Livingstone & Lievrouw 2009:418). Binary media constitutes discreet and measurable units of information; Manovich (2001:49) explains that analogue media, in contrast, is continuous and has "no apparent indivisible unit from which it is composed".

Augmented reality

Augmented reality is the combination of three-dimensional computer-generated elements superimposed on a video display. Azuma (1997:356) defines three criteria for AR: "1. [AR] Combines real and virtual. 2. [AR] Is interactive in real time. 3. [AR] Is registered in three dimensions".

Computer generated imagery

Computer generated imagery refers to the implementation of digital technologies in the creation of imagery (Hall 1989:2-4). The practice may utilise graphics generated entirely using user input or mathematical formulae /algorithms, but may also involve the manipulation of imagery generated through the use of lens and non-lens-based recording devices (Hall 1989:2-4).

Deep remixability

Manovich (2001a:66) defines deep remixability as the interchange of tools and processes of analogue media, only possible through simulation through computer software. Manovich (2007c:76) reiterates this position in the article *Deep Remixability,* in which he states that through the interchange of "ways of representation and expression" across different media a new metamedium arises. The metamedium of digital media can access techniques from various analogue media regardless of their physical characteristics (Manovich 2007c:76).

Global Positioning System

A global positioning system employs satellites in a geosynchronous orbit around the

earth to provide various devices with accurate, real-time data regarding their location (Hofmann-Wellenhof, Lichtenegger & Collins 1994:4).

Graphical User Interface

Computer software environments that require input do so through a graphical user interface: a collection of visual elements such as icons, menus, and windows that provide visual feedback for user input (Lawrence & Verzani 2016:xiii); or simply: “a visual system for interacting with the computer” (Blais & Ippolito 2006:251).

Hypermediacy

Bolter and Grusin (2000:31-35) explain hypermediacy as the pluralism and multiplicity inherent in new media by using a plethora of analogue and digital media. This tendency manifests primarily through instantiation and ubiquity (Pais 2012:43).

Immediacy

Bolter and Grusin (2000:38) define immediacy as the opposing force to hypermediation. In other words, computer hardware and software express a tendency to render their processes increasingly opaque and “leave us in the presence of the thing presented” (Bolter & Grusin 2000:6). In this sense artists aim to “erase” media (Bolter & Grusin 2000:5) in order to live up to a logic of being “up to the minute and complete” through the appearance of a spontaneous style but through the use of multiple media (Bolter & Grusin 2000:6, 9).

Mixed Reality

An alternative term for augmented reality technologies. The term mixed reality highlights the interrelationships between virtual technologies and physical space (Ohta & Tamura 2014).

Photomontage

Kordic, Martinue, and Herzog (2016) illustrate that historians and artists use the term photomontage in a variety of contexts. Initially, the term referred to the use of combination printing by early photographers. Later, a cut-and-paste approach was developed by Dada artists, and finally, contemporary new media artists also use the term when referring to digital collages of various images, vector graphics, and illustrations.

Polygon file format

The Stanford PLY file format is a standard, open source format popularly used for storing large volumes of data (Bourke [Sa]).

Post-media

In the essay *Post-Media Aesthetics*, Manovich (2001b) argues that traditional notions of artistic media fail to apply to post-digital technology. Manovich (2001b:4-5) points to examples such as the introduction of mass media, digital storage and reproduction, and enhanced digital authoring and editing tools that all destabilise traditional notions of media. Manovich (2001b:6-7) continues by introducing a series of declarations for post-media aesthetics that function as a "direction we may want to pursue in developing such a system". These declarations are elaborated on below.

Red, Green, and Blue / Red, Green, Blue, Alpha

In digital technology, the primary colours used in display devices are Red, Green, and Blue. The "A" in RGBA indicates the addition of transparency through the use of the Alpha channel that represents the opaqueness of the image using a greyscale value (Kerlow 2004:158).

Remediation

Bolter and Grusin (2000:55) define remediation as the interaction between one medium and another where one medium appropriates the tools and processes of the other. The authors emphasise (2000:55-56) that the relationship does not need to be defined along an analogue/digital binary or fall along a chronology.

QR Code

The term QR stands for "quick response" (Denso Wave [Sa]) and was adopted to reflect the speed with which the code could be read. Denso Wave introduced the QR Code barcode standard as a more robust form of data storage than conventional barcodes (Denso Wave [Sa]). The standard has since become a popular means of encoding various forms of data such as addresses for internet web pages that are readable by mobile phone applications (Denso Wave [Sa]).

Virtual Reality

The term virtual reality encompasses the use of head-mounted displays that surround the user's field of view. The goal of VR applications is to provide an immersive visual and aural experience that momentarily intercepts the user's perception of their surroundings (Bucher 2017:5) and seems to respond to the movements of the user (Rush 1999:208).

CHAPTER 1 **Introduction**

1.1 AIM AND BACKGROUND

This research explored the differences and similarities between digital and analogue image manipulation, and what potential insights these cross-references can offer the creative process for a new media artist. Mainly, this study aimed to contextualise the practices of digital image manipulation that are distinct from traditional image manipulation techniques through the notions of deep remixability and remediation. Deep remixability is the term applied by Manovich (2001a, 2013) to describe the hybrid visual languages in digital media that exchange techniques, languages, and methods of traditional media in a digital environment. This dissertation identifies and describes how these hybrid languages also exchange the seemingly incompatible aesthetics of traditional media with each other within the software environment (Manovich 2007a:70). This study aimed to show that new avenues of creative expression may be possible through an exploration of the novel aspects of digital image manipulation in both research and practice.

Figure 1.1. Oscar Gustave Rejlander, *Two Ways of Life* (cropped) (1857).

Figure 1.2. Hannah Höch, *Cut with the Kitchen Knife Dada through the Beer-Belly of the Weimar Republic* (1919).

In the context of this dissertation, the term ‘analogue image manipulation’ refers in part to photomontage, or the assemblage of film photographs (Kordic, Martinique & Herzog 2016). In analogue photography, photomontage involved the arrangement of film negatives or prints to create the final composition. From the late nineteenth century, photographers such as Oscar Gustave Rejlander depicted fantastical scenes by using several negatives in a

technique known as combination printing (Kordic *et al* 2016). *Two Ways of Life* (1857) (Figure 1.1) is an example of his work, which strives to achieve a level of compositional unity seen in single-negative photographs. Rejlander's layering of film negatives stands in contrast to the cut-and-paste approach introduced by Dada artists decades later. Dada artist Hannah Höch (Figure 1.2) appropriated the term *photomontage* when referring to her collages[1] (Makela & Boswell 1996:i).

Photomontage continued to gain in popularity as a technique throughout the twentieth century. The process of photo manipulation saw adoption from surrealists such as Man Ray and Russian constructivists such as El Lissitzky to avant-garde artists such as Harue Koga (Kordic *et al* 2016). While some contemporary artists, such as Thomas Barbey, continue to use analogue methods to achieve their results, artists such as John Stezaker have increasingly switched to using computer software such as *Adobe Photoshop*, or GIMP, to achieve their goals (Kordic *et al* 2016). New tools are constantly being adopted by digital image editors in the creation of their works. Photogrammetry produces three-dimensional digital representations of objects from a collection of photographs. AR can displace digital objects into the physical world by overlapping physical and virtual space using the aid of a tablet or smartphone.

Two artists I have selected for analysis use these new tools in their own work. The first is John Craig Freeman, a professor of New Media Art at Emerson College in Boston (Freeman 2019), is a new media artist who specialises in public installations. Freeman is particularly interested in how new media recontextualises notions of place and uses AR to collide personal narratives with larger socio-political discourses (Freeman 2019). The second, the Oddviz collective, was formed by Erdal İnci, Çağrı Taşkın, and Serkan Kaptan in Turkey (Oddviz 2019). The new media group uses photogrammetry as a means of preserving street art such as monuments, public interventions, and graffiti (Oddviz 2019).

I analyse Bolter and Grusin's (2000:35) definition of remediation as the tendency for digital media to appropriate aspects of traditional media in new ways, respectively embracing and obscuring the mediated experience. The tension between these two actions is also defined through the concepts of hypermediacy, reminding us of the multiplicity of media, and our

[1]There is some debate about whether the term *photomontage* applies to the work of Dada artists. Makela and Boswell (1996) and Deschin (1937) both note a strict interpretation of *photomontage* as referring to purely photographic processes that do not involve any form of cutting or gluing. However, Makela and Boswell (1996:i) do point out that Höch herself consistently used the term when referring to her work. This dissertation chooses to honour her decision and refers to her work in the same way.

desire for immediacy, reflecting a conflicting need for obscurity and transparency. To explain this, Grusin (2004:18) writes about the “contradictory logic of mediation”, where contemporary culture strives “to eliminate all signs of mediation in the very act of multiplying them”. This dissertation aims to identify ways in which digital media employs both hypermediacy and immediacy within the context of digital image editing.

In service to the above aims, I articulated the following sub-goals. The goal of the research was to thoroughly explore the novel aspects of digital media and the conceptual possibilities these aspects hold for the artists in the creation of their work. The study also investigated conceptual possibilities in digital image editing that diverge from the norms and conventions established by previous analogue photomontage artists. The emphasis on newness and unique characteristics fosters expectations of growth in the field of new media art. I aimed to do so by questioning these conventions through my work in AR applications in combination with printed work. To influence and form my specific vision, this study further aimed to explore a series of case studies from new media artists to contextualise the arguments of Manovich, Bolter, and Grusin in practice. The above-mentioned case studies demonstrate variety in methodology, field of work, as well as the diverse conceptual approaches that underpin reapplication of media. Through a framework of media displacement, my work seeks to highlight the distinct contributions of digital image editing by reframing the viewer’s perspective to one outside the immediacy of digital media. My practice served to reflect on the comparisons made during the analysis of the case studies and by engaging with the questions that arose throughout my research.

1.2 PROBLEM STATEMENT AND RESEARCH QUESTIONS

This dissertation aims to problematise the notion of digital image editing by examining examples of media displacement and user interactivity through the theoretical lenses of remediation and deep remixability. My research problem opens into three research questions, as discussed below.

1.2.1 Research question 1

How do the notions of deep remixability and remediation assist in distinguishing the methodological underpinnings of digital imagery from analogue imagery? I address this question primarily in Chapter 2 through the construction of a theoretical framework that unpacks key differences between analog and new media.

1.2.2 Research question 2

What are distinct conceptual and methodological contributions of digital media manipulation in specific examples of contemporary art? I address this question in Chapter 3 through an analysis of my case studies. I identify key themes in the analysis. With regard to the work of Freeman, I identity the importance of embodiment, interactivity, and the socioeconomic dimension of public works. I also identify the concept of *theoria*, of travelling to seek knowledge, and the potential of AR to facilitate this process. Regarding the Oddviz collective, I explore how the traditional application of photogrammetry is to preserve historical and cultural artefacts. I examine how the Oddviz collective conceptually applies this quality of photogrammetry to preserve temporary street interventions such as graffiti.

1.2.3 Research question 3

To what extent can an analysis of digital media manipulation within theoretical, creative, and conceptual sources give rise to the creation of original artworks? This final research question is addressed primarily in Chapter 4, which discusses my own installation, *Digital Tourist*. In this chapter I discuss each work in the installation in relation to the various key themes and concepts unpacked in Chapters 2 and 3.

1.3 METHODOLOGY AND ETHICS

This dissertation adopts a methodology of inductive qualitative research. Inductive research begins by exploring open questions to test a hypothesis and to immerse oneself in the data in order to examine it for interrelationships and patterns.

This study focused primarily on the implementation of digital media manipulation techniques within specific software applications such as *Adobe Camera RAW* and *Meshroom,* which I selected for their prominence in their respective fields. The knowledge claim used in this dissertation is pragmatic, with an emphasis on the real-world practice of digital image editing, and allows for a multitude of possible art-making approaches.

As alluded to earlier, the strategies of inquiry involved a historical literature review, an examination of artwork case studies as discourse analysis, and an exploration of my work reflecting auto-ethnographic methodology. The practice also alludes to possibilities of autotopography, which is described by Gonzales (1995:134) as “museums of the self”. In the way an autobiography represents the self through the written word, Gonzales (1995:134) coined the term autotopography to encapsulate a form of self-representation that presents itself spatially. My work explores the notion of autotopography within a digital space as a means to further explore the connections between physical space, objects, and identity.

Cross-referencing these themes results in a multidimensional framework that provides a structure for interpretation. Several other factors guiding my research are the following:

a. This study was mostly investigative, considering the underdeveloped nature of new media discourse specifically relating to image editing.
b. It was the goal of this research project to establish a theoretical framework progressively, as opposed to applying an existing framework to the case studies.
c. The reliability of the research was enhanced by making use of peer-reviewed sources and sources published through established publications. While establishing validity is always problematic, this study endeavoured to validate its research by correlating the findings between sources and by reviewing critical responses to primary and secondary sources.
d. Concerning ethics, this study did not make use of sources such as interviews that require direct observation of individuals by the researcher. The University of South Africa (UNISA) granted ethical clearance to conduct this research.

1.4 CHAPTER OUTLINE

The chapter immediately following this one seeks to provide a literature review of key voices by means of an overview of the current discourses surrounding digital image editing, particularly as it relates to new media practice, and to compare it with analogue image editing techniques. The first focus of the literature review provides a discussion on different kinds of editing, as well as their potential applications. The notions of deep remixability and remediation are explored concerning digital image editing. A brief overview provides the development of Manovich's (2007b, 2007c, 2013) notion of deep remixability and unpacks his concept of artistic languages. Additionally, Bolter and Grusin's (2000) concept of remediation is summarised and contextualised regarding new media.

Next, the discussion explores the roles of the viewer, the artist, and their relationship to the digital image. The needs of viewers regarding interactivity in digital photomontages are examined through the paper by Aseem Agarwala (2004). The literature review interrogates the methodologies and resources available to digital artists through their phenomenological relationships by examining the arguments by Lampert (2014). The first research question functions as a broader delimiter that constrains the discussions in Chapters 2 and 3. This focus applies by paying particular attention to Manovich's notions of artistic languages and the metalanguage of computer software as it applies to digital imagery. Chapter 2 details Rowe's (2014) application of the concept of remediation on digital image editing software and outlines two potential representational strategies for digital images. The review concludes by overviewing the conceptual possibilities for new media regarding artist-researcher Filipe Pais' (2012) notion of media displacement and the arguments of Manovich (2001b) for a post-media conceptual framework for digital art.

Throughout the third chapter, my second research question seeks to unpack the impact of new media in contemporary art. Through the analysis of case studies, I explore how digital image editing contributes to contemporary art making through the lenses of remediation and deep remixability. The analysis considers the methodologies of each artist as a reflection of the computer metalanguage.

I analyse and discuss Freeman's work in the context of deep remixability and remediation, focussing on the combination of techniques Freeman uses in the execution of his work. Through this analysis the themes of embodiment, *theoria*, private/public, and the displacement of virtual into physical are discussed. In addition, I analyse the Oddviz collective's work in relation to preservation, memory, identity formation, and incorporating notions of place into digital media.

Chapter 4 of this dissertation investigates the conceptual possibilities open to the artist by examining some methodologies that apply to the practical component of this research project. An outline of my work will serve as an example of the post-media conceptual framework proposed by Manovich. An overview provides the various artistic languages appropriated through the project *Digital Tourist*. This chapter also explains the implementation of my practical work as a database. Therefore, I will argue that the practical project *Digital Tourist* challenges the conventions in digital image editing by introducing the practice of photogrammetry and applying the work to an AR platform.

The *Digital Tourist* project works towards a strategy of media displacement by employing an AR application, a physical installation and printed work. The final research question explored in Chapter 4 is the strategy of media displacement that my work adopts. The *Digital Tourist* installation contains seven AR works, different virtual scenes that trigger from book covers or pages. Chapter 4 discusses each work in turn, first through visual description and then analysis. I relate the different themes unpacked throughout this study to each work, indicating what new conceptual advances have been made in my artmaking practice when relevant.

The final chapter serves as a summary of my findings. I provide an overview of core literary ideas, consider the limitations and successes of the project, and discuss knowledge that arises from the research. Key findings are emphasised from the research, namely the importance of layering and the introduction of AR technologies as a vehicle for media displacement strategies. Lastly, I conclude with a short discussion on possible avenues for new research on the topic.

CHAPTER 2 **Literature review and theoretical framework**

2.1 OVERVIEW

The goal of this chapter is to provide an overview of selected current discourses surrounding new media studies, specifically as they relate to digital image manipulation. As stated in the previous chapter, this research focused on specific texts by Manovich[2] as they relate to deep remixability and digital image manipulation. Manovich's work is reviewed in service to my primary research question, namely how deep remixability can distinguish digital imagery from analogue imagery. I am also focussing on Bolter and Grusin's book *Remediation: Understanding New Media* (2000), which discusses the relationship between analogue and digital media. Additionally, Asta Rowe's (2014) observations on the relationship between High Renaissance mannerist painting techniques and the work of contemporary digital artists are explored to provide more specific examples of remediation in digital imagery. A review is also given of the work of Agarwala *et al* (2004) on interactive digital compositing, as well as Lampert's (2014) argument on the importance of layering and transparency in digital artwork.

Lastly, an overview of various potential conceptual applications for new media is presented. For example, the arguments of Manovich, Bolter and Grusin (2000) and Pais (2012) are compared and contrasted. To address the third research question of investigating digital media manipulation, the juxtaposition of these arguments provides new critical insight into contemporary new media artmaking practices.

2.2 DEEP REMIXABILITY

In *Understanding Hybrid Media* (Manovich 2007b:9), deep remixability is, to Manovich, a remix not only of forms and content, but of the underlying language of a medium; therefore deeper than, say, remix culture. Deep remixability is an exchange of processes, methods, and ideas between media. For example, Manovich uses the case of a web page as being more than surface-level remixing. Graphics and text appear alongside each other, but do not interact in a significant way. Deep remixability, in the words of Manovich (2007b:9), is where "...typography is choreographed to move in 3D space; motion blur is applied to CGI; algorithmically generated fields of particles are blended with live-action footage to give it an

[2] *The Language of New Media* (2001a), *Post-Media Aesthetics* (2001b), *Avant-Garde as Software* (2002), *New Media from Borges to HTML* (2003), *After Effects, or Velvet Revolution* (2007a), *Understanding Hybrid Media* (2007b), *Deep Remixability* (2007c), *Software Takes Command: Extending the Language of New Media Vol 5* (2013), and *Aesthetics, Formalism, and Media Studies* (2017).

enhanced look…".[3] In other words, the methods and tools from one medium cross over to another due to the simulated nature of the computer software environment. The act of media interchanging resources through computer simulation is a key difference between analogue and digital media.

refines his argument in the article titled *Image Future* (2006). He (Manovich 2006:25) begins by claiming that the visual languages of animation, computer generated imagery (CGI), and live action used to be easy to tell apart. However, he notes how the differences between CGI and live action films are becoming difficult to identify as CGI becomes more capable of accurately rendering scenes. Therefore, the differences between CGI and live action films today are as a result of choice and not because of the inherent differences in the media (Manovich 2006:26). Returning to this dissertation's primary research question, another key difference between analogue and digital media is that the representational strategies available to analogue media are constrained by the physicality of the medium. Digital media are more flexible, able to interweave various approaches from different forms of traditional media.

Manovich (2006:27) also notes how the photograph has survived into the twenty-first century because of its adaptability and resilience. Manovich (2006:28) argues that the "code" of the photograph has changed, while its "skin" remains the same. This means that the internal workings of a photograph have changed dramatically. In camera bodies, cellulose film has given way to the digital sensor, and in post-production the darkroom is replaced by *Adobe Lightroom*. This transformation has yet to reflect in the appearance of a photograph, or its "skin". In addressing this dissertation's third research question, Manovich's argument forwards an aesthetic strategy to create new media artworks by moving away from systems of visual representation that are based off those deployed by traditional media.

[3]Hansen (2006:32) points out that most of *The Language of New Media* (Manovich 2001a) is spent on merely comparing new media with traditional media. This, Hansen (2006:32) argues, limits the "aesthetic potential of new media" by constraining Manovich's perspective to contemporary media.

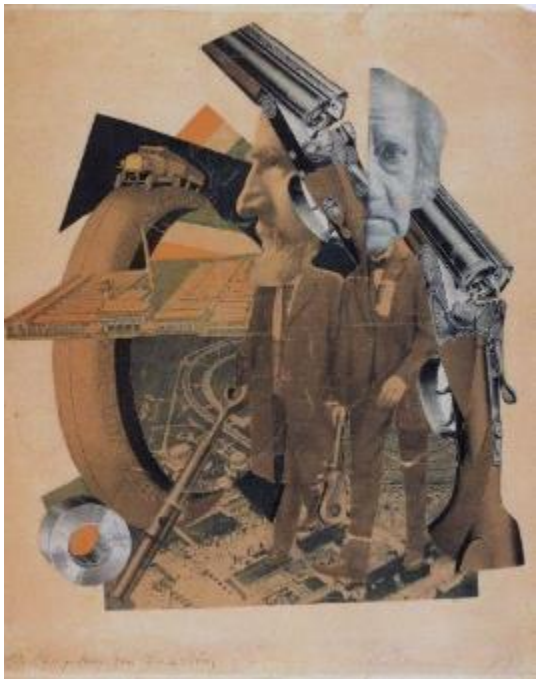

Figure 2.1. Hannah Höch, *High Finance* (1923).

Figure 2.2. Johnson Ting, *Welcome to Neo Beijing* (2017).

A year later, Manovich expands on the term deep remixability in two articles: *After Effects, or Velvet Revolution* (2007a), and *Understanding Hybrid Media* (2007b). Manovich (2007a:70) is careful to note that deep remixability does not automatically equate to a collage of work, which is where he (Manovich 2007b:10) adds the term ‘deep’ to remixability in order to distinguish his term from collage or postmodern pastiche. Instead, the notion of deep remixability is more concerned with the methodologies of traditional media and the impact they have on representational approaches. Therefore, deep remixability can manifest in more subtle ways than juxtaposing various forms of media against each other, as in a collage. For example, compare Figures 2.1 and 2.2. Höch’s work is an example of early twentieth-century Dada photomontage where text and photographs were presented alongside each other on the canvas. Ting’s work, by contrast, is a digital photomontage wherein photographic conventions such as depth of field and lens flares are combined with illustration techniques in a digital medium.

Manovich (2007a:71) notes that a major shift in methodology was introduced with the advent of digital layering: the ability to separate a composite into multiple levels of imagery and edit them separately. What enables this new approach to working with different media is the ability to control the opacity of parts of a layer by defining the transparency of the layer

through an "alpha channel".[4] Manovich (2007a:73) argues that the traditional limits of media in terms of size constraints are removed in compositing; that is, the initial size of a layer does not need to correspond to others or the size of the final frame. This results in a shift from a "time-based" approach to a "composition-based" workflow in cinema (Manovich 2007a:73). Another key distinguishing feature of digital media is therefore the independence components in a composition can have from each other, something which is not possible with physical media. Manovich (2007b:11) uses bokeh[5] as an example of the former. Bokeh is one such artefact from lens-based recording that has become a technique that can be manipulated, adjusted, and controlled independently and used in concert with non-lens-based media, again as in Figure 2.2. Manovich (2007b:11) notes how these previously "unavoidable artefacts" in conventional media become "new techniques for media design", directly addressing this dissertation's third research question. The artist is free to use previously mandatory hallmarks of traditional media as aesthetic choices in their work. These 'artefacts' contain meaning and direct the viewer into specific ways of thinking about the work.

In *Software Takes Command,* Manovich (2013) expands his concept of deep remixability, describing a "metamedium" as being the combination of a set of "metalanguages", which themselves are the appropriated techniques, approaches, and forms of traditional media or, as he terms them, "artistic languages" (Manovich 2013:117). Artistic languages are the visual styles and elements that come from other forms of media to be used in a remixed work. More specifically, Manovich (2013:117) describes artistic languages as patterned uses of a subset of all techniques available in a given media (Manovich 2013:117). For example, within film negative retouching, certain darkroom techniques allow the photographer to selectively brighten or darken areas of the negative by concentrating on or blocking light from exposing parts of the image. Ansel Adams (Adams & Baker 1983:166) famously incorporated these techniques at the turn of the twentieth century in his landscape pictures. It is likely that Manovich is using the term 'artistic language' when referring to the process of manipulating the local tones of a film negative as opposed to specific tools used during the process. The term *artistic language* is therefore analogous to 'style' or 'genre' (Manovich 2013:116). Deep remixability is a term that encapsulates not only the tools open to digital artists, but also the interoperability of various styles. As explored in later chapters, this allows

[4]The term alpha channel is discussed in more detail in the next chapter.

[5]*Bokeh* refers to the characteristic circular elements that appear in the out-of-focus highlights of a photograph (Long 2007:96).

for practices such as photography to adopt the genre conventions of other forms of traditional media.

In Hansen's book *New Philosophy for New Media* (2006:9), the author challenges Manovich's argument that a digital image has transcended a causal relationship with reality. Hansen (2006:9) instead argues that Manovich does not recognise how digital images give form to information via an embodied, visual, experience and thus must be entirely reconceptualised. Hansen's criticism of Manovich's work presents an avenue of exploration in my own research. My practical work aims to explore the relationship between the individual and a new media object through an embodied experience. By incorporating the element of movement and interactivity in my work, I seek to address a guiding question in my research: exploring new conceptual possibilities in the making of digital art.

2.3 REMEDIATION

Remediation describes the tendency of new media to reform, rework, or rehabilitate other media. Bolter and Grusin (2000) introduce their framework of remediation in *Remediation: Understanding New Media.*[6] Remediation can be defined in three axioms: "[1] remediation as the mediation of mediation... [2] remediation as the inseparability of mediation and reality... [3] remediation as reform" (Bolter & Grusin 2000:55-56). "Remediation as the mediation of mediation" is the notion that all media comments on, informs, rehabilitates, engages with, and reacts to all other forms of media (Bolter & Grusin 2000:56). Media, therefore, does not exist in a vacuum, but in an interdependent network of meaning that continuously reworks other forms of media. Furthermore, "remediation as the inseparability of mediation and reality" is not to say that media reflects some form of objective reality; rather, the authors attempt to justify the emotional response of the viewer as being real (Bolter & Grusin 2000:58). "Remediation as reform" is the cultural belief that any new media must improve on those that came before it (Bolter & Grusin 2000:59). Internet journalism must be better than traditional journalism, stereoscopic digital cinema must be better than conventional cinema, and so on. The authors argue that the mediation of media is not limited to a particular direction in time (Bolter & Grusin 2000:50), so older forms of media can remediate newer forms. Therefore, remediation does not imply historical or technological

[6]Reviewing *Remediation*, Kirschenbaum (1999) notes that Bolter and Grusin spend the bulk of their discussion on general fields such as photography, film, virtual reality, and the internet. This general approach is not particularly damning, as Kirschenbaum (1999) himself notes. What Kirschenbaum takes issue with is the role *Remediation* assumes as an introductory text to new media studies.

progress; although, as the third axiom would show, there is the expectation of progress.

Bolter and Grusin (2000:21) note that remediation is not unique to new media. Film negative retouching can be considered a remediation of oil painting. Walter Benjamin (1972:206) notes much the same in *A Short History of Photography* when he writes that retouching is that "through which bad painters took their revenge on photography". The ability to accurately and quickly capture the likeness of a subject is unique to photography, but the ability to manipulate features on the subject to suit the artist is inherited from the tradition of painting. Benjamin (1972:206) acknowledges this connection in his comment, if disparagingly. Bolter and Grusin (2000:67) also argue that not only formal qualities constitute media but also the social, economic, and ideological qualities associated with the media (Bolter & Grusin 2000:67). For example, my own work, *Digital Tourist*, seeks to engage the viewer not with representation of various household objects but to invite potential viewers in engaging in the emotional, social, and psychological associations these items hold.

Remediation and deep remixability share many hallmarks. Both frameworks attempt to unpack the way in which simulated media can interact with each other via the computer software environment. One distinguishing factor between these two theoretical perspectives is how remediation places emphasis on the socioeconomic and cultural connotations that come with the rehabilitation of older forms of media.

2.3.1 Immediacy and hypermediacy

Within the framework of remediation there is an apparent contradiction, where media attempts to envelop the viewer, sometimes by rendering the medium transparent, other times by fracturing the viewing experience. Specifically, the authors explore two aspects central to remediation: "immediacy" (Bolter & Grusin 2000:31) and "hypermediacy" (Bolter & Grusin 2000:35), which describe new media's tendency to both embrace and obscure its mediated nature.

Hypermediacy foregrounds the mediated nature of visual art. Bolter and Grusin (2000:31-35) describe hypermediated spaces, such as computer interfaces, as a collage that invites the viewer to explore a digital space. An appropriate example is that of the AR mobile application used by *Digital Tourist* that merges camera data with computer generated imagery. Other applications such as *Google Translate* can provide real-time translations of written text in a variety of languages by recognising character strings from a video feed and superimposing translated material over the original text (Good 2015). Furthermore, a myriad

of mobile video games, such as *Pokemon Go*, create interactive scenarios that take place within the field of view captured by a mobile phone camera (Niantic 2016).

Immediacy, in the context of Bolter and Grusin's argument, is the cultural need to make transparent the mediated nature of visual art.[7] In the case of interfaces, transparency is achieved by removing all evidence of technology (Bolter & Grusin 2000:22-23). The goal is therefore to provide the user with a means of navigating and interacting with the digital space as 'naturally' as they would with the physical. *Digital Tourist* shares this goal. By inviting the viewer to intuitively interact with the physical and digital objects presented in the exhibition, I hope to leverage the notion of immediacy to further remove the boundary separating the physical from the virtual real for the viewer. Bolter and Grusin (2000:31) do not claim that immediacy is the desire to fool the viewer into accepting the image as fact. Furthermore, Bolter and Grusin (2000:30) explain that immediacy is not a pervasive quality in all remediated media, but rather a "family of beliefs and practices that express themselves differently at different times among various groups".

As argued by Bolter and Grusin (2000:28), digital media seeks immediacy by making itself invisible and obscuring the boundaries between mediated and unmediated experiences. The development of linear perspective in Western art serves as a particular example of immediacy. As noted by both Berger (1972) and Bolter and Grusin (2000:24-25), linear perspective had a powerful effect on the tradition of Western oil painting. Oil painting provided the viewer with a 'window' to look through, bridging the gap between depiction and reality. Another aspect of pre-nineteenth-century oil painting was its use as an erasive medium (Bolter & Grusin 2000:25), one in which the artist works hard to erase the evidence of brush strokes and other signs of mediation.[8] Photography furthered the immediacy of perspective by automating it (Bolter & Grusin 2000:26). This process of relying on chemical and mechanical techniques greatly increased the immediacy of the image but did present the perceived risk of removing the artist altogether. Furthermore, the erasure present in photography and painting is extended even further in computer generated imagery. The computer automates much like photography does; however, photography depends on nature

[7]Bolter and Grusin's concept of immediacy has been met with some criticism. Particularly, Anne Cranny-Francis (2005) challenges their argument about the relationship between viewer, medium, and text by noting that both the viewer and the "text" celebrate the medium and any meaning-making that may arise from it, as opposed to erasing the medium (Cranny-Francis 2005:8-9).

[8]This aspect of oil painting was forwarded by only some Western European artists, especially during the seventeenth to late nineteenth centuries, as noted by art historian Norman Bryson (1983:92).

to function by mechanically capturing light. Computer imagery does not necessarily do this, instead using mathematical equations and formulae to generate imagery. The computer program, once properly written, needs no further input from the programmer (Bolter & Grusin 2000:28). However, computer imagery does not imitate reality; instead, it imitates photography.

Bolter & Grusin (2000:38) point out, much like Greenberg (1973:68-69) did, that the dominant logic of immediacy gave way to hypermediation in the modernist period by embracing and foregrounding the material qualities of a medium. Particularly, the photomontages of the middle-twentieth century seem to celebrate the mediated nature of the photographic image. By purposefully arranging selections of images with drawing and text, the apparent immediate nature of photography is subverted.

In new media, analogue photography is hypermediated with the use of digital reproduction, editing, and distribution. The photogrammetric process used by *Digital Tourist* in the creation of the piece is yet another instance of photography hypermediated by new media. The hundreds of reference images that are sorted, compared, and combined form a three-dimensional 'hyper-photograph' that contains enough information from each photograph to form a three-dimensional representation. Thus, immediacy and hypermediacy both serve to further my practical work: both during the acts of viewing and while creating the work.

2.3.2 Levels of remediation

The process of remediation can occur along multiple strata of 'intensity' that progressively destabilise traditional media. Remediation on the first level works within the confines of the older medium, offering an immediate, but improved, version of the original text. As Bolter and Grusin (2000:45) point out, digital technologies attempt to make themselves transparent, acting as a framing device for more traditional media. In *Digital Tourist*, the mobile device used by the viewer when viewing the work acts in this fashion by offering an improved camera that captures both the physical and the virtual real.

On another level, remediation in a digital space seeks to improve upon older media without necessarily challenging it. While still functioning within the predetermined structure of the traditional artistic language, to borrow from Manovich, newer forms of media can attempt to surpass the limitations of the older medium. As Bolter and Grusin (2000:46) note, remediation, especially digital remediation, expands on traditional media by drawing from other digitised media. In image editing, for example, corrective processes have been enhanced through the implementation of digital painting techniques such as the use of

Adobe Photoshop “brushes” to quickly lighten or darken certain areas. A further benefit is that the process can be reversed at any time by deleting the corresponding layer. Conversely, such a process of dodging and burning in analogue image editing is time consuming, requires significant labour to accomplish, and is permanent (Kodak [Sa]).

Remediation is more active where the application of digital technology seeks to fracture the traditional medium. Particularly, through multiplication of the medium and juxtaposition of various media against each other, a hypermediated experience is derived from older media fragments. While Bolter and Grusin (2000:47) use the example of a desktop interface to contextualise the fracturing of media, another example could be the interface of *Adobe Photoshop* itself. *Adobe Photoshop* makes use of panels, menus, icons, and shortcut keys to present a dizzying array of options for the digital image editor. The image itself can be viewed through a variety of filters and at different sizes. Indeed, the image itself can be ‘blown apart’ and individual colour channels can be inspected and edited. This hypermediation of the image dissolves the notion of a ‘pure’ image and invites the image editor to view the image as the sum of its parts.

The final, most aggressive, form of remediation is where the newer digital technology seeks to completely absorb its analogue predecessor. Such an extreme example of remediation still does not free the newer medium from the old, but does result in the old medium becoming encapsulated within newer technologies. Bolter and Grusin (2000:48) underline the fact that the traditional medium still ontologically frames the newer medium. An example of this final stratum of remediation is that of photogrammetry. Alan Walford (2017) explains that photogrammetry is the process by which multiple images are taken at various angles and used to reconstruct a three-dimensional computer model. Digital technology thus allows the photograph to overcome its two-dimensional limitation and be used in the creation of fully realised three-dimensional digital objects. The reconstruction is highly dependent on lighting conditions, colour balance, and contrast of the resulting digital images, which refers to old media constraining the new, as noted by Bolter and Grusin (2000:48).

An example of digital image editing as a vehicle of remediation can be found in the article *Photoshop: Genesis of the Anti-Image* by Asta Rowe (2014). The article (Rowe 2014) views the sixteenth-century mannerist movement as an ancestor of contemporary digital image editing. Rowe (2014:71) focuses the discussion on the software application *Adobe Photoshop* and claims that mannerism demonstrates many of the same underlying structures of representation as digital image editing. Rowe (2014:71) explains that the mannerist preoccupation with *maniera* (style), *difficultà* (technical difficulty), and *artifizioso*

(artificiality) has been inherited by digital image editors. Rowe (2014:71) aims to establish this link by examining the work of digital artist Ruud van Empel and mannerist painter Giuseppe Arcimboldo. Rowe (2014:72) presents the argument that mannerism does not reject the Renaissance tradition, but instead attempts to experiment with new forms of representation that either enhance or diminish these aspects. Similarly, Rowe (2014:72) claims that manipulating digital images within *Photoshop* affords the artist the ability to manipulate proportions, adjust compositions and distort perspective in a number of ways.

Rowe (2014:74) views both *Photoshop* and mannerism as "an epidermis between the image and the world". In other words, both mannerism and digital image editing intercede between the image and the viewer as the artist alters reality to suit their own needs. Rowe's claim about digital image editing is not new. What is novel about her argument is that she notes that as mannerism drew inspiration from art, not real life, so does *Photoshop*. Digital image editing is, as Rowe (2014:74) would claim, self-referential. Furthermore, Rowe (2014:74) draws parallels between the "*maniera*" in mannerism and in *Photoshop*. *Photoshop*, as in the case of Van Empel's work, is less concerned with the integrity of the subject. As Rowe (2014:74) points out, like the mannerist artists of the sixteenth century, digital image editing enthrals the viewer through a display of style. Lastly, Rowe (2014:75) draws parallels between Van Empel's technical skill and the mannerist concept of "*difficulta*", or virtuosity in painting. Technical skill in one's discipline is usually celebrated, but Rowe (2014:75) notes that in few other movements since mannerism was virtuosity so celebrated. Similarly, contemporary digital artists are celebrated for their skill in digital image editing. Thus, a celebration of the artificiality and style of the image and the skill of the artist are hallmarks of both mannerist painting and digital image editing.

2.3.3 Responses to *Remediation: Understanding New Media*

Stephen Dobson (2009) has concerns regarding Bolter and Grusin's apparent disregard for the audience. Specifically, Dobson (2009:4-5) warns that the discussion of remediation assumes all viewers are equal. Dobson (2009:4) notes that remediation is constituted by and relies on a hybrid network of "technological, social, and economic relations". An example of this interchange can be found in digital image editing. The relationship between the artist, their hardware, their software platform of choice, the aesthetic choices that are constrained by the client, as well as the consideration of audience reaction form a complex structure of interacting elements where no single factor has primacy over another. However, Dobson (2009:5) warns that such a "network" does not consider those who are both included yet also excluded from it. To clarify, Dobson (2009:5) refers to the "digital divide", meaning persons

who do not have regular access to digital technology because of socioeconomic reasons or active discrimination. These persons are at risk of being excluded from having agency in the creation of new media but are nonetheless impacted by it – hence his use of the term exclusive-inclusion (Dobson 2009:5). For example, consider the beauty standards established by contemporary popular culture magazines such as *Cosmopolitan* or *Vogue*. Although disenfranchised individuals are excluded from the network of creation, the cultural expectations created by cover images nonetheless have an impact on them.

Dobson is also concerned about the way in which Bolter and Grusin approach the control a viewer has over their experience. Dobson (2009:7) cites Benjamin's claim that in mechanical reproduction there is a "loosening of the subject-object or subject-machine relation", and therefore consciousness and the self play an important role in consuming media. Dobson (2009:7) argues that this logic applies to new media as well. Dobson (2009:7-8) is quick to point out that Bolter and Grusin ignore this loosening, thereby aligning themselves with a view that stems from experiences embedded in the self. Dobson (2009:8) also remarks that Bolter and Grusin seem far too bound to the idea of a conscious, controlled self that seeks to wrestle meaning from media. The author indicates that there is always the possibility of experiences where the viewer is not in control (Dobson 2009:8).

Baetens (2006) notes that remediation is narrowly explained as a concept defined through relationships different media have with each other. Baetens (2006) offers other possible perspectives on media not covered by Bolter and Grusin: socioeconomic viewpoints and the need for innovation. With regard to socioeconomic reasons, Baetens (2006) points out that the shift from one strategy of representation to another is not necessarily motivated by the need for immediacy. Instead, artists may be motivated by cost factors or cultural concerns. Baetens (2006) takes a technologically deterministic stance when he claims that there is a cultural drive for new technologies, and thus new media, to improve in capability and reduce cost. Therefore, the need for immediacy or hypermediacy is driven not only by forces between two media, as Bolter and Grusin argue, but also through economic and cultural pressures.

2.4 INTERACTIVE DIGITAL IMAGERY

Photomontages, a kind of image editing used in analog and digital media, are commonly defined as the combination of several image fragments (Tate 2018, Makela & Boswell 1996:2), but more accurately as the juxtaposition of ontologically or stylistically incompatible elements that create new visual and conceptual meaning. This section outlines various

debates on the conceptual potential of different abstract and representational styles of montage. Lastly, photomontages have varying applications, from reflecting on personal trauma, reconstructing spatial forms in virtual reality, reshaping objective recordings into subjective impressions to forming part of the paradox of the compositor–viewer relationship in new media. In answer to my second research question of methodologies and conceptual contributions in new media; digital photomontages demonstrate the ease with which layers and transparency are manipulated, the capability for user-interactivity, and the possibility of occupying three-dimensional space.

The role of the viewer as potential author is illustrated by Aseem Agarwala, Mira Dontcheva, Maneesh Agrawala, Steven Drucker, Alex Colburn, Brian Curless, David Salesin, and Michael Cohen (2004). The authors propose a novel way to create digital composites driven by user input. Using the term “interactive digital photomontage” (Agarwala *et al* 2004: 249), the authors introduce a system that processes input given by a user via a visual interface to combine several exposures taken by a digital camera. The authors’ compositing technique aims to allow the viewer to alter a digital photograph from a representation of a scene to a depiction of their subjective experience. My own work, *Digital Tourist*, functions in a similar fashion. Although, as opposed to Agarwala’s work, the user in *Digital Tourist* is not free to rearrange the component photographs to create a new composite, they are free to view the scene from any vantage point they choose.

The authors (Agarwala *et al* 2004:294-295) also warn of two technical challenges in digital image compositing: the selection of clearly defined boundaries between object and background, as well as the isolation of the entire subject without including elements of the background. The first technical challenge refers to a level of tonal contrast between elements, without which the element selection algorithm will fail to find objects to isolate. The second technical limitation occurs in fragments of the original background left behind after the selection process is completed. These background fragments are called “artefacts” (Agarwala *et al* 2004:295) and allude to the manipulated nature of the image. A common example is the tell-tale ‘halo’ of light around hair from a subject placed from a light background on to a dark one. It is certainly true that in most commercial applications such artefacts are undesirable; however, Pais (2012:45-46) argues that it is the appearance of these ‘mistakes’ that brings to light the virtual nature of the viewing experience. I would propose therefore that the second limitation mentioned by Agarwala *et al* is not a limitation but, instead, an aesthetic strategy in digital imagery. This aesthetic strategy is significant to Manovich, who argues for new representational methodologies in *Post-Media Aesthetics*

(2001b), as explained later. The practical component of this research, the new media installation *Digital Tourist*, embraces these 'artefacts' by opting to retain them in the final presentation of the work. The goal behind these is to evoke 'traces' of the spaces within which the scenes and objects depicted in the work were originally found.

2.4.1 Digital layering and transparency

Figure 2.4. *Skyfall*, "Opening Sequence" (2012)

Jay Lampert (2014) questions the phenomenological implications of a fundamental tool used by the digital artist: layering and transparency. Lampert (2014:30) argues that digital compositing introduces a new form of perceptual control. Lampert (2014:30-32) is careful to outline the history of perceptual control in cinema by mentioning the different ways in which the artist can alter our perception of a section of space-time. Specifically, Lampert (2014:32-36) mentions the new level of control digital compositing allows to work towards altering the viewer's perception of a particular scene. In the opening sequence for *Skyfall* (2012), for example, the digital compositor is able to visualise a fantastical sequence of images where the protagonist descends through a series of dreamlike scenes that revolve around the central themes of the film; that is, violence, death, and mistrust. It is through software applications like *Adobe After Effects* that the artist is able to control every facet of the viewing experience by manipulating visual data in a variety of ways, such as the use of layers that overlay recorded footage and computer-generated imagery. The scene depicted

in Figure 2.4 from the opening sequence in *Skyfall* would not be possible without the aid of digital compositing.[9]

Additionally, Lampert (2014:43) highlights a paradox unique to digital imaging, namely the importance of layering in the perception of the digital image that is nonetheless undetectable to the viewer. What interests Lampert is the difference in phenomenology between the compositor and the viewer. Lampert (2014:39) notes that, for the artist, "[t]he experience is in the construction, not just in the conclusion". Such a statement reflects the duality of digital image manipulation. The artist bears witness to the project at several stages of development; the various effects layers, masks, and adjustments are hidden from the viewer. While the inner workings of art being hidden is not unique to digital media, it is difficult to find another medium that can manipulate, expand, alter, and generate layers and transparency with the ease that software applications can. For Lampert (2014:40), the defining element unique to new media is that transformative power it wields in layering and transparency. However, while the artist has the ability to expand and collapse stacks of layers, hide and reveal key layers, blend or obscure layers through masks, and isolate elements by rendering the background transparent, the viewer only sees the final result: a conclusion. Another unique aspect to digital media is the dynamism inherent in works of new media. A viewer can view the final work, the conclusion, but also explore the inner workings of the artwork. It is the manipulation of these multiple layers of a work that has had the most significant impact on informing my second research question; that is, in identifying significant methodological and conceptual factors in digital art. My work *Digital Tourist* seeks to explore this relationship between artist, viewer, and work, by providing a visual output that is incomplete without the input of the viewer. By actively engaging with the work, the viewer becomes a participant, or user, of the various pieces exhibited.

Lampert (2014:41) muses on the possibility of what effect new media could have on the viewer if they became more aware of the role the features outlined above had in the creation of the work. The paper of Agarwala *et al* (2004) on interactive digital photomontage presents a possible solution to this problem by introducing a level of user interactivity in the compositing process, and so the gap between artist and viewer narrows. I expand in Chapter 4 on how *Digital Tourist* incorporates possible strategies that introduce a level of user interactivity, as proposed by Agarwala *et al* (2004), to address the phenomenological

[9]For example, in one scene of the opening credits, the agent 007 casts four shadows that revolve around him, even though the light on the agent himself does not change. The shadows move in ways independently of 007 and each other, also reacting to the agent firing his gun.

consequences of new media introduced by Lampert (2014).

2.5 APPLICATION STRATEGIES FOR NEW MEDIA

The end of this chapter provides an overview of selected strategies that authors and artists conceptualise and apply for new media in their artmaking. These strategies are discussed in relation to my third research question: what conceptual and methodological approaches particular to digital technologies can assist in the creation of new media art? I also discuss how selections of these strategies are incorporated in my own work.

Some authors argue that an analogue transposition of digital art exposes the medium to new critical insights. Filipe Pais (2012), for example, contends that translating digital media into a physical space forces the viewer out of an immersive trance. While Robrecht Vanderbeeken (2011) does not specifically advocate a move of digital media into a physical space, the author does argue that opposition to established representational strategies in media can reframe discussions on existing media. Certain authors oppose the above views and instead embrace the uniquely digital aspects of new media art. Manovich (2001b), specifically, argues for an entirely new conceptual system based on the ontology of the database.

Pais (2012:44) illustrates the problematic nature of critical discourses surrounding new media. He identifies two types of immersion: the first is as a result of dependency, which is made apparent when technology ceases to function (Pais 2012:44). The author points to examples relating to personal electronic devices, but the same applies to digital image editing.[10] Corrupt image files, broken memory cards, faulty screens, and unexpected program errors are all moments when the artist becomes aware of the mediated nature of their art making. Therefore, immersion in a digital medium is a form of dependency made visible when the digital artist’s tools unexpectedly crash. The second type of immersion is specific to a user's interaction with digital technology. As Pais (2012:44) claims, "the degree of immersion seems to be inversely proportional to the degree of awareness of that medium". This means that the easier a technology is to use, the less the user is aware of the mediation at work.

Pais develops his critique of new media by introducing the notion of media displacement, noting that the inherent intuitive design of new technology makes critical insight of new

[10]By way of example, the author (Pais 2012:45-46) provides a discussion of his daily routine that seems filled with digital devices. However, as Dobson (2009:5) argued earlier, this assumption of the ubiquity of digital media is atypical of the experience of many people.

media problematic (Pais 2012:43). As a result, the author proposes that in art making a paradox arises: to render the medium transparent, the artist must "make visible the workings of media" (Pais 2012:44). Pais (2012:44) argues that this is done by going “against the flow of remediation” by bringing digital objects into physical being. Although Pais does not seem to consider that Bolter and Grusin both note that remediation does not always shift from physical to digital but can ‘flow’ both ways, Pais does introduce a novel approach to rendering the workings of new media visible. Pais (2012:43) specifically cites the immediacy of new media, as argued by Bolter and Grusin, as a significant hurdle in the critique of new media. Thus, the author (Pais 2012:43) names his approach a "tactic of Media Displacement" to foreground the systems of new media. *Digital Tourist* incorporates this element of Pais’s argument by deploying AR technologies to bring the digital image partway into the physical world. In support of this argument, Pais (2012:46) recalls Claudia Giannetti's concept of the endo-aesthetic, that in order to appreciate the world, the viewer must stand outside of it and the viewer can only do so via a simulation. Pais (2012:46) extends Giannetti’s argument to digital media: because we are so enmeshed within digital media it is impossible to observe it from the outside. Therefore, a simulation of new media is required in order to better understand it. Pais (2012:46) motivates that "displacing" media from digital to analogue creates such a simulation and a "critical detachment". This simulated new media in physical form invites a new, more critical, insight, which motivates my decision to use AR technologies in the installation of my work.

While Pais’ (2012) work explores the relationship between different media, Vanderbeeken (2011) investigates the relationship media has with itself. Vanderbeeken clarifies, through an analysis of a stage play and documentary video, how working against established strategies of representation can lead to new conceptual possibilities. Vanderbeeken (2011:70) refers to this process as “medial inversion”. Medial inversion is the act of opposing conventions in a medium, style, or genre to evoke new meanings, ideas, or emotions (Vanderbeeken 2011:70). In other words, breaking away from established forms of representation in media invites forms of analysis that may not be available otherwise. Therefore, medial inversion invites a fresh perspective as well as new critical insight by invoking a reflexive posture in the viewer and artist (Vanderbeeken 2011:70).[11]

Digital Tourist incorporates this argument in adopting a strategy of medial inversion by

[11]Vanderbeeken (2011:70) notes that medial inversion can be understood as a "satirical parody" that appropriates cultural symbols and places them within new contexts. The author argues that this provides a bulwark against the "society of the spectacle" (Vanderbeeken 2011:70).

problematising certain photographic conventions. That is, my work brings into question the conventions of high-resolution digital photography[12] through the use of point clouds; three-dimensional objects to two-dimensional representations by using three-dimensional proxies; limited viewer interactivity by implementing AR technologies; and spatial agnosticism by creating a site-specific artwork.[13]

I would, therefore, argue that Vanderbeeken proposes an alternative reading of remediation. Although he does not specifically reference the term remediation, Vanderbeeken (2011:85) does state that media "... thus generate[s] a different kind of anti-environment that does not necessarily require the use of a different medium". Therefore, media can remediate itself through inversion (Vanderbeeken 2011:85). As Bolter and Grusin (2000:50) have argued, remediation is the tendency of one medium to reform another; however, by adopting a strategy of medial inversion it becomes possible for a particular medium to reform itself.

Manovich (2001b:6) proposes that in a post-internet culture a new conceptual system may be developed, outlining it as follows:

1. The ways in which artworks "organise data" and "structure the user's experience of data" should be explored (Manovich 2001b:7). What Manovich is proposing is a taxonomy, or ontological framework, that considers both content and meaning as "data".
2. Post-media aesthetic discussions should be free from the type of data or storage method they use (Manovich 2001b:7). Here Manovich attempts to 'free up' terms used in digital information technology for use in representational strategies.[14]
3. Post-media aesthetics should adopt the ontologies of the hardware and software environment (Manovich 2001b:7). Manovich proposes that the use of terms such as "compress", "copy", "transfer rate", and "bit depth" should be applied to new media artworks as opposed to their vehicle of communication: digital technology.

[12]Manovich (1995:8) points to the long-running debate between "continuous-tone" analogue photography and high-resolution discrete sample digital photography as being a key distinction between the two forms.

[13]My term 'spatial agnosticism' is in reference to how digitally reproduced photographs lack the aura of original works, and thus are free to occupy any space at any time (Benjamin 2010, Berger 1972). *Digital Tourist* deploys augmented reality technology's potential to reintroduce the aura (Bolter, MacIntyre, Gandy & Schweitzer 2006).

[14]For example, the use of multiple windows in a graphics user interface to display information does not necessarily need to apply only to visual data.

Furthermore, Manovich argues vehemently that future generations will inevitably understand the world from the point of view of information technology, and that it is "something we ethically must do" (Manovich 2001b:7) to transfer that epistemology over to traditional media.

4. A focus on the medium emphasises the artist's intentions; however, shifting to software moves attention to the user, their experience, and their capabilities (Manovich 2001b:8). Manovich argues that the notion of medium places emphasis on the physical qualities of the work, and thus is seen as an embodiment of the artist's intentions. Manovich proposes that by viewing works of culture as software, the viewer's ability to interact with the work, their "operations" (2001b:8), is brought to the foreground.
5. Post-media should distinguish between the way a piece of "cultural software" should be used, and how differently it is used in practice (Manovich 2001b:8). Manovich draws particular attention to the disconnect between the intended use of software and how it is commonly used by the majority of viewers. This accidental, or in some cases deliberate, misuse of cultural software is a space within which there is room for exploration, for new conceptual possibilities.
6. Lastly, of interest is "information behaviour", or the way in which the user extracts and works with data (Manovich 2001b:9). Information behaviour is the patterned interaction between a user and cultural software. Manovich is quick to point out that this behaviour can range from the "ideal" to the "subversive" (Manovich 2001b:9). Information behaviour within post-media describes not only our present daily activities of using computers, but is an asynchronous term that can apply to all products of culture (Manovich 2001b:10).

To conclude: Chapter 2 serves to unpack the key theoretical concepts used in this study: deep remixability, remediation, and media displacement. My discussion of these concepts in relation to digital image editing contextualises the arguments of Manovich, Bolter and Grusin, and Pais within the work discussed in later chapters. This chapter outlines the landscape of new media studies relating specifically to digital image editing. While not exhaustive, Chapter 2 provides several key findings. Deep remixability is the underlying mechanism through which digital image editing appropriates artistic languages from varying traditions in art, namely painting, photography, and collage. Digital image editing, through remediation, is the dialectic between different modes of art: virtual/physical, digital/analogue, and old/new. Digital media displacement functions to remediate virtual spaces towards

physicality through the use of analog and real-world elements.

The focus of the discussion narrows in Chapter 3 by looking at one specific form of digital image editing, photogrammetry, and one instance of media displacement, AR. These two specific medial strategies are explored in relation to the work of John Craig Freeman and the Oddviz collective to address the research questions posed by this study. Chapter 3 is therefore an exploration of the conceptual contribution digital image editing can have in the creation of new media art.

CHAPTER 3 **Analysis of case studies**

This chapter examines the work of new media artist John Craig Freeman and the new media collective Oddviz through the lenses of deep remixability and remediation. The chapter focuses its discussion of digital image manipulation through the main ideas highlighted in the previous chapter: hypermediation, the active user, content as data, the open digital database, deep remixability, immediality, and hypermediation. These novel aspects are identified in the work of Freeman and Oddviz through a discussion on the conceptual implications such digitally oriented methodologies have on their work.

3.1 JOHN CRAIG FREEMAN

Figure 3.1. John Craig Freeman, *Virtual US/Mexico Border* (2017).

In digital photomontage the paradigm of interactivity[15] is fundamentally important, with viewers participating in the consumption, distribution and, in some cases, the creation of the work. In the case of Freeman's work, the primary means by which the viewer interacts with the artwork is through their mobile device. Freeman's AR installations, such as *Virtual US/Mexico Border* (2017) (Figure 3.1), overlay virtual reconstructions of various scenes and

[15]In this context I am using the term interactivity as Agarwala *et al* (2004) use it, meaning the embodied interaction between a user and the artwork.

subjects on to specific locations in the real world (Emerson College 2017). In *Virtual US/Mexico Border*, Freeman places elements along the border between the United States and Mexico on the waterfront of the Norwegian town of Stavanger. Engaging users through their mobile devices via AR to displace the subjects and environments in the work, Freeman calls attention to human rights concerns occurring thousands of kilometres away from the exhibition site (Emerson College 2017).

Writer and new media artist Dorothy Santos (2017) further explores Freeman's work in the context of biology and how AR affects human behaviour. The cultural and social implications of emerging technology give rise to "new human patterns of behavior" (Santos 2017:449). Santos (2017:449) argues that Freeman's work is an exploration of the role technology plays in the changing relationship between individuals and their physical environments. For example, in *Virtual US/Mexico Border*, the user must physically explore the space to "truly experience" (Santos 2017:449) the digital objects. Exploring digital spaces in a physical way brings to the surface certain background events, such as "thinking with a specific intention on a lost object" (Santos 2017:449). AR allows the artist to introduce obscure stories otherwise unworthy of depiction in a gallery (Santos 2017:449).

This notion of individual interactivity is important to Freeman's work. As Ulmer and Freeman (2018:97) describe it, "Interactive equipment establishes at the level of technics a feature of the world central to the history of the arts, which materialise and augment a human capacity to be affected by place and event". Through their phones, users can create their own compositions of a place or event, save the images, and disseminate them in whatever manner they wish. I argue that this additional element of interactivity furthers the individual's engagement with the work and allows Freeman's work to be more impactful than it would be in other, more conventional mediums. This dissemination and multiplication of Freeman's work furthers the notion of hypermediation in digital media. Specifically, the layering of virtual over real spaces, the deployment of Freeman's work to multiple user-owned electronic devices, and the further pluralisation through distribution on social media are all examples of what Bolter and Grusin (2000:21,28,31-35) noted when outlining hypermediality in new media.

Installation artwork and mixed reality serve an important function in facilitating user interactivity. This addresses a core aspect of the first and third research questions listed in the introduction of this dissertation. The notion of user-interactivity is foregrounded in new media artwork, and as a conceptual framework alludes to new methodological and conceptual possibilities. Furthermore, it is through incorporating elements of digital

remediation and remixability of traditional media in a digital installation that such possibilities can be expanded upon. It is important to clarify that the term installation is used here very loosely, and can refer to the physical installation of work in a particular place but also to the digital installation of a work at a particular point in virtual space. While the implications and possibilities of a wholly virtual installation are outside the scope of this dissertation, it is important to underline the importance an embodied experience has in providing the user with a sense of interactivity when engaging with new media work.

Knight and Senie (2016) address how Freeman's work reframes the dynamic between physical and virtual spaces in public discourse. Freeman's work leverages the ability of AR technologies to introduce particular social discourses into public spaces. The use of AR in his work obscures the division between virtual and physical spaces, allowing the user to move beyond the limits of "time, geography, or politics" (Knight & Senie 2016:337). Freeman's goal is to utilise new media technologies for challenging our assumptions of the real and to "introduce new visual languages" (Knight & Senie 2016:337). Later, I argue that Freeman's work does not introduce a new visual language but instead is an example of deep remixability of other languages and techniques from analogue media.

Figure 3.2. John Craig Freeman, *Coming Home* (2018)

In *Coming Home*, Freeman applies a virtual layer to the real-world city of San Francisco. Explained on the project page, Freeman (2018) notes that the city is experiencing a dramatic increase in housing prices. As a result, a large number of individuals are left homeless. Freeman hopes to bring the plight of these individuals to light through his work with AR. To do so, he used photogrammetric techniques to capture the likeness of the individuals, while embedding audio into the AR application that narrates various stories from those displaced onto the streets. Users can open this application in a variety of areas around the city to listen to different perspectives from different people. This juxtaposes the plight of these individuals against the city scene recorded through their phones.

Freeman's work makes use of the "porous" (Knight & Senie 2016:337) nature of AR to blend the experience of the user with the socioeconomic condition of the poor in San Francisco. Freeman is able to use AR in this hypermediated fashion because mediated experiences are no longer viewed with mistrust (Bolter & Grusin 2000:42). His work also embraces and acknowledges the hypermediated nature of the medium by overlaying different virtual and physical spaces in a way that appreciates the medium as a conveyor of meaning by itself (Bolter & Grusin 2000:41). Freeman uses not merely the content of his work to convey his intended meaning but shows that the medium itself can also communicate a message. Bolter and Grusin (2000:62) argue that one cannot distinguish media from their socioeconomic and political context. Freeman uses that context to further underline his point: the people who are able to 'see' into the lives of the homeless can only do so because of the expensive mobile devices they own.

The addition of a physical aspect to his work has further conceptual implications. Academic and new media artist Rewa Wright (2018:357) considers the physical and the virtual joined together in what she refers to as an "embodied experience". Referencing AR as a form of digital assemblage, the author argues that AR has the potential to shift user perception and introduce political and ethical issues into "existing conversations about the material world" (Wright 2018:358). Wright (2018:359) supports this claim by analysing several artworks that challenge the perception of AR as an "information overlay" and position it as a "citizen-oriented form of critique" that uses the embodied experience of AR to make ethical and political points. Freeman's work is analysed by Wright (2018:364) as one example of AR's "activist role" (Wright 2018:359). Wright (2018:359) further argues that the additional effort involved in AR art is not a discouraging factor, but instead becomes a motivating factor that "fuels" engagement with the work. For Freeman, Wright (2018:367) argues, this effort culminates in the creation of a portal through which two cultures meet. Freeman juxtaposes

the world of the user with the world of the “denied and downtrodden” (Wright 2018:364). AR not only introduces a new sense of space and place in digital media but also new cultural and ethical dimensions to different physical spaces.

Provost Professor of Communication, Journalism, Cinematic Arts and Education at the University of Southern California, Henry Jenkins (2006), addresses the issue of user interactivity from the perspective of convergence culture. Convergence culture is “where old and new media collide, where grassroots and corporate media intersect…” (Jenkins 2006:2). Jenkins (2006:131) notes that “fans”, or individual consumers of culture, adapt to new media technologies and take advantage of them in the creation of their own work. New media presents a platform for experimentation that results in new techniques and “relations” (Jenkins 2006:132) to others. Jenkins (2006:132) argues that within the new social paradigm of convergence culture “everyone is a participant”. Jenkins (2006:133) does make a distinction between interactivity and participation. His definition of interaction as being technologies that are “responsive to consumer feedback” (Jenkins 2006:133) aligns with the context in which the term is used throughout this dissertation. Jenkins (2006:133) does elaborate to make the point that “interactivity is constrained by the technological”, and so the limits of the medium impose a limit on the responsiveness of the work. Participation, conversely, is constrained “by the cultural and social protocols” (Jenkins 2006:133). However, what Jenkins (2006:133) does acknowledge is that the internet is now a place of mass participation as virtual spaces increasingly become commonly used as everyday social places. Jenkins’ conceptualisation of convergence culture underscores the collaborative nature of Freeman’s work as individuals increasingly interact with technologies and participate with each other in both physical and virtual spaces.

Users collaboratively participate with a work by distributing the entirety, elements, or altered versions of the work. By adopting the individual’s personal mobile device as a platform for the artwork, Freeman’s installations can be distributed through social media. Users can save images displayed on their mobile devices by capturing screenshots of the exhibition. These images can be further edited by adjusting contrast, colour, or other factors. Additional text and graphics can be added, further recontextualising Freeman’s work. In this way the exhibition becomes a collaborative experience, with users able to contribute to the meaning of Freeman’s work. The fluid nature of ownership in digital technologies is so ingrained in the very nature of the medium, that it is a distinct hallmark of new media work.

Gregory Ulmer (Ulmer & Freeman 2018), professor of Electronic Languages and Cybermedia at the European Graduate School in Saas-Fee, Switzerland, together with

Freeman acknowledges this unique aspect of digital media. Ulmer and Freeman (2018:95) compare social media and the internet to the public square, a place where social discourse was conducted. Social media functions in a similar fashion to these physical public spaces by allowing individuals to "air grievances, display solidarity, express difference, celebrate similarity, remember, mourn, and reinforce shared values of right and wrong" (Ulmer & Freeman 2018:95).

The authors are aware of the possibilities of augmented-reality art for these digital social spaces, claiming that the virtual "encourages exploration of mobile location-based art in public" (Ulmer & Freeman 2018:95). They extend this argument by proposing that augment-reality technologies are on a course towards the convergence of "real-time information (Internet)" and "the present lifeworld (Lebenswelt)" (Ulmer & Freeman 2018:97). The social application of augmented-reality art is therefore not a feature of new media, but a distinctive quality of it. The interaction of individuals with an artwork forms part of a larger emergent network of individuals that share, comment on, and inform others' experience of the work. Freeman not only acknowledges this feature of his work, but actively seeks it (Ulmer & Freeman 2018). In *Virtual US/Mexico Border*, Freeman leverages the individual and social elements of the work to call attention to the deaths of Latin American immigrants attempting to find refuge in the United States (Ulmer & Freeman 2018:98).

Figure 3.3. John Craig Freeman, *The Augmented Landscape 1* (2017).

Figure 3.4. Henry Peach Robinson, *When the Day's Work is Done* (1877).

AR is the product of a deep remixing of several analogue languages. Specifically, the methodology, resources, and approaches implemented in AR installations are inherited from analogue photomontage. Figure 3.4 is an example of a combination print by Henry Peach

Robinson. Six negatives were cut, arranged, and exposed over each other to form the final image. The limitations of this approach meant that Robinson needed to carefully plan the execution of each layer. Composition, lighting, perspective, and exposure had to be consistent across all six images for the resulting combination to be effective. This approach is similar in intent and execution to Freeman's AR work using photogrammetric scans. For example, consider Figure 3.3: the combination of several image layers to form a unified whole, the creation of a visual Gestalt through colour grading, and the consistency in lighting across various image fragments. Figure 3.3 is a reflection of contemporary digital imaging conventions and norms that were established by traditional analogue film montage.

Freeman and Robinson both use their respective image manipulation techniques towards reaching similar conceptual goals, and both attempt to displace notions of time, geography, and politics. In Robinson's case, he creates an idealised scenario that functions as "an allegory about the cycle of life" (Garcia 2010:5), painting an idealised portrait of late nineteenth-century working-class life. Freeman takes a more critical stance and uses AR to challenge notions of reality and to "more fully represent our current understandings of place and space" (Knight & Senie 2016:337). Both these artists use similar aesthetic strategies to displace the user to a new cultural, social, and geographic frame of reference.

While not using transparent images overlaid on top of each other, Freeman's interweaving of virtual and physical realities conforms to Lampert's (2014) notion of transparency. Lampert (2014:42) notes: "Layering and transparency are effectively the same concept, since layering is not possible without the transparency of the layer on top". AR layers content in the same way digital image manipulation does: by employing transparency to place one visual element over another. In Freeman's case, as in Figures 3.1, 3.2, and 3.3, the elements being overlaid are a digital recording of a physical space and a virtual reconstruction of an object or scene.

Layering can apply to AR as Lampert (2014:42) argues that layering is something beyond an aesthetic idea. Lampert speculates about what art could look like if artworks were made around the idea of revealing their layered characteristics. I would argue that AR is a possible manifestation of this goal. By juxtaposing two layers of reality against each other, the contrast between the two is the underlying mechanism that drives the user's experience.

I propose it is how layers function in digital media that becomes a defining factor in distinguishing digital image manipulation from analogue image manipulation. While layering was certainly possible before the advent of digital imaging, it was to a far more limited extent than what computer software allows. Art critics and journalists Angie Kordic, Elena

Martinique, and Nadia Herzog (2016) illustrate that early photomontage work was largely based in printing practice. For example, the combination printing technique adopted by Henry Peach Robinson in Figure 3.4 exposed multiple negatives onto the same emulsion. This technique introduced a fundamental shift in how photographers thought about their images. The direct correlation between the mechanical processes of the camera and the chemical reaction of the emulsion was challenged. However, this technique had several limitations. For instance, the negatives could not be altered in very significant ways; there was a limitation on the number of negatives that could be stacked; the subjects needed to be consistent in terms of scale and lighting; and finally, the subjects themselves could not be altered but only placed within the context of the other scene (Martinique *et al* 2016).

Lampert (2014:40) does note that layering may possibly not be as "radical" a change in how visual art is experienced. Lampert illustrates that digital layering "...controls sense-organs but does not switch to a new one". Lampert (2014:40) compares the advent of layering in art with the introduction of sound to cinema and points out how this new aural stimulation in films radically changed the artform. I would argue that just like the introduction of sound Lampert (2014:40) references, layering in AR does introduce a new sense. Lampert (2014:46) also debates the differences in perception of perspective for digital "compositors" and their audience. AR in this way further bridges the gap between user and artist by allowing a greater degree of movement for the user when experiencing the work. The artist, to an extent, offers up a degree of control by allowing individual users to choose their own points from which to view the work within a controlled environment.

Layering is made possible by the development of the alpha channel, a property unique to digital imaging. The development of the alpha channel allowed compositors to isolate elements from their background and define the transparency of the element. Computer scientists Alvy Ray Smith (1995:5), along with Ed Catmull, invented the RGBA[16] system

[16]This system stores the information of the digital images into three primary colours: red, green, and blue. In addition, a fourth channel – alpha – defines the opacity of each pixel. This additional channel allows the digital artist to define the transparency of each pixel in an image. Smith (1995:7) distinguishes alpha channels from a separate entity – masks. Masks are attachments to layers that 'knock out' areas of the background to reveal underlying images in a composite. With the introduction of "integral alpha channels" (Smith 1995:7) inherent transparency became unique to digital images. Smith (1995:7) explains that there are two ways to calculate the effect of integrated alpha channels on the rest of the layer: premultiplied and non-premultiplied alpha. Premultiplied alpha is preferred in digital imaging as it is computationally far more efficient (Smith 1995:7). Smith (1995:8) points out that premultiplied alpha causes a shift in the artist's approach to composited elements. This is because a premultiplied alpha value of zero is completely transparent. Thus, colour channels multiplied with zero return zero and so do not 'exist'. Smith (1995:8) argues that this is more in line with the human perceptual system. In short, this changes our perception of images from layers with associated mattes

used in digital imaging.

As important as alpha channels and layering are, they are almost never directly experienced by the viewer. As Lampert argued earlier, the experience of an artwork differs from the perspectives of the artist and the viewer. Artists have access to the “project file” (Lampert 2014:39), a term that refers to the version of the image that contains all the editable layers, components, and filters of an image.

Figure 3.5. Hannah Höch, *Untitled, from an Ethnographic Museum* (1930).

Figure 3.6. Eugenia Loli, *How to Attract and Eat a Male* (2018).

Digital image artists may also draw from the artistic languages of collage and mixed media art. Influenced by the Dada collective, digital image artists have implemented collage techniques within their own workflows. Dada artists adopted the use of scissors and glue as their method of creating photomontages (Kordic *et al* 2016). The stark juxtaposition of image fragments against each other developed a visual language that was drastically different from the ontologically consistent style popularised by Rejlander and Robinson. This open acknowledgement of the constructed nature of their work is implemented in contemporary digital image editing through comparable means. A family of ‘selection tools’ In *Adobe Photoshop* allows the image artist to define a particular area of the image. This selection can be isolated from the rest of the image and placed into a separate document along with fragments from any number of sources: other digital photographs, scanned illustrations, vector artwork, or computer renderings. Figures 3.5 and 3.6 illustrate the comparable

moving over each other to objects acting independently within a frame (1995:8).

approaches between the Dada artist Hannah Höch and a contemporary digital artist, Eugenia Loli.

3.2 THE ODDVIZ COLLECTIVE

Fig 3.7. Oddviz, *Kadıköy II* (2018).

The images created by the Oddviz collective, such as *Kadıköy II* (Figure 3.7), relate strongly to themes of preservation of transient public artworks and cultural heritage. The group addresses these issues in and around Turkey by making use of new media techniques such as photogrammetry and computer-generated animation (Sierzputowski 2018, Raab 2017, Summers 2017). Erdal İnci[17] (in Raab 2017) describes their motivation for using photogrammetry because of the "imperfect" nature of the final product and how the final work resembles the expressionistic qualities of painting. Erdal (in Raab 2017) continues his motivation by claiming that "photogrammetry will work well to preserve areas that will no longer exist". Erdal refers here not to the representational potential of photogrammetry, which is the defining feature of film and photography, but to the interactive and explorative

[17]İnci, Çağrı Taşkın and Serkan Kaptan are the three members of the Oddviz collective (Oddviz 2019).

potential of the technique. To provide a metaphor, photogrammetry is a three-dimensional photograph that provides the documentative and representational qualities of photography while facilitating exploration and movement in three-dimensional space (Sierzputowski 2018, Cheng & Hou 2019:157). In other new media projects, the technique has been used by artists such as South African Jonty Hurwitz in the microfabrication process of the world's smallest sculpture (Yetisen *et al* 2016:1732).

The motivating element for Oddviz is the preservation of public sites that contain graffiti, street art, public sculpture, or even abandoned buildings (Sierzputowski 2018, Summers 2018). Oddviz (in Sierzputowski 2018) describes their work as a way of "protecting street culture in 3-dimensions". Oddviz (in Summers 2018) also views the subjects of their work "as important culture capsules that evolve as they corrode or get covered in posters, stickers and graffiti", and argue they take part in "digital preservation" (Oddviz in Summers 2018). Photogrammetry is uniquely positioned to facilitate this need for documentation and protection of cultural spaces due to the practice's usual application: the preservation of rock art and megalithic structures in archaeological excavations.[18]

Professor Karl Kraus (2007:1), former chairman of the Faculty of Engineering and Natural Sciences at Vienna University of Technology, defines photogrammetry as the reconstruction of "the position, orientation, shape and size of objects from pictures". Digital photogrammetry is the reconstruction of these qualities through the use of computer imaging that emulates "human vision and perception" (Kraus 2007:1). Kraus (2007:2) notes that photogrammetry "provides information about both the natural landscape and the cultural landscape". Kraus (2007:2) uses the term "cultural landscape" to refer to buildings and other constructs imposed on the natural landscape, both of which can be recorded using photogrammetry.

Photogrammetry is widely used in the field of archaeological preservation (Addison 2000:23, Bryan & Chandler 2008, Chandler & Freyer 2005, McCarthy 2014:175, Plets *et al* 2012:143), in part because of the non-intrusive nature of the practice but also as a means of fostering community engagement (Bryan & Chandler 2008, McCarthy 2014:175, Plets *et al* 2012). Plets *et al* (2012:143) note that the nature of how the data is gathered during the photogrammetric process is particularly pressing for physically delicate works as "the increasing presence of tourists also threatens the… archeological heritage".

[18]For further reading on the history of photogrammetry in archaeological fields see Addison (2000), Chandler and Fryer (2005), Kraus (2007), Bryan and Chandler (2008), Plets *et al* (2012), and McCarthy (2014).

Photogrammetry, therefore, provides two benefits. First, the practice allows archaeologists to record their subjects without physical interaction; second, it provides a virtual alternative for tourists to engage with these cultural elements without damaging them.

Another point raised by researchers in this field is the collaborative possibilities afforded by the photogrammetric process. McCarthy (2014:178) underlines this point through the data-capturing process being "carried out entirely by children between the ages of 10 and 16" in his documenting of a Scottish graveyard. McCarthy (2014:183) notes that "The most valuable application of multi-image photogrammetry may yet prove to be in facilitating community involvement in archaeological recording". Chandler and Fryer (2005:2) echo this sentiment, as do Plets *et al* (2012:140), who note that "the presentational strength of the outcomes also has a huge potential for public outreach projects". Plets *et al* add that "it was clear that 3D and VR was successfully applied in public outreach projects and changed the way to communicate heritage". Lastly, Bryan and Chandler (2008:260) claim that the output generated by the photogrammetric process "is now recognised by the archaeological community as beneficial, particularly for providing contextual information".

What these studies indicate is that the language of photogrammetry is that of observation, recording, and preservation. What distinguishes photogrammetry from other lens-based recording media is the ability of the process to facilitate engagement from the public and to better relay contextual information not possible with two-dimensional representations. A comparison of the sentiments of the Oddviz collective and the work of Freeman with the above observations of these archaeologists reveals a conceptual and methodological thread that unites them.

Figure 3.8. Oddviz, *Fiat 124 – Murat 124 – Seat 124 – VAZ 2101* (2018).

Figure 3.9. Karl van Heerden, *Arm* (2017).

The photogrammetric process depends heavily on the quality of the source images used in subject reconstruction, particularly in terms of consistency in colour, tone, and the definition of edges in the image (Plets *et al* 2012:149, McCarthy 2014:183). Consequently, computer imaging techniques can have a significant impact on how well photogrammetric software interprets the object in three-dimensional space. For example, photogrammetric software such as *Meshroom* uses colour values measured from the image pixels when determining a subject's overall appearance and form. Compare Figures 3.8 and 3.9. Figure 3.8, by the collective Oddviz, has been carefully scanned and reconstructed to be as accurate as possible. Possible colour contamination from natural and artificial light sources has been removed, specular highlights from the glass and metal components have been removed, and harsh shadows created by sunlight have been softened or removed. As a result of this corrective work using digital imaging techniques, the car is accurately reconstructed in virtual space.

Contrast the work of Oddviz from an example of a test reconstruction I conducted (Figure 3.9). In *Arm* the reconstruction is less accurate; the various angles of the arm overlap at unusual angles and parts of the subject are missing. This is primarily due to the use of imagery with low contrast, poor management of variations in colour as a result of lighting, and poor edge definition. The difference in result between the two reconstructions is due to the software program's ability to discern the form of the subject, distinguish the subject from the background, and correctly estimate the subject's volume in three dimensions using colour, tone, and edge information from the source image.

Considering Manovich's (2001b:7-9) proposed conceptual framework for new media, digital

image editing approaches content in the work as information, or data,[19] to be added to a database, that is, information that can be selected, inserted, deleted, or updated. This method of reading new media artworks signifies that 'data' supplants that 'subject' to reflect the underlying behaviour of their component elements. In *Kadıköy II*, Oddviz photographs the objects from various angles, then processes the images using computer software applications such as *Agisoft Photoscan*, *Meshroom*, or *RealityCapture* to create accurate digital reconstructions (Sierzputowski 2018). Oddviz presents their subjects as items in a large catalogue – a printed piece that inventories street art from a particular location (Summers 2018).

In various ways the component elements of new media artworks can be manipulated by the user in a fashion similar to elements in a database. Contrast the work of Oddviz, which selects each element when capturing the subject, with Freeman's work, in which the user selects the subject of each composition. Oddviz's work is in a printed format, preventing the insertion of any new data or visual element. Freeman, however, allows for new data to be inserted. Freeman's work is more malleable, but individual elements in his work, such as the guard in *Virtual US/Mexico Border*, cannot be changed or removed. The Oddviz collective and the work of Freeman are examples of the different levels of resistance that artworks can demonstrate when manipulating their component data.

The ability to recontextualise elements within a composition as data introduces the possibility that digital image editing has the potential to be a more 'open' or accessible visual database. Freeman's goal is to demonstrate unseen relationships between various places, both real and virtual. Therefore, while Freeman's work is more open to manipulation than Oddviz, it is not explicitly so. Digital image manipulation, in AR applications in particular, has the potential for more open databases. This point will be explored in the analysis of my own work in Chapter 4.

In summary, this chapter explored the findings of my research by examining the work of digital artists John Craig Freeman and the Oddviz collective. Bolter and Grusin's notion of hypermediation was explored in relation to AR in new media art. I examined how Freeman's work is a reflection of hypermediation in two ways: first, through hypermediating notions of space by layering physical and virtual spaces; and second, by pluralising his work through

[19]In the field of information science, "data are the sensory stimuli, which we perceive through our senses" (Zins 2007:487).

mobile devices and social media.

The distinction between user and viewer was clarified by analysing the level of interactive potential in my case studies. I argued that Freeman's work is dependent on the notion of interactivity in new media to communicate the concepts embedded in his art. The implications of artwork as data were also briefly interrogated. The Oddviz collective was used as an example of artists who approach their subject matter as elements in a database, as opposed to traditional notions of subject and background in a composition. Expanding on Manovich's ontology of the database, I contextualised the nature of open versus closed databases in new media work. The manipulation value, or the malleability of the data in the database, in Freeman's work was compared to that of the Oddviz collective. I argued that both artists display either a resistance to the manipulation of data in their work or allow manipulation to some extent as a by-product of the technology they employ. I proposed my own work as a furthering of the notion of an open database, a response to the lack of intentional interactivity in my case studies. Also, the phenomenological implications of opening the artist's process to the user were examined through Freeman's work. I employed Lampert's arguments surrounding the phenomenology of the artist and the importance of layering, arguing that Freeman's work in AR is an example of an abstracted concept of layering postulated by Lampert.

Lastly, Manovich's framework of deep remixability was applied to digital image manipulation. I identified four artistic languages remixed in digital image manipulation: computer imaging techniques, analogue photomontages, painting, and collage art. The way in which these languages were remixed was explored, as well as how this distinguishes digital image manipulation. I proposed how photogrammetry can further distinguish digital image manipulation by addressing the points raised throughout this chapter. That is, photogrammetry and AR serve as techniques that can foster user interactivity, provide a more open database and artistic processes to the user, and facilitate hypermediation through pluralisation and instantiation of the work. In Chapter 4, these observations will be further developed in examining my own work as a response to the observations and arguments made in this chapter.

CHAPTER 4 **Exploring the metamedium in the work of Karl van Heerden**

4.1 INTRODUCTION TO THE ARTWORKS IN *DIGITAL TOURIST*

Digital Tourist is a mixed-reality installation that is comprised of three sections: a reconstructed bookshelf from my home, framed prints, and an image wall depicting my process. The bookshelf contains a personal collection of books and old camera equipment. Seven of the books in this part of the installation also serve as AR markers for an application I developed using the *Unity* game engine. The details of this creation process are provided in Addendum A. The artworks use the marker-based AR mobile application to translate different objects, spaces, and people into ephemeral geometry attached to the real-world anchors of book covers or pages. The prints are of the geometry used in the mobile application recontextualised as static works. The process wall visualises the photographs and critical reflection necessary to produce each object presented in the AR component. The exhibition is also available to view online as a short documentary. The documentary is hosted on YouTube and is available through this link (Van Heerden 2019).

Like the works of Freeman[20] and Oddviz[21] discussed in Chapter 3, the *Digital Tourist* project explores the themes of preservation, transience, and heritage through the use of new media. Unlike the work of Freeman and Oddviz, the themes explored in *Digital Tourist* are of a personal nature. Where the case studies I have chosen seek to explore social and public spaces, *Digital Tourist* deploys new media technology to displace private places and objects into the public space of the gallery.

The *Digital Tourist* installation approaches the themes of identity formation through material objects, places, people, nostalgia, and memory. The individual works relate to different aspects of my identity as an individual and an artist. The works also function as entrances through which to explore different aspects of the research presented in this dissertation, namely: deep remixability, remediation, media displacement, autotopography, memory, identity formation, embodiment, the software gaze, and the image as database.

[20]John Craig Freeman, *Virtual US/Mexico Border*, 2017, interactive AR installation, Boston.

[21]Oddviz, *Kadıköy II*, 2018, fine art print, private collection.

Figure 4.1. Karl van Heerden, *This Is Where I Learned to Love Art* (2019).

Figure 4.1, *This Is Where I Learned to Love Art*, is one of the works in the *Digital Tourist* exhibition. The models of the room and figure are reconstructions created using the same photogrammetric process employed in my case studies in the creation of their work. The reconstructed models used in the different works are arranged in different scenes that highlight particular aspects of my identity: the people who have had a significant impact on my personal and creative development; objects of particular sentimental significance, and different spaces I occupy. In the case of Figure 4.1, the scene depicts my brother sitting in our mother's living room. The scenes in *Digital Tourist* are superimposed over different books from my personal collection that relate thematically to the virtual content. *This Is Where I Learned to Love Art* juxtaposes the informal space of a parent's living room with a book on European art history. The title of the book, *The Great Workshop* (Recht, Périer-D'Ieteren, Griener, Chartier, Pomian & Burke 2007) and of the work itself signifies the important influence my mother had on my creative and professional development. The *Digital Tourist* installation was installed at the UNISA Art Gallery in 2019.

Figure 4.2. Karl van Heerden, “Example use-case of *Digital Tourist* application” (2019).

In *Digital Tourist* AR is deployed through the use of a mobile application I developed using the *Unity* game engine. The application is compatible with smart devices using the Android mobile operating system that have a camera, screen display, gyrometer, and accelerometer,[22] as demonstrated in Figure 4.2. The device’s gyroscope and accelerometer are used to maintain the illusion of the AR content remaining in place within the scene. The software is programmed to detect visual markers; in this case book covers. When detected by the device’s camera, the application will trigger corresponding content to appear at a predetermined location relative to the books. The decision to use the *Unity* engine was based on the ease of use in development and the choice for Android was based on the available hardware for the exhibition. The AR application requires minimal input from the user. Users navigate through the augmented environment by manipulating either the position of the device themselves, or the angle of the book. No further action is required, as the software will automatically display the reconstructed scenes upon registration of the predetermined targets.

[22]The gyrometer and accelerometer are two inertial sensors that can measure the device’s angular velocity and acceleration respectively (Laermer 2006:527). This allows the device to understand its relative position in three-dimensional space from an initial reference point.

Figure 4.3. Karl van Heerden, *Things from My Childhood I Didn't know I had* (2019).

Figure 4.4. Oddviz, *CRT TV – (Tüplü Televizyon)* (2017).

Comparing Figure 4.3 with 4.4, one visual distinction between my work and Oddviz is in presenting the reconstructed model as a point cloud[23] rather than a contiguous form. While Oddviz (in Raab 2017) seek to preserve various cultural and public works in a digital medium, *Digital Tourist* uses the point cloud as a visual strategy to remind the viewer of the transience of memory and the physical objects attached to them. The point cloud is thus leveraged as a tensional force in the interplay between nostalgia, immersion, and hypermediality.

By leveraging available technology, I invite users to participate in exploring personal spaces and artefacts from my own life. In doing so, I aim to address the third research question of this dissertation, namely what characteristics of digital image manipulation can be developed for the creation of original work. Furthermore, the broader installation expanded on the productive conversation between digital and analogue processes. A recurrent theme throughout this dissertation is user-interactivity made possible through the introduction of AR deployed on mobile devices. Where Freeman (2018) used AR to re-engage public spaces as active places of social discourse, *Digital Tourist* instead displaces the private space of one individual's life through the places, people, and objects that constitute it to the public space of an art gallery. These private places, people, and objects include:

[23]Point clouds represent the geometric data of surfaces and objects collected from contact and non-contact methods (Zukas & Zukas 2015:45) by displaying each data point in three-dimensional space. In photogrammetry, a non-contact method, the resulting data also collects colour information (McCarthy 2014:177).

7. *My Friend, My Model, My Muse*. A portrait of the artist's friend and long-time model, Stephan Potgieter.
e. *My Kitchen Reminds me of Vermeer*. The artist posed in his kitchen.
f. *Things from My Childhood I Didn't Know I Had*. A collection of objects from the artist's past.
g. *Photographer, Gypsy, Sage, Mother.* A portrait of the artist's mother.
h. *I Go to Places in these Books*. Several bookshelves arranged around the artist's piano.
i. *Learning to see the Past*. A number of photographic tools and accessories.
j. *This Is Where I Learned to Love Art*. An image of the artist's mother's living room inhabited by the artist's brother.

Figure 4.5. Karl van Heerden, *My Kitchen Reminds Me of Vermeer* (2019).

The application itself provides no textual guidance nor features any form of graphical user interface. Figure 4.5 is an example of what the user sees through the mobile device display. The only visible element, the *Wikitude* watermark seen in Figure 4.5, is a component of the AR platform implemented in the application. The presence of the camera feed being displayed on-screen recalls other VR, AR, and MR applications, inviting the user to explore the exhibition through the device.

What follows is a brief description of each of the digital works in the installation. Each work is discussed in terms of the underlying conceptual themes as well as how the research conducted has informed the creation of the pieces. Afterwards, the intermedial dialog between the physical and virtual components of the installation is discussed in relation to the themes of media displacement, remediation, and deep remixability. The creation process is detailed towards the end of the chapter, which concludes with a contextualisation of *Digital Tourist* in relation to other forms of new media art.

4.2 SEVEN AR WORKS IN *DIGITAL TOURIST*

The conceptual framework for the *Digital Tourist* project investigates how notions of space and place can be interrogated in a layered virtual/physical artwork. *Digital Tourist* utilises the unique temporal, spatial, and interactive qualities of AR to explore the tensions between places, objects, memories, and the self. By means of AR, digital media manipulation, and photogrammetry, I utilise the digital metamedium in a way that leverages characteristics novel to new media. The conceptual framework described below was developed to address each of the three research questions established at the beginning of this dissertation.

The first question posed by this dissertation seeks to explore the distinctions between analogue and digital imagery through deep remixability in digital metamedia. *Digital Tourist* approaches this by spurring the appearance of digital imagery through the presence of physical objects and spaces. The intermedial relationship between the virtual and physical interrogates the remixability of new media. Pais's (2012) argument, discussed in Chapter 2, on the need for media displacement in new media is also considered and supports the methodological motivation mentioned above.

The second research question, relating to the distinct contributions of digital image manipulation, is explored in *Digital Tourist* through the use of AR. The point cloud imagery, as seen in Figure 4.1, is the result of a computer-generated reconstruction of two-dimensional imagery. The representation of objects as point clouds immediates the viewer through AR, while simultaneously hypermediating the subject through a plurality of media – both print and digital.

The final question, relating to the conceptual possibilities of digital media manipulation, is addressed through the themes of memory, nostalgia, and identity. The various works in *Digital Tourist* all relate to the collected material experiences of the artist's life. Through a digital preservation of the objects, people, and spaces I interact with, I move against their transient nature. AR allows these preservations to be displaced from the digital 'archive' into

a physical space, colliding notions of the private home and public gallery. As discussed in Chapter 3, spaces contain knowledge about the people that inhabit them, and so this collision is also one of different kinds of knowledge that form the basis of my identity as an individual. At the same time, by using a new media form such as AR, the constructed nature of this knowledge is made apparent to the viewer. The objects are not solid, but ephemeral, to underline that these objects are reconstructed interpretations made by a computer.

4.2.1 *My Friend, My Model, My Muse*

Figure 4.6. Karl van Heerden, *My Friend, My Model, My Muse* (2019).

Figure 4.7. Karl van Heerden, "Point cloud generated from constituent photographs" (2019).

A young man's face and torso float in a small grey box displayed on the screen of a tablet device (Figure 4.6). The 'room' he occupies replaces the figures who inhabit the cover of the book *On Photography* (1977) by acclaimed critic Susan Sontag. The man, Stephan Potgieter, appears solid from a distance, but as the viewer brings the tablet closer, the figure begins to dissolve into thousands of tiny dots of colour, reminiscent of both a painterly expression of colour and a data archive. Stephan's pose and expression are reminiscent of a 'headshot', a photograph often taken of models to document their appearance for prospective clients. The figure can be viewed from multiple angles, inviting the viewer to compose the scene as they choose.

Photographs have proven resilient and adaptable to the changes brought about by the development of digital cameras. As discussed in Chapter 2, Lev Manovich (2006:28) argues that this resilience is so because although the internal construction of a photograph has changed, it's "skin", or representational strategy, has not. *My Friend, My Model, My Muse* removes this 'skin', not just by replacing the traditional photograph on the cover of the book,

but also by confronting assumptions of what constitutes a photograph. The subject was documented with a digital mirrorless interchangeable-lens camera by taking roughly one hundred photographs; the resulting digital files were processed using typical photo-editing software (*Adobe Camera RAW*). These files were later recombined into a digital interpretation of the subject by photogrammetric software (Figure 4.7). As the viewer assumes this is what Stephan Potgieter looks like, so did the computer software used in the reconstruction process, extrapolating what a three-dimensional representation of the subject should be from the constituent photographs. The discursive quality of the relationship between software, the artist, and the viewer underlines the constructive nature, the "code", (Manovich 2006:28) of photography. *My Friend, My Model, My Muse* is an exercise in making visible the deep remixability of the languages of portrait painting, still life photography, and new media in a conversation around a particular individual.

Introduced in Chapter 2, Lev Manovich (2013:117) describes deep remixability in terms of the "metamedium" of computer technology. Digital art, Manovich (2013:117) argues, is based on a simulation of a particular medium's "artistic language". Because a computer can simulate all media, it does so freely. *My Friend, My Model, My Muse* recognises the subject in portraiture as one of many themes in different forms of art. In new media the portrait can become an expression of software information rather than appearance. All the works in Digital Tourist choose to express this information through the use of the point cloud – an assemblage of data points that delineate the forms of objects, spaces, and people.

In *My Friend, My Model, My Muse*, artistic languages from different practices, including photogrammetry and AR, are appropriated as tools that can be freely intermixed and used when necessary (Coover, Badani, Caviezel, Marino, Sawhney, & Uricchio 2012:192). Thus, the perspective of deep remixability more accurately reflects the nature of new media work, while questioning the user's assumptions about the role of traditional artistic languages in digital imagery. This is achieved predominantly through the manipulation of qualities in the digital image to influence how the software reconstructs the geometry of the subject. It follows that digital media can potentially contain a system of representational strategies that fundamentally challenge the norms and conventions of analogue media. *My Friend, My Model, My Muse* achieves this through a defamiliarization of portrait photography. The use of photogrammetry as a methodological intervention and the subsequent representational strategy of using point clouds depict the subjects in a manner estranged from the viewer.

Figure 4.8. Karl van Heerden, “Comparison of clarity setting on images” (2019).

Figure 4.9. Karl van Heerden, “Resulting geometry from input images” (2019).

Image editing techniques commonly used in *Adobe Camera RAW* are remediated in the construction of my work, including *My Friend, My Model, My Muse*. Typically, image editing techniques are employed by the artist to further certain goals: enhance contrast, correct colour, or remove unwanted blemishes from surfaces. In *Digital Tourist*, image editing

techniques and methods are employed for the benefit of the image-construction algorithm and not the user. For example, the three-dimensional model reconstructed from source images contains surface details that are used as reference points during the image analysis process. The computer software breaks down the image into thousands of matching pairs of details, determined by criteria such as shape, colour, and local contrast. These elements can be affected using techniques such as manipulating the overall distribution of tones, adjusting clarity,[24] and affecting edge-detail to alter the final result of the reconstructive process. I aim to remediate analogue retouching methodologies to exploit the reconstruction of various objects to defamiliarise familiar subjects, that is, people, places, and objects closest to me. Retouching conventions such as preservation of surface detail, localised tonal adjustment, colour grading, and contrast control are remediated for this different purpose. For example, the convention of preserving surface detail in contemporary digital image editing is radically challenged. Surface details are enhanced during the reconstruction phase in order to assist the software in building a three-dimensional model. However, in the final image, surface detail is either minimised or completely missing (Figure 4.9).

4.2.2 *My Kitchen Reminds Me of Vermeer*

Figure 4.10. Karl van Heerden, *My Kitchen Reminds Me of Vermeer* (2019).

Figure 4.11. Karl van Heerden, "Point clouds of artist and kitchen" (2019).

[24] *Clarity* is a term used by *Adobe Camera RAW* and *Adobe Lightroom* to refer to the mid-range of image tones (Kelby 2014). Enhancing clarity has the effect of increasing apparent surface detail and texture in an image; conversely, reducing clarity produces a 'softening' effect as surface detail is minimised. Figure 4.8 is an example of the *Clarity* setting on -20 (right) and +100 (left) used to alter the apparent surface texture of the subject.

The artist is depicted as standing in the middle of a small kitchen (Figure 4.10). His stance is relaxed and contemplative as he gazes out of the window. Around him is the usual collection of things to expect in such a domestic scene: a refrigerator, a washing machine, and recently washed dishes. The figure of the artist appears more solid than the surrounding suburban landscape that manifests as minute points against the dark grey of the virtual room (Figure 4.10). Early-morning light spills into the kitchen and pools on the floor, although the figure alone seems to be more evenly lit. It is as if the figure should be part of the space but does not quite belong.

Karl Kraus (2007:2) mentions briefly in his book on photogrammetry that the technique "provides information about both the natural landscape and the cultural landscape". Although Kraus does not reflect more on the implications of his statement, it was a significant insight for me. Photogrammetry captures not merely the form or shape of objects in the way that other surveying methods do but also captures the way light interacts with these objects. Bolter and Grusin (2000:67) note that a medium cannot be separated from the socioeconomic context in which it appears. As Vermeer used painting to capture idyllic scenes of seventeenth century life for his wealthy clients, I use photogrammetry to document the everyday conditions of my life – a contemporary, fragmented, and stressful life.

A frequent concern when documenting an object using photogrammetry is the avoidance of direct sunlight or other similar light sources that may introduce unwanted shadows. The presence of shadows in a work embeds traces of the object's environments into its reconstruction and prevents accurate use of pre-rendered or real-time lighting effects later. *My Kitchen Reminds Me of Vermeer* rejects this methodological concern and asserts that the object/environment's lighting is equally important in documenting the subject's 'character'. Vermeer used light to contextualise the quiet scene of domesticity in the painting The *Milkmaid*[25]; the very painting used by the AR application to trigger my own work. Vermeer's use of light to evoke mood and atmosphere is remediated in *My Kitchen* towards a similar intention, but with a built-in tensional relationship by calling attention to the artificiality of the work's construction.

[25] Johannes Vermeer, *The Milkmaid*, 1658-1660, 46cm x 41cm, oil on canvas

Figure 4.12. Karl van Heerden, “Print of artist’s kitchen” (2019).

This kitchen appears in two places in the exhibition: first as the titular subject in this work and then also as a standalone print (Figure 4.12). Bolter and Grusin (2000:31-35) describe hypermediated spaces as a collage that invites the viewer to explore a digital space. Multiplying a space consequently proliferates possible meanings obtainable brought to the work by the viewer. It is memory that opens up this plurality and transient quality in the meaning of the space (González 1995:147). The viewer is forced to construct what understanding of the space they can from the different print and digital work which immediates through light and linear perspective (Bolter & Grusin 2000:11). The use of both digital and print media also echoes the arguments of Pais’s media displacement discussed in Chapter 2.

Media displacement is primarily concerned with the fracturing of media experienced through a translation of the digital into the physical (Pais 2012). Pais (2012) describes several examples of artists who employ media displacement as a strategy in their work: a 1:1 recreation of a virtual map used by the online multiplayer game *Counter-Strike Global Offensive,*[26] an interactive installation piece that allows individuals to “take away” (Pais

[26]Aram Bartholl, *Dust*, 2011, Alumide 3D print, 36cm x 33cm x 4,5cm.

2012:49) public tweets,[27] and an interactive installation that interrogates contemporary internet search engines such as Google[28] (Pais 2012:49). These examples all share a common theme: questioning the role of digital media in contemporary culture and the impact that new media has on the viewer. *Digital Tourist* shares this theme in common with the examples from Pais' research.

The problem driving *Digital Tourist* is to leverage the technology of AR to highlight the tension between immediated and hypermediated spaces. In the context of *My Kitchen*, 'immediate' spaces refer primarily to the virtual form of the work. First, the artwork makes public deeply personal and private places, people, and objects. Also, the user engages in the activity of documenting and exploring. Furthermore, the work attempts to critically examine the nature of digital image manipulation by introducing the notion of physical interactivity to image manipulation using AR. In this technical exploration of medium expansion, I aim to consider the resulting agency as a conceptual intervention.

Media displacement can also be adopted to highlight the quality of deep remixability in new media. By displacing virtual artworks into physical spaces, the processes, methods, tools, and approaches from new and traditional media become conceptually fused (Schröter 2011:6) in an intermedial[29] relationship. In *My Kitchen*, the methods and "visual languages" (Knight & Senie 2016:337) of photography, for example, are fused with site-specific artwork and the embodied experiences in AR art. Original medial forms such as photography are thus recontextualised and redefined through this relationship (Schröter 2011:6). This point addresses the first research question posed by this dissertation. Media displacement as a methodological strategy becomes a vehicle through which the novel contributions of deep remixability are made to new media art.

Media displacement also allows for the interplay between tensional forces of immersion, intermediality, and immediacy. By building "anti-environments"[30] (Pais 2012:45), the artist

[27]Jens Wunderling, *default to public: tweakleak*, 2008, digital projector, printer, dimensions variable.

[28]Gill Ferreira, Mónica Mendes & Victor Diaz, *AHA! A Human Approach*, 2012, interactive web page.

[29]Professor for Multimedial Systems Jens Schröter (2011) describes four "models of discourse" on intermediality. The first model, "synthetic intermediality" (Schröter 2011:2), refers to the "fusing" of different media into a new supermedia. This concept bears similarities to Manovich's (2007b) notion of deep remixability. What differs between these two terms is that Manovich (2007b) conceptualises a single medium, the computer that simulates all other media, while Schröter's (2011:3) argument is that supermedia are "less in the intermedium itself, but rather in its perceptive and cognitive assimilation".

[30]The notion of the anti-environment stems from Claudia Giannetti's theories of endo-aesthetics (Pais 2012:46). The underlying principle governing endo-aesthetics is that critical reflection within an

can transfer the viewer's point of view out of their fully immersed state and into a more critical stance. By overlaying the virtual component of the installation onto physical space, the boundaries between physical and digital break down. The examples illustrated by Pais (2012) opt to transfer the digital component fully into an analogue environment. *Digital Tourist* uses a combination of both digital and print-based works to establish an intermedial tension between print, virtual, user, and artist.

4.2.3 *Things from My Childhood I Didn't Know I Had*

Figure 4.13. Karl van Heerden, *Things from My Childhood I Didn't Know I Had* (2019).

Figure 4.14. Karl van Heerden, "Point cloud of one book in *Things from My Childhood I Didn't Know I Had*" (2019).

Two teddy bears, a small pile of smoothed sandstone, a wooden puzzle egg, and several books hover above the words "the disappearance of objects" (Figure 4.13). The objects are in varying states of solidity. The wooden puzzle is solid-looking and dominant while the books seem to almost fade out completely. The books (Figure 4.14) vary in genre, from epic fantasy, autobiographical works, and an English-Japanese dictionary to a book devoted to facts about chocolate. The teddy bear looks old, crumpling in on itself as the stuffing inside has slowly condensed over the years. These objects represent a selection of formative memories and experiences of the earlier years of my life.

The notion of autotopography is introduced here as a conceptual foundation for the subject matter in the work *Digital Tourist* as a whole, but particularly relevant to *Things from My Childhood I Didn't Know I Had*. Autotopography reframes traditional norms of

environment is impossible for the viewer, and so simulating the environment and allowing the user to 'look in' allows for a new perspective. The creation of an anti-environment is the motivating factor in adopting a mixed-reality approach to the installation as opposed to a purely virtual installation.

autobiographical forms of self-reflection by resisting the linear narrative imposed through writing. Mieke Bal (2002:180) illustrates this point by noting how the inclusion of *topos* contextualises the practice "to a spatial, local, and situational "writing" of the self 's life in visual art". Jennifer González (1995:134) argues that deploying autotopographical forms of self-exploration in visual art with relation to personal mementos and objects opens new conceptual pathways to identifying "what contributions things make to the identity of the person who possesses them".

Autotopography is therefore well suited to unpacking the interconnected and complex relationship between the objects that occupy *Things from My Childhood* through the shared memories that connect them. The relationship between memory, object, and person has been explored in new media before, such as the "Memory Box" (Kirk & Sellen 2010:2).[31] Kirk and Sellen (2010:5) noted during their study on how digital technology can help preserve the past that objects contain memories of people known to us, forming a deeply personal landscape of meaning embedded in the material condition of our lives. Digital technology has the potential to preserve these objects that would otherwise "become damaged, get lost or simply become too much of a burden to keep" (Kirk & Sellen 2010:4). In preserving these objects that "personal landscape" is also preserved and the material foundation of my early life is thus presented in *Things from My Childhood I Didn't Know I Had*. The embedded materiality of the artist's identity (González 1995:147) is triggered by an external force, namely specific objects (González 1995:136), that act as a form of mediation of the memories of our past – both real and articulated (Kirk & Sellen 2010:1).

Kirk and Sellen's (2010) observation of preserving and utilising new media to safeguard memory regarding private places and objects also resonates strongly with the work executed by Oddviz (in Raab 2017) in preserving collective memories using photogrammetry. Often, these memories are of specific spaces and of people known to us, forming a deeply personal landscape of meaning embedded in the material condition of our lives (Kirk & Sellen 2010:5, González 1995:133). Kirk and Sellen (2010:5) have identified four schemas along which these autotopographical objects divide: Constructing the persona; connecting with a shared past; to preserve a legacy; in honorarium.

The different works in *Digital Tourist* touch on many of the above themes, but *Things from My Childhood* specifically focuses on the themes of identity formation and nostalgia. By

[31]Kirk and Sellen (2010:2) explain: "In this small box, RFID tagged items could be placed (rather than stored) which would then trigger the replay of associated audio commentaries, essentially enhancing the experience of the object".

considering the work from this perspective, *Digital Tourist* becomes an active process of construction and travel (González 1995:135) and requires the presence of an active participant to participate “on the spot” (Bal 2002:191). The viewer and the artist engage in a mutual agreement during their shared experience of the work that not only allows for the construction of an identity embedded in the work (Kirk & Seleln 2010:5) but acts as a form of mediation of “both our actual and articulated memories of the past” (Kirk & Sellen 2010:1). Such a contract is facilitated by the objects in *Things from My Childhood* as memories that arise “from a preconscious or previously unconscious state, […] most often activated by an external force – an object” (González 1995:136). The formation of a “material identity” (González 1995:147) is reliant on these physically evoked memories that are used as a framework of sorts. González (1995:147) illustrates a key difference between an autobiographical and autotopographical approach to identity construction by stating that “Memory allows the object to have changing and multiple meanings, whereas history demands of the object a specific and single identity”. New media multiplies this effect of objects on memory. Kirk and Sellen (2010:9) claim that digital media may be used to apply different “lenses” that augment a physical object in different ways, thereby allowing for multiple, simultaneous perspectives.

Figure 4.15. Karl van Heerden, “Bear print in *Digital Tourist*” (2019).

The yellow teddy bear in *Things from My Childhood* is also present in the exhibition as a large-format print (Figure 4.15). The work plays with scale in an intermedial dialogue between the digital and physical representations of the subject. The bear appears small in *Things from My Childhood*, lending it an intimate and private quality, suggesting the tactile comfort of a cuddle toy. However, the bear in the print is large, almost monolithic, made strange as a result of the 'point cloud' image rendering from the AR application. The print exposes the art-making process on a large scale while simultaneously preventing close examination because of the abstraction of the subject into tiny dots. This invariably makes the work strange through an accurate measurement of real data. It is this distance-through-proximity that evokes Benjamin's (2010) aura in art and lends spatiality to virtual work, exposing the inter-tensional contradiction of striving towards immediacy through a plurality of mediation. The bear print is accompanied by a square grid of sixty-four photographs that were used in the reconstruction of the bear. These elements, component images, digital artwork, physical objects, process wall, and prints together remediate each other within the gallery space by playing with the physical/virtual duality of the work; to wit, the prints are simultaneously the basis and the result of the digital work. The physical objects and process wall may appear mundane in isolation, but are transformed through mediation with AR and digital technology into works of art.

Benjamin's (2010) distance-through-proximity definition of the aura[32] is invoked partially through *Things from My Childhood*. Consider, for instance, that the application can be programmed to function on any image target, and can, therefore, be as easily accessible at home as in the gallery. By using physical objects, the application *Digital Tourist* constrains the activation of the virtual overlay to a specific place and time, and thus the environment and objects within it become an important factor in the interplay between user and artwork. This point also addresses the third research question in this dissertation, as the reintroduction of the aura into digital artwork can be considered a conceptual source for the creation of original artwork.

AR therefore forms a bridge between the digital and physical, allowing for a revival of the

[32]The aura of an artwork does not stem from its uniqueness, but rather from its history: a history of materiality and a history of ownership that lend credence to its originality (Benjamin 2010). Therefore, the aura of an artwork is dependent on its placement within a larger sociological, geographical, and historical context (Benjamin 2010). The aura in a work is invoked through what Benjamin ambiguously defines as "distance-through-proximity" (Bolter *et al* 2006:29). If one can engage the viewer while making them aware of their distance to the work, the aura remains intact. Distance-through-proximity can be evoked in digital art when the work is linked to a specific time and place, providing a sense of uniqueness (Bolter *et al* 2006:31).

aura in new media (Bolter, MacIntyre, Gandy & Schweitzer 2006:21). The advent of digital technologies has worsened the already tenuous link between the image and aura. Despite what might be inferred from Benjamin's (2010) claims regarding its demise, there are those that argue the aura can still be revived in new media (Bolter *et al* 2006, Bolter & Grusin 2000, Davis 1995, Mul 2009, Pham 2014, Wilson 2012). The problem, these authors propose, is not the loss of original artwork. *Things from My Childhood* hopes to allude to the aura by situating the virtual work within a particular locus of memory and place. I aim to do so by making the embodied interaction of physical and virtual media unique to each particular user and the physical space of the gallery.

AR applications, such as *Digital Tourist*, revive the aura in new media by locking digital works into a particular point in physical space. *Things from My Childhood* does so by providing both a 'window' through which to see, as well as a window in which to see the subject. The video feed through which the user views my work functions as the modern manifestation of Alberti's window, a particular frame through which to view the world in perspective. As noted by Bolter and Grusin (2000), this window *immediates* the viewing experience for the user through linear perspective. Therefore, the tablet device and display work together to create a 'live window' through which the viewer can see the digital artwork. Pais (2012:44) refers to this as the immediate effect of *ready-at-hand*.

I would argue that it is this simultaneous pushing and pulling of the user's gaze that evokes the aura as defined by Benjamin's (2010). The closer the user is made to feel to the work, through immediacy, the condition of the software and hardware as being present-at-hand creates a distance through proximity. This is not to say that the aura is required to justify the work of new media as 'art'. Instead, the notion of aura makes important conceptual contributions to the field of digital technology, addressing the third research question proposed by this study. The idea of limiting the display of a digital object to a particular instance, giving rise to the concept of digital scarcity, is not the norm in new media. By limiting the user's experience of a digital artwork to a particular location, Berger's (1972:19) notion of the 'artistic pilgrimage' is reintroduced into digital art. The uniqueness, material history, and physical location of an artwork imbue the space around the work with a special significance or "cult value" (Berger 1972:19). More recently, images can be called up on a variety of devices: television screens, computer screens, and mobile phones. This relocates the artwork to the environment of the viewer, significantly altering the relationship between work and viewer. *Digital Tourist* aims to retain some of the cult value so dominant in the ages before mechanical and digital reproduction by introducing a spatial component in new

media work. Whether a reintroduction of this notion signifies progress or regress in the discourse surrounding new media art is beyond the scope of this argument.

4.2.4 *Photographer, Gypsy, Sage, Mother*

Figure 4.16. Karl van Heerden, *Photographer, Gypsy, Sage, Mother* (2019).

Figure 4.17. Karl van Heerden, "Point cloud of subject" (2019).

A woman in her late fifties is posed for a portrait (Figure 4.16). As if the software used in the reconstruction of the subject intuitively understood the importance of the face, hers is rendered in minute detail, with wrinkles apparent around the corners of her eyes and mouth. The voluminous hair she wears is presented as a mere suggestion, with only a few points outlining its form. Her clothing is a vibrant blue patterned with a leaf motif. The light grey room in which she resides breaks through her form to lend the figure a ghostly quality, a reminder of the fleeting time we have with our parents. The book which my mother occupies is titled *Wisdom* (Zuckerman 2008), a collection of portraits and advice from an older generation. The way she is posed, framed, and lit is similar to the other individuals photographed within the book and the space which she occupies fills the entirety of the cover. This integration, layering, and juxtaposition create an intermedial link to the collected wisdom of all the individuals within Zuckerman's *Wisdom*.

Barthes' (1982) celebrated book *Camera Lucida* illustrates the power a photograph has to absorb and affect memory. In the text, Barthes (1982:67-70) reflects on the author's relationship with his own mother through a photograph. Barthes (1982:69) "rediscovers" his mother through the image he refers to as the *Winter Garden Photograph* (Barthes 1982:70) and notes a certain "innocence" she exhibited in life. *Photographer, Gypsy, Sage, Mother* reflects on the role of my mother as the Mother archetype in much the same way Barthes'

image of his own mother did. My work also interrogates the immediacy of the photographic image in 'inserting' itself between the viewer and some underlying material truth.

Bolter and Grusin (2000:110) echo Barthes' (1982:80) argument about the immediate nature of photography. The photograph creates a link between the subject and the viewer through the light rays that emanate "from a real body which was there ... which ultimately touch me" (Barthes 1982:80). New media allows for strategies to disrupt this light-link, if only temporarily. Painterly abstraction in *Photographer, Gypsy, Sage, Mother*, the medial displacement of a virtual object into the physical world, and the juxtaposition of a fragmented subject against the contiguous photographs in the book *Wisdom* serve to establish a dialogue of remediation that begins to interrogate this link.

A pertinent theme addressed in the work *Photographer, Gypsy, Sage, Mother,* is the viewer's act of looking into the private life of the artist. This act of looking is described by Daniel Chandler (2014) as the gaze. However, the gaze is far more than a simple glance. The gaze is that which is directed towards the object of desire, as Lacan put it, the *objet petit a* (in Dino 2011). The gaze is the mechanism which turns subject into object. When the viewer looks at the subject in *Photographer, Gypsy, Sage, Mother*, they invariably gaze at an object. When concerned with the act of looking, this also applies to software. The gaze does not require a conscious, living viewer, as Dino (2011) notes that one of Lacan's favourite examples of the gaze is the skull in *The Ambassadors* (1533) by Holbein. [33] Instead, the function of the gaze is in the mind of the viewer, who sees the subject of the gaze as an object of desire. Feminist critique, such as Laura Mulvey's (1975) article, famously leverages this concept when analysing the gaze of the 'male' camera as applied to women. Photogrammetric software gazes in a similar way to the male-directed camera by selecting the 'desired' element in the scene to reconstruct in three dimensions.

Software gazes much like Foucault's (2003) doctor does, by viewing the subject not as a person, but as a collection of symptoms. In the case of software such as *Meshroom*, these symptoms manifest as deviations, errors, gaps, and stray data that must be corrected. The success of this correction is dependent on the amount and accuracy of the images provided by the artist. Photogrammetric software considers only the accurate representation of the desired object, much in the same way Foucault's doctor only desires to fix the ailing patient, but that desire is influenced by the artist. Introducing the notion of the software gaze attempts to further address this study's third guiding research question in exploring new

[33]Hans Holbein the Younger, *The Ambassadors*, 1533, 2,07m x 2,01m, oil on oak.

pathways in the creation of new media art. The potential of the artist interrupting or altering the gaze of software is a novel characteristic of digital imagery that can further be developed in the creation of new media artwork, as I have attempted to develop it in my own work.

Much like the approach by Agarwala *et al* (2004), photogrammetry draws from a series of images and selects the most appropriate elements when reconstructing the subject or, as Agarwala *et al* (2004:294) and his team might put it, the memory of the subject. One aspect that distinguishes *Photographer, Gypsy, Sage, Mother* from the examples found in Agarwala *et al* (2004) and the work of Freeman and Oddviz is the project's depiction of the subject as a collection of visualised data points. In opposition to a representationally accurate depiction of the subject, these 'clouds' of data are characterised by a lack of lighting, no clearly defined boundary, and 'errors': fragments of background data mistaken by the software as part of the subject. This alienated and abstracted strategy of representation attempts to create an anti-environment, a defamiliarization of familiar subjects and modes of representation, that is, photographic portraiture. By building an anti-environment, *Photographer, Gypsy, Sage, Mother* can be a simulation of another place that allows the viewer to see in from the outside (Pais 2012:46). This temporary inversion of perspective creates the critical distance that is needed to question the link a photograph, or digital software, establishes between viewer and subject. *Photographer, Gypsy, Sage, Mother* remediates the medial forms of the portrait photograph: lighting, composition, and framing. However, the work uses the strategies of new media: abstraction-through-data, virtuality, and interactivity to establish a critical distance from which photographic immediacy can be explored.

4.2.5 *I Go to Places in These Books*

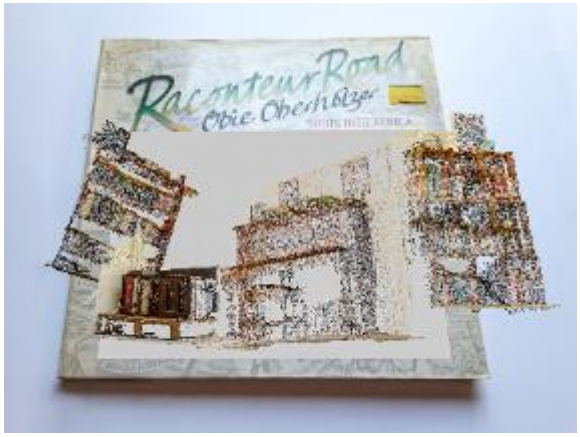

Figure 4.18. Karl van Heerden, *I Go to Places in These Books* (2019).

Figure 4.19. Karl van Heerden, "Example reconstructed geometry" (2019).

A number of bookshelves are arranged around an old upright piano in the work *I Go to Places in These Books* (Figure 4.18). The shelves are lined with books on art, photography, cooking, fantasy, science fiction, and cats. They are placed at odd angles that defy any attempt at consistency in perspective or geography. The shelves are constructed from old planks and wine crates; the piano is against a wall adorned with posters (Figure 4.19). The book, *Raconteur Road* (2000) by Obie Oberholzer, is a photo book of the photographer's travels across South Africa. The image that dominated the cover of the book has been overlaid with the contents of my own work, *I Go to Places in These Books*. The raconteur in *Raconteur Road* refers to someone who tells stories in an amusing way, alluding to the visual humour inside. I aim to tell my own story through the work in *Digital Tourist*. By incorporating a spatial dimension through *topos*, *I Go to Places in These Books* tells its own story through the different spaces it depicts.

Through VR and AR, new media introduces notions of space to photographs, which are typically considered two-dimensional (Coover, Badani, Caviezel, Marino, Sawhney, & William 2012:192). This contribution of new media to notions of embodiment and interactivity with the work addresses the third research question of this dissertation, namely the conceptual contributions of new media to original art.[34]

[34]The research on embodiment and interactivity in new media is explored in Chapter 2 through the work of Agarwala *et al* (2004) and Manovich (2001b). Applications of embodiment and interactivity via new media were analysed in the work of Freeman in Chapter 3, specifically the work *Virtual*

Through the combination of physical and virtual art objects, the viewer becomes a user, able to interact with the artwork and dynamically explore *I Go to Places*. For the purposes of this project, the use of space in visual media has been interpreted as the ability of the user to explore, organise, and reframe the visual 'data' that users access through the different artworks in *Digital Tourist*. Users are free to physically explore the AR object to view it from different angles. AR as a form of new media art facilitates changes in human behaviour and can recontextualise understandings of place by juxtaposing digital objects against a physical environment (Knight & Senie 2016, Santos 2017, Ulmer & Freeman 2018, Wright 2018).

AR artworks play on the relationship between artwork, user, and virtual/physical space. Two dominant themes arise from the discussion of Freeman's work in Chapter 3 that have served as influential elements in *Digital Tourist*. These themes are the ability to affect human behaviour and the reframing of assumptions around physical and digital spaces. With regard to the first theme, AR works introduce "new human patterns of behaviour" through the introduction of new technology (Santos 2017:449). With the dominant rise of popular digital technologies such as social media, much of cultural discourse has shifted to online spaces (Jenkins 2006:133, Ulmer & Freeman 2018:97). The potential of AR artworks is not only to "materialize" (Ulmer & Freeman 2018:97) the individual's relationship with physical space, but to further it by adding a digital component. This reintroduction of the physical through AR is significant in that the technology has the capacity to create "embodied meanings" in the user (Wright 2018:357). Such meaning-making is particularly useful for works or narratives that may not be wide enough in scope to warrant large-scale public works (Knight & Senie 2016:337, Santos 2017:450). In other words, AR-driven works perform a kind of deep remixing of online and physical space that affects the individual's understanding of both personal and public spaces.

To return to the second theme, the reframing of assumptions around physical and digital spaces, AR works also recontextualise notions of physical space by using the physical world as a platform to highlight particular issues, gain new insight, or to collapse certain conceptions of distance. Santos (2017:449) illustrates that Freeman uses his work to underscore certain socioeconomic or political problems in American culture, as is the case with *Virtual US/Mexico Border*. *Digital Tourist* makes no such claims about systemic issues at play in contemporary society. Instead, my work focuses on the interconnected web of meaning generated by individual, memory, object, and place. In the case of *I Go to Places in*

US/Mexico Border.

These Books, the particular relationship between an individual and the books functions as a different form of spatial collapse. Books allow the reader to 'travel' to different worlds via the imagination. AR remediates this personal journey into a new framework by recontextualising the individual's notions of space and place.

Digital Tourist takes its name as a modern adaptation of the notion of *theoria*, of travelling to distant lands to seek knowledge (Ulmer & Freeman 2018:99). However, instead of the Mediterranean circa 500 BCE, the user explores the places, meanings, and material existence of a single individual. With AR, as well as other forms of new media, the geographic distances that separate different spaces are collapsed. The knowledge embedded within these places become subsequently combined. Places as vastly different as the inside of my living room and the gallery space become interwoven via new media (Knight & Senie 2016:337). The 'places' referred to in the title of this work are not real, they are imagined and fantastical, but are oriented within the physical, and the knowledge they contain is made present through AR (Knight & Senie 2016:337). However, as Ulmer and Freeman (2018:99) also note, from this act of digital tourism a synthesis of knowledge emerges. In the case of *I Go to Places in These Books*, both I and the viewer are the tourists. The work collides two epistemic domains into a symbolic landscape of the private and the public, and from the resulting dialectic new understanding of the artist emerges. AR facilitates this process by linking the geographically oriented physical with the 'space-less' virtual (Knight & Senie 2016:337). AR-driven works are by their nature uniquely positioned to allow different perspectives to meet, thereby creating what Freeman (in Wright 2018:364) describes as a "meaningful encounter".

4.2.6 *Learning to See the Past*

Figure 4.20. Karl van Heerden, *Learning to See the Past* (2019).

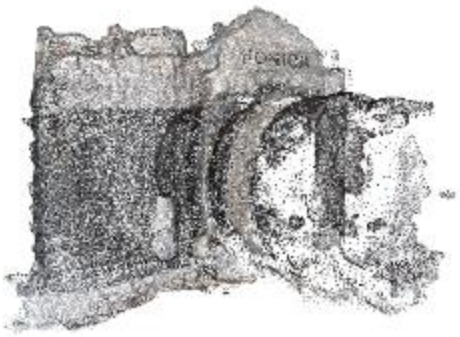

Figure 4.21. Karl van Heerden, "Point cloud of camera used in *Learning to See the Past*" (2019).

A dozen objects are meticulously arranged in a grid layout across the cover of the book *Learning to See Creatively* (Peterson 2003) (Figure 4.20). The objects vary in use, origin, and time. Old cameras are present; from a Yashica twin-lens reflex camera from the 1940s and a Canon 8mm film camera to a Konica single-lens reflex camera (Figure 4.21). Devices from the more recent past are also present with two VR headset adaptors for mobile phones arranged in the grid. A number of old colour filters that change the way light passes through a lens are piled into the corner. The objects align with the compositional grid created by the picture adorning the cover of the book. The book is a manual on photography, complete with rules on composition, lighting, perspective, and the more technical aspects of film photography.

Learning to See the Past has been about looking towards the past as much as it has been about the future. *Digital Tourist* may use new media technologies to speculate on the influence of deep remixability in the creation of digital art, but it also presents my reflections on my work as a professional photographer and retoucher. Asta Rowe (2014) looks at the remediation of digital image editing by mannerist painters. Rowe (2014:71) argues that digital image editors today, much like the mannerists of sixteenth-century Italy, emphasise style, difficulty, and artificiality. The use of software in digital image editing is, in effect, more self-referential as it explores and is inspired by art rather than life (Rowe 2014:74). As Rowe (2014) looked to painting to understand digital image editing, *Learning to See the Past* uses the tools of previous generations of photographers to reflect inwards on the history of my own practice.

I employ the use of digital image editing software to interrogate the notion of the image as database. Adopting the ontology of hardware and software stems from my exploration of Manovich's framework for post-media aesthetics. There is an argument among some new media theorists (Manovich 2001b, Mul 2009) that new media is a manifestation of the paradigm shift computer technologies introduce in the creation of visual work. Such is the difference, they argue (Manovich 2001b:6, Mul 2009:99), between digital and analogue media that previous forms of discourse fail to fully encapsulate the new methodological and conceptual possibilities introduced by new media art. Therefore, authors such as Manovich (2001b) and Mul (2009) propose an adoption of the ontological structures of the database: the underlying principle of interaction between computers and users. This point also relates to the first research question of this dissertation. Specifically, the notion of Manovich's image-as-database as a conceptual framework assists in distinguishing the methodological underpinnings in analogue imagery from digital imagery. A shift towards adoption of this way of viewing new media also proposes the adoption of the ontologies of hardware and software. Consequently, implementing the database through the software environment as the underlying structure for new media underlines the importance of user interactivity, and focuses attention on the intent of users, as opposed to the intent of the artist.

Digital Tourist considers the database as the ontological framing device for new media work. The project presents the user upon 'loading' of the application with the initial dataset. The user is free to insert, update, select, and delete the data in any way they wish. This is primarily achieved through embodied interaction with the artwork as the user navigates the mixed reality environment using the tablet device provided. The limited viewing angle of the tablet device's video feed remediates the practice of cropping in film photography. It is through a process of inclusion and exclusion via selection that the user interacts and reorganises the visual database. Furthermore, the user is free to organise the visual hierarchy of elements by manipulating foreground, background, scale, and relative position within the composition by repositioning themselves in physical space. This aligns with Mul's (2009:100-101) argument that the notion of the database is more than a useful theoretical lens. Databases can serve as material and conceptual metaphors and in the case of the *Digital Tourist* exhibition, the goal is to adopt the database-as-concept as the foundation of the work.

Figure 4.22. Karl van Heerden, “Bookshelf in *Digital Tourist*” (2019).

Figure 4.23. Karl van Heerden, “Closeup of process wall in *Digital Tourist*” (2019).

A new kind of value, manipulation value, is introduced by the structural framework of the database which *Digital Tourist* rests upon (Mul 2009:95). Digital art assumes the ontology of data: “insert, select, update, and delete” (Mul 2009:100). Firstly, it is important to note that anything that allows for the storage of information can be considered a database (Mul

2009:100). In the case of the *Digital Tourist* installation, the AR components, the installation of the bookshelf (Figure 4.22), and the 'process wall' (Figure 4.23) are all treated as different kinds of databases. What distinguishes these different databases is their relative efficiency in storing, updating, and retrieving information. Analog media, such as the books and prints against the wall, can be viewed in terms of a database, if not a very efficient one, as the data is stored in a permanent fashion (Mul 2009:99). Mul (2009:95) argues that digital media allows for more effective forms of data storage as the information can easily be moved around or manipulated. This is where the concept of manipulation value lies, in the ability of the viewer-as-user to interact with the data stored within a particular work. Digital media has unique characteristics that make it far easier to organise visual data than traditional media (Mul 2009:100). For instance, relational databases can reorganise and display information in a multitude of ways, in some cases in ways that the original database designers did not anticipate (Mul 2009:100). *Digital Tourist* does not propose a hierarchy of efficiency or invite a comparison between the information 'stored' in the different forms of database in the installation. Instead, the installation establishes a tensional relationship between the different forms of information storage and retrieval as a means of inviting the viewer to participate in a plurality of meaning. The work makes visible the changes in meaning different forms of media impart onto the information they contain, acting as lenses that distort and warp the original meaning of the embedded data.

Learning to See the Past functions as a database of historical objects and sentimental artefacts. Kirk and Sellen's (2010:5) study on such personal mementos highlights how personal historical artefacts allow individuals to connect with a shared past. By arranging the personal artefacts of my own past in a hypermediated series of databases, *Learning to See* reflects on the generations of my family that invested time and effort into the practice of photography. The collection of objects, of data, spans almost a century and the use of AR as a framing device establishes an intermedial relationship between the analog film cameras, instructional texts from my studies, and the virtual reality devices of my more recent experiences. As mannerism remediates digital image editing into the tradition of painting, these photographic artefacts remediate and reframe AR by contextualising the practice within a photographic tradition. Using the database as a conceptual tool, the viewer is presented with this information in varying ways – all of them distorted and directed by the medial forms that contain them.

4.2.7 *This Is Where I Learned to Love Art*

Figure 4.24. Karl van Heerden, "Point cloud of camera used in *Learning to See the Past*" (2019).

Figure 4.25. Karl van Heerden, "Point cloud of camera used in *Learning to See the Past*" (2019).

A young man sits on a couch against a dark blue backdrop (Figure 4.24). The man's pose is contemplative as if he is deep in thought. The couches are situated next to a window and covered in a patterned fabric. There is the suggestion of a room around the individual, with books stacked next to him. The scene has replaced the cover of the book *The Great Workshop* (2007), a documentation of the great art of post-medieval Europe. The book speaks to my family's tradition of art appreciation. Growing up I had a keen sense of the influence artists from the past had on my own work.

Bolter and Grusin (2000:48) remind us that older media ontologically frame newer forms of media. *This Is Where I Learned to Love Art* acknowledges and embraces the art-historical roots of new media. The work establishes a tension between various forms of media by framing new media directly within the context of European art depicted on the cover of *The Great Workshop*. This serves to remind that the strategies of composition, perspective, and lighting were established centuries before the first VR headset was put on. These aesthetic strategies form the underlying artistic language that defined the tradition of Western European oil painting from the 1400s onwards and later photography (Berger 1972). Berger (1972) notes that linear perspective constrained how Western Europeans engaged with art for centuries after its reintroduction. The use of linear perspective in Renaissance painting introduces the concept of the viewer, a single 'eye' from which the scene is depicted, and of a 'window' through which the viewer gazes into the scene (Berger 1972). Bolter and Grusin (2000:21) also use the historical roots of linear perspective in their discussion of immediacy, the tendency of media to make itself 'disappear', drawing the viewer into the work. However,

in oil painting, the point from which the scene is looked at by the archetypal viewer is fixed, as opposed to the adaptable viewpoint of AR technologies.

It should be underscored that immersion is not a synonym for immediacy. Immersion is the deliberate desire by the software to draw the user into a digital experience, at the expense of their awareness of their surroundings; for example, virtual reality headsets do so. Immediacy is a more nuanced phenomenon, describing the tendency for digital interfaces to render themselves less apparent, or 'obvious', to the user (Bolter & Grusin 2000:21). In some cases, as with user interfaces, the goal of immediacy is to create a more intuitive experience for the user, thereby reducing the state of *present-at-hand* for the user and the interface.[35] In other cases, immersion is a symptom of the immediacy of new media. For example, virtual reality experiences seek immediacy at the expense of the user's awareness of their physical surroundings by surrounding the user with audio and visual information. Immersion is achieved as a result of the desire for immediacy. However, Pais' (2012) explanation of immersion falls more in line with Bolter and Grusin's (2000) understanding of immediacy. Consider the condition of *ready-at-hand* described by Pais (2012:44), which aligns very closely with Bolter and Grusin's notion of *immediacy*, discussed in Chapter 2. In both these terms, the core concept is the tendency of media to render itself unnoticeable by the user and thus intervene in their sense of place. Yet, the fascination with the medium is what urges the viewer to engage with the artwork.

The cover of *The Great Workshop* (Recht *et al* 2003) is of an artist's studio filled with paintings. Figures can be seen observing and discussing various works in a public space intended for the display and consumption of art. The juxtaposition of the private space of my mother's living room (Figure 4.25) against the public space of a studio, exhibited in the public space of the gallery, evokes the feeling of Giannetti's (in Pais 2012:46) endo-aesthetic, of looking in from the outside to understand the world. With the introduction of interactivity through new media, the viewer is not limited to the context established by the framing of the artist. Instead, the viewer defines their own context for the work by dynamically adjusting the composition and visual hierarchy. While attempting to immerse the viewer in a world filled with personal belongings and mementoes, in *This Is Where I Learned to Love Art* I move toward a better understanding of identity formation through an external simulation, or displacement, of the spaces that constitute aspects of my life. I also encourage the viewer to

[35]In brief, the condition described by Pais (2012:44) as present-at-hand is the moment when the user is removed from their immediate experience with digital media and becomes aware of the technology at work. Such a removal can occur often when the technology new media is dependent on does not function according to expectation.

engage with the work on their own terms through the interactive potential of AR. This double-logic of immediacy and hypermediation lies at the core of the remediation of media (Bolter & Grusin 2000:5).

Narrative scholar Marie-Laure Ryan (2001:89) explains that despite the artificiality of digital technologies, virtual realities immerse us in other "worlds". *Digital Tourist* draws the user into the personal 'world' of the artist by connecting them to "a connected set of objects and individuals" (Ryan 2001:91) specific to the artist's personal experience, by presenting a "habitable environment" (Ryan 2001:91), via immediacy presenting a virtual/physical "totality for external observers" (Ryan 2001:91), and also by providing a "field of activity" (Ryan 2001:91) through the use of AR. In addressing the above points, I aim to also address the first research question stated at the beginning of this dissertation – that of the role remediation has in distinguishing digital from analogue image manipulation. The use of a mobile device that must be held in front of the user reinforces the simulated nature of the experience.

By providing a digital overlay to the installation work, I can evoke a *present-at-hand* condition described by Pais (2012:44) to reframe the user's experience of the work. *Present-at-hand* is antithetical to the desired state of a tool or interface; that is, *ready-at-hand*, where the user is immersed in the experience of using the tool (Pais 2012:44). The works produced for *Digital Tourist* aim to invoke awareness in the user of the tool they are using. By adopting the use of AR in the exhibition, the user is not as immersed in the virtual environment as they would be in a similarly designed virtual reality application. The goal of AR is thus not the creation of a fully immersive virtual world; instead, the software functions to overlay, or augment, a physical space with digital content. Through the use of embodied interaction with the installation and the mixed reality application on their smartphone, users engage in exploration and play with the hybrid environment, while being made aware of the constructed nature of their experience through the *present-at-hand* condition.

However, Pais (2012:44) notes the difference between *ready-at-hand* as an immediate effect and *present-at-hand* as the realisation of the user of the failing of the software environment. This *present-at-hand* effect of technology behaving in unexpected or erroneous ways is a tool for the artist to shift the user's perception from immediate engagement to a critical angle. Consequently, when the user experiences said shift, the effect of the 'window' is broken, and the user is made aware of the minute, augmented, world into which they are viewing. This effect occurs through unexpected behaviour in the digital reconstruction of the subjects overlaid on the prints. The software powering the mixed reality application can 'lose sight' of

the image target momentarily or misinterpret data from the camera gyroscope and accelerometer. In the first case, the reconstruction may momentarily disappear; in the second instance, the model may appear to ‘flicker’ as it changes position or orientation to match the misinterpreted camera position. These artefacts occur at unpredictable moments, evoking the feeling of present-at-hand in the user.

4.3 CONTEXTUALISING *DIGITAL TOURIST* IN NEW MEDIA ART

Figure 4.26. John Craig Freeman, screenshot from *Portal to an Alternative Reality* (2017).

Figure 4.27. John Craig Freeman, screenshot from *The Augmented Landscape 2* (2017).

My work shares similarities with the other photogrammetric artists. In particular, the work of Freeman bears some similarity to my own work. Freeman also makes use of photogrammetry as a technique to hypermediate digital photography. In *Portal to an Alternative Reality* (2017) (Figure 4.26), for example, Freeman uses hundreds of images reconstructed using photogrammetry to recreate areas of Wuhan, China. Multiplying a single image into hundreds rebuilds the subject in an explorable manner, allowing the viewer a deeper level of physical engagement than with two-dimensional photography. My project,

Digital Tourist, strives for the same level of interactivity through photogrammetry. Transforming two-dimensional photography into three-dimensional digital realities invites another question: that of the relationship between physical and virtual spaces. Figure 4.27, *The Augmented Landscape*, juxtaposes virtual landmarks from St Petersburg in Russia and Wuhan in China against the real-world backdrop of Salem, USA. Freeman attempts to make visible the historical globalised trade routes between those various locations.

Furthermore, Freeman's artworks are intended to be explored. In both *Portal to an Alternative Reality* (2017) (Figure 4.26) and *The Augmented Landscape 2* (2017) (Figure 4.27) the viewer is able to traverse the virtual reconstructions created by the artist. In the case of Figure 4.26, the exhibition uses a virtual reality headset, fully immersing the viewer in the experience. In *The Augmented Landscape 2* (2017) (Figure 4.27), a publicly available AR mobile application affords individuals the ability to explore both Salem and St Petersburg or Wuhan simultaneously. *Digital Tourist* opts to use AR as a conceptual vehicle, furthering the artwork's goal to contrast the physical and the virtual.

Figure 4.28. Oddviz, *Kreuzberg I* (2018).

My other case study, the work of the collective Oddviz such as *Kreuzberg I* (2018) (Figure 4.28), also features similarities. For example, the artists also choose to use photogrammetry as a means of capturing their subjects. What differentiates Oddviz from Freeman's work is that they hypermediate the objects themselves, above that of just the photograph itself. As

seen in Figure 4.28, graffiti-covered facades from the German town of Kreuzberg are arranged in an isometric pattern across the entire canvas. *Digital Tourist* aims for this form of multiplication to a similar but lesser extent. *Digital Tourist* multiplies various personalia and recontextualises their meaning in the process. Like the work from Oddviz, by randomising scale, placement and rotation, the meaning in the objects present in *Digital Tourist* becomes open-ended, allowing the user to provide their own input.

However, my work differs in particular ways from that of these artists. There are certain methodological and conceptual differences between Freeman's work and mine. In particular, Freeman is fairly concerned with an accurate reconstruction of his subjects during his photogrammetric process. This emphasis on naturalism arises out of Freeman's calling attention to areas otherwise connected through trade, culture, and a shared history, while the distance between them is collapsed through AR. In the case of my work, although interrogating traditional notions of space through AR is important, the subjects in *Digital Tourist* do not need to be accurately represented. It is less important what these objects look like a specific room, or object; instead, it is more important that they exist. Freeman's argument, by contrast, depends on the viewer knowing that the building in Figure 4.27 is the Kazan Cathedral in St Petersburg, or recognising the Mandarin characters on street signs in Figure 4.27.

Freeman's work thus comments on a particular space, and the relationship that space has with other places in the world through a shared economy, culture, or history. *Digital Tourist* differs in this aspect in that my project employs a particular space, the gallery, only as a vehicle through which to explore the private spaces of the artist in AR.

A further consequence of using the medium of print as their primary format is the limited scope for user interactivity. The Oddviz collective places no importance on the potential their work has to be explored, manipulated, or recontextualised through the user. The meaning in Figure 4.28 is intended to be final, although it can be interacted with through interpretation. *Digital Tourist* differs in this aspect by not only allowing, but encouraging, user interactivity.

In summary, this chapter reflected on the installation *Digital Tourist* in the context of the research conducted in Chapters 2 and 3. My work was analysed using the theoretical framework I have constructed throughout the previous chapters. Individual works within the installation were discussed in relation to specific theoretical concepts, such as deep remixability, remediation, autotopography, immediacy, media displacement, the aura, the gaze, and Manovich's (2001b) post-medial paradigm of the image as database. The chapter

focussed on the use of both photogrammetry and AR as means of conceptual intervention. The use of these digital technologies was interrogated as novel contributions in the creation of digital art that offer conceptual additions distinct to new media art. I considered the use of photogrammetry as a means of preserving personal, ephemeral connections and a personal and cultural landscape. I also explored AR as a way of displacing these private, virtual domains into the public space of the gallery. Furthermore, AR allows for the incorporation of *theoria*, of travelling to seek knowledge, through embodied interaction with the work. Lastly, I examined how the combination of digital and analog works in the *Digital Tourist* installation establishes a dialog of remediation between virtual and physical.

CHAPTER 5 **Conclusion**

5.1 OVERVIEW

In concluding this dissertation, *Interactive Digital Media Displacement: Digital Imagery Contextualised within Deep Remixability and Remediation*, the research questions posed in the introductory chapter are revisited. The eminent question that drove my research was to distinguish the methodological underpinnings between digital image editing and analogue image editing to enable media displacement as creative and interactive strategy. In Chapter 2 I explored how Manovich's (2007a) notion of deep remixability can highlight the novel characteristics of digital image editing. I also employed Bolter and Grusin's (2000) arguments on the remediation of media to interrogate the relationship between analogue and digital image editing. From this initial exploration, two other questions emerged: aspects of digital image editing distinct from analogue image editing, and the conceptual contributions that these aspects can make in new media art. These two research questions were addressed through the creation of the installation *Digital Tourist*, a print and digital installation using AR to address themes of identity, memory, and nostalgia.

In answering my second research question – "What are distinct conceptual and methodological contributions of digital media manipulation in specific examples of contemporary art?" – I identified elements that are characteristic to new media in examples of contemporary new media art. In Chapter 3 I highlighted key findings from my research using contemporary artists John Craig Freeman and the Oddviz collective as examples. Prominent points from this research were the hypermediation of digital media, the notion of an active user, content as data, the open digital database, the openness of the artist's process to the user, and deep remixability in digital photomontage. Freeman's work addresses socio-political issues through AR by collapsing and hypermediating notions of space. Freeman uses new media to displace social issues from one context to another, reframing them for the viewer. Oddviz uses the unique aspects of photogrammetry, namely non-contact-based three-dimensional recording, to preserve street art that is otherwise transient and ephemeral. As discussed in Chapter 3, photogrammetry is a tool used in the preservation of both the natural and cultural landscape (Kraus 2007:2).

In addressing the final question – "To what extent can an analysis of digital media manipulation within theoretical, creative, and conceptual sources give rise to the creation of original artworks?" – I motivated how the identified characteristics in my analysis can be applied to my own work. In Chapter 3 I highlighted the importance of place and space,

embodied interaction, and the role objects play in preserving memory. In Chapter 4 I expanded on these themes by applying them to my own work. The AR installation I created, *Digital Tourist,* is the research output based on the key points I addressed in previous chapters. In the following sections I will briefly summarise the core ideas that arose from my literature review and how my own work has been influenced by said literature; elaborate on the knowledge emergent in my work; reflect on the limitations, successes and criticisms of my research; and briefly outline possible avenues of research.

5.2 CORE LITERARY DISCUSSION AND MY WORK AS A RESPONSE

The observations and arguments from Manovich, Bolter and Grusin, Lampert, Agarwala *et al*, and Pais provided the basis of my analytical framework. Three key authors provided the foundational pillars of analysis as well as a conceptual springboard for my own work. Manovich's (2013) observations on the nature of the computer metamedium and its relationship to traditional artistic media informed my understanding of new media art. Also, Manovich's (2001b) arguments on a post-media framework served as a conceptual element in the creation of my own work. Lastly, Manovich's (2001b) notion of adopting the ontological structures of the database provided an analytical framework from which to view examples of contemporary digital art. Bolter and Grusin's (2000) framework of remediation provided insight into the conceptual and methodological relationship between analogue and digital media. Furthermore, Bolter and Grusin's (2000) concept of hypermediacy was discussed. In addition, hypermediacy was investigated as a driving factor in the plurality of digital artworks shared and created by users. Lastly, Bolter and Grusin's (2000) definition of immediacy was critically applied to my chosen case studies.

Various other authors also provided insight into characteristics distinct in digital media. Lampert's (2014) understanding of the phenomenological differences between artist and viewer assisted in further distinguishing the expectations of viewers of digital artworks. In addition, Lampert (2014) introduces important definitions for the concept of layering, which were applied to AR applications and my own work throughout this dissertation. My argument, based on his research, is that layering is an important distinguishing characteristic in digital photomontage. However, where Lampert addresses layering from an aesthetic or methodological approach, I consider layering in the context of juxtaposing virtual over physical spaces, and the layered conceptual implications this evokes. The research of Agarwala *et al* (2004) on the expectations of users of digital photomontage applications greatly informed the analysis of my chosen case studies, and provided guidance on the creation of my own work. Lastly, Pais' (2012) notion of media displacement provided a

conceptual strategy for my own work, enabling the lived experience of an individual to become accessible to the viewer through a closing of the distance between private/public and virtual/physical.

5.3 EMERGENT KNOWLEDGE IN *DIGITAL TOURIST*

Digital Tourist as an installation uses photogrammetry to document and augment reality to explore personal connections between objects, people, and places important to me. Furthermore, the production of art and construction of the installation was a primary tool for thinking through my research questions via practice. One of the goals of this dissertation was to identify novel contributions for the creation of new artworks that problematise the notion of digital image editing by examining examples of media displacement and user interactivity. Throughout my research I have identified to what extent the above techniques serve to immediate the viewer into the 'world' of the artist. Through incorporation of *topos*, place, and *theoria*, the viewer of the installation experiences an implied collapse between the public space of the gallery and the private space of the artist's life. Photogrammetry and AR are vital contributors to this experience. Photogrammetry preserves and defamiliarises, through three-dimensional point clouds, the subjects, while AR facilitates interaction with these objects, displacing the private virtual world into a physical public space.

Throughout this dissertation, other points have also emerged from the research. Layering in digital media affords new conceptual and methodological possibilities for the artist. Layering is present in both digital and analogue media; however, in digital media there is the concept of the *alpha channel*. This function of digital imagery embeds the transparency of the layer as a quality in the image itself. This transformation from traditional media 'mattes' into digital 'objects' presents conceptual changes. Another aspect of digital media, which I did not implement in the making of my own work, was the potential for exposing the process of layer blend modes to the viewer. As Lampert (2014) noted, exposing the working file to the viewer closes the phenomenological gap and is another distinguishing factor between analogue and digital imagery. Based on my research on the topic of layering, I proposed to consider AR as a form of layering, both for its approach to using premultiplied alpha and blend modes, but also for the technology's ability to use those techniques to superimpose digital content over real-world environments, thereby remediating the virtual and the physical. I also argued that layering is another example of Bolter and Grusin's (2000) argument on hypermediation. Users participate in this form of remediation through a plurality of media. In *Digital Tourist* this plurality is presented in the prints, physical installation, and digital components. Furthermore, the installation formed a layering of reading: firstly, the placement of AR works

in the real space of bookshelves; secondly, presenting the physical prints of point clouds; and thirdly, presenting a process wall revealing the multiplicity of images concealed in the final AR objects.

Another point is that digital media allows for the viewer to become a more active participant in the work. Based on the arguments of Manovich (2001a) and Agarwala *et al* (2004), a key difference between the viewer of traditional media and the user of digital media is that a user has a heightened expectation of interactivity with the work. Interactivity can manifest in many ways, and my work approaches interactivity from an embodied perspective through the implementation of AR technologies in context with real space, which prompts viewers to move through the installation. I also considered the role of AR in reintroducing Benjamin's (2010) notion of the aura by evoking a sense of distance-through-proximity.

Furthermore, Manovich's (2001a) arguments on adopting the ontology of the database were considered. Specifically, Manovich (2001a) notes digital media's propensity for inserting, selecting, distributing, and deleting information more quickly and easily than traditional media. I also argued for photogrammetry as a novel contribution to new media art. Photogrammetry as a methodology is not wholly unique to digital media, remediating other artistic languages such as painting and photography. However, photogrammetry relies heavily on computer software to reconstruct objects in three-dimensional space. As such, this technique was employed in order to more critically examine how computer algorithms collectively function in what I have termed as the software gaze.

I also explored the notion of interrupting the software gaze. My work interrogates the assumptions computer software makes about physical objects during the photogrammetric reconstruction process. Through experimentation with retouching techniques I have problematised the way photogrammetry software views and interprets the objects present in my work. This has implications for the viewer as well. By shifting photogrammetric practice away from a goal of accurate object reconstruction, the objects depicted in my work push the viewer away from what Pais (2012) defined as an immersed state. This aligns with Pais' (2012) arguments on media displacement, and how my approach can further critical insight into the relationship between digital artworks and immersive and tactile space.

5.4 SUCCESSES, LIMITATIONS, CRITIQUE

This dissertation constitutes a small contribution to the relatively new discourse focussed on digital image editing and hence several areas of research were not covered. These are briefly discussed below.

Eiserman and Hushlak (2013:89) argued for the “programmatic” nature of image editing software, and the limiting effect this can have on the innovative possibilities of the artist. While this argument was considered, the use of intermediality in *Digital Tourist* emphasises the combination of analog and digital media and the novel contributions that arise from this relationship.

Manovich’s (2017) essay on the issue of aesthetics in media studies highlights a discord between academic discourse and cultural convention with regard to digital imagery. The argument is that academics in media studies disregard notions of aestheticism and beauty as “formalist” (Manovich 2017:2) while common usage of image editing applications is precisely that. The disconnect between popular usage of image editing applications and academic research is interesting, but as this study did not focus on commercial applications of digital image editing, the argument is not relevant to this dissertation.

Colton (2008:2) conducted research on how viewers of new media artworks often find digital imagery more “creative” if provided with an explanation on the creation process. My argument did not include a similar discussion on the perception of creativity in new media artwork on the part of the user as my research goal was not aimed towards establishing a standard of creativity for new media artworks. However, Colton’s (2008) argument did influence the analog components of the installation, namely the process wall, discussed in Chapter 4, and the creation of a detailed catalogue.

Often, theorists view the use of image editing software applications in a particularly negative way. Knochel (2013), for example, specifically warns against the use of any amount of post-production on images produced for the purposes of scientific visualisation and art education. Although image editing techniques may in fact enhance the viewing experience, or provide fresh insight, academics such as Knochel (2013:189) view the use of image editing techniques as potentially dishonest. Because the focus of investigation for this research was not concerned with an accurate, objective recording of the subject, it did not consider fields of research that probed the concept of truth in manipulated imagery.

Several limitations reduced the scope of the study. My argument focussed on the use of specific software applications such as *Adobe Camera RAW* and *Meshroom*. These programs were chosen for their prominence and ubiquity in professional fields. Additionally, the conventions, terms, methodologies, and tools used in *Adobe Camera RAW* establish the standard which most other image-editing applications follow. This study motivates the choice of the personal life of the artist as the most fitting case study for the work in *Digital Tourist*.

As the installation concerned itself with mementoes and connections from a personal perspective, the use of my own connections was most appropriate. Lastly, this study did not examine potential socioeconomic factors that may impact either the artist or the user. For example, regular access to a computer for the artist, the culturally dominant norms that shape the artist or user's perception, or the ability of the user to engage with digital work due to economic factors were not considered. The installation made use of a tablet device that was provided by the artist for the benefit of attendees. In addition, the engagement with the digital component of the work was guided by either the artist or an assistant, further lowering socioeconomic barriers for the viewer.

5.5 NEW AVENUES OF RESEARCH

Future areas of inquiry may include different approaches, or extensions of this project. For example, removing the digital component of the project entirely may significantly alter the user's appreciation of the work, further exploring the arguments made by Pais (2012). Alternatively, in line with Manovich (2001a) and Lampert's (2014) notions of database ontology, an increase in the manipulation value of the project can be achieved by increasing the interactivity of the piece. For example, users may be able to upload their own images to the exhibition, alter the process by which the three-dimensional reconstruction is created, or manipulate the model in various ways after creation.

Digital Tourist is an installation that focusses on the identity of a single individual, presented through a novel combination of print, installation, and AR. The technology used in the creation of the work has the potential to be opened up to the public, encouraging individuals to create their digital collections that reflect their own identity. In furthering the goal of user interactivity, it is my aim in future works to allow for the individual user to take a more active and constructive role in the creation of new media art. I have come to learn the value of new media in reframing past experiences within new contexts and hope that my future work may serve as a vehicle for the same critical self-reflection in others. Through researching the theories of deep remixability and remediation, I have come to the conclusion that the novel interchange of media possible through digital technologies reflects upon a deeper interchange of experiences, thoughts, and memories within the self.

Appendix 1

DETAILING THE CREATION PROCESS OF *DIGITAL* TOURIST

The creation process for the AR component of *Digital Tourist* involved the following steps, in order:

1. Capture subject using a Fuji XT-2 mirrorless camera
k. Edit images in *Adobe Camera RAW*
l. Reconstruct three-dimensional object in *Meshroom*
m. Load point cloud into *Meshlab*
n. In *Meshlab*, simplify high-resolution point cloud to around 100,000 points
o. Export point cloud as PLY format[36]
p. Build Android application using the *Unity game* engine[37]
q. Import low-resolution point cloud as augmented content
r. Import scanned-in book covers as image targets[38]
s. Link relevant point clouds to book covers
t. Export *Unity* project as Android APK file format
u. Download and install APK file to tablet device

In my process I typically capture one to two hundred images using a digital camera of the subject from various angles. The subject is photographed in one of two ways. With smaller objects, such as toys and books, the subject is placed on a turntable and photographed with the camera in a static position and at a high angle. The turntable is rotated at ten-degree increments. Once a full revolution is complete, the camera is lowered and the process repeated. In this manner the subject is photographed from all sides, including the top and bottom. For larger subjects, such as people and rooms, the subject remains static while the camera is moved around them. The method of capturing the images is similar to the above-mentioned process, with images captured around the subject from above and below. With people the process is particularly difficult. The typical amount of time required to properly document a subject from all angles is between fifteen and twenty minutes and it is quite difficult for individuals to remain as still as possible for such an extended period. However, having the subject remain seated and remaining in a neutral and comfortable position allowed for enough consistency between images for the reconstruction software to recognise

[36]The Stanford PLY format was chosen as it is readable by the *Unity* game engine and stores vertex colour information.

[37]The *Unity* engine is a free-to-use cross-platform real-time rendering engine that allows for the development of virtual reality and augmented reality applications for deployment to many operating systems including Android and iOS (Unity Technologies 2019).

[38]Image Targets are recognised by the software application when in the field of view of the device's camera (Wikitude 2019). When recognised by the application, the content associated with the image tracker is displayed at the coordinates in virtual space predetermined by the artist (Wikitude 2019).

various aspects of the subject.

The resulting image files are edited with a number of goals in mind. Some edits are required to make the file easier to process later, such as changing the file format from the native RAF raw format to a more compressed JPEG format, to minimise the memory usage in *Meshroom*. Sharpening and texture-enhancement are also performed on the image. Regarding colour and contrast, any undesirable colour casts are removed from the image, and the contrast is minimised to prevent large areas of dark shadows or bright highlights.

Meshroom is open-source software capable of photogrammetric reconstruction. Photogrammetric reconstruction of the subject is dependent on the identification of matching features between the various angles. As mentioned above, the input images can be manipulated by the artist to produce different 'interpretations' of the subject by the software. The photogrammetric reconstruction process also seeks this tonal uniformity. After the initial process of feature identification, the matching points of visual data are represented in a "point cloud" as millions of individual elements of colour. From this 'cloud' a closed mesh can be generated as a digital facsimile of the original subject.

I chose to eschew this final phase in the reconstruction process and focus on the intermediate stage of the point cloud instead. This is accomplished through processing of the mesh in multiple stages. First, the colour information obtained by the photogrammetric process is applied to each vertex[39] of the mesh. The mesh is then stripped of edge and face information, leaving only the coloured vertices. Lastly, the mesh is simplified from one to two million vertices to around one hundred thousand to allow for smoother operation on the more limited hardware of mobile devices. The point cloud provides a visual analogy to the data set; in other words, it is a visual database that emphasises the unique quality of the digital image: the pixel. The visual database does this by allocating each pixel a point in three-dimensional space, allowing the user to physically explore the 'dataset'.

The book covers used as image markers were scanned and digitally processed. The digital image editing was minimal; intended to ensure the image tracker in the *Digital Tourist* application would consistently and quickly recognise the marker. Contrast was enhanced, the image sharpened, and perspective or geometric distortions were corrected for.

The *Digital Tourist* application was developed using the *Unity* game engine. Within the

[39]A vertex represents a point in three-dimensional space but can also contain colour information (Luna 2006:174).

development environment, a third-party tool known as *Wikitude* provides out-of-the-box AR functionality for applications developed within *Unity*. The game engine does provide built-in support for AR through *Vuforia*; however, the performance of the image marker tracking is less accurate and slower when compared to *Wikitude*. *Unity* also reduces the amount of coding required to none, as the application provides a GUI for developer input. In the *Unity* environment, individual image trackers are assigned for each scene, of which there are seven in total. These scenes correspond to each work in the *Digital Tourist* installation. All the constituent meshes of each scene are assigned to the image trackers and the relevant book covers were assigned as markers. Once complete, the project was exported to the Android APK format and installed on the tablet device.

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