

EDITED BY GIOVANNA FOSSATI AND ANNIE VAN DEN OEVER

EXPOSING THE FILM APPARATUS

Global Laboratory Perspectives



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FRAMING
FILM

Eye Filmmuseum

CRITICAL ACCLAIM FOR *EXPOSING THE FILM APPARATUS. GLOBAL LABORATORY PERSPECTIVES* (2025):

“As a curator and researcher in computational museology, I read *Exposing the Film Apparatus* as both a major intervention and as a pragmatic guide. Extending the 2016 ‘research laboratory’ turn outlined in *Exposing the Film Apparatus: The Film Archive as a Research Laboratory*, this new volume advances an operational paradigm for apparatus collections: cameras, projectors, scanners, storage systems, and emulators are not inert but technologies whose ‘persistent materiality’ and operability are knowledge foundations for media history. Its core proposition—that we cannot write media history while bracketing how apparatuses work—reorients archival theory toward practice, gesture, and technicity.

The book follows trajectories I recognize from my own lab practice, shifting analysis from objects to operations through the archivability of gestures. It also it reorientates colonial narratives through situated case studies while addressing post-digital conditions in which analogue, digital, and emulated systems can coexist. Taken as a whole, these methods demand hybrid conservation, broadened access and, refreshed teaching strategies.

Two framing essays and twenty-three device-centred chapters—from pinholes and Kinoras to U-matic infrastructures to VR—translate these claims into method. Conservation becomes care, data is sovereign and pedagogy benefits when students reactivate technologies formerly kept ‘behind glass.’ More than a compendium, this is an academic framework. It equips archivists, curators, and educators with a coherent vocabulary and a lexicon for practice. Essential reading!”

**SARAH KENDERDINE, PROFESSOR OF DIGITAL MUSEOLOGY,
ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE, SWITZERLAND**

“This book is a crucial intervention at a critical moment. While the volume begins with the essential question of how we preserve the material traces of cinema, it also raises deeper questions: who has access to these technologies, and what worldviews are embodied when they are put into practice?

The chapter title ‘Empowerment or digital colonialism?’ could serve as an epigraph for the entire project. The book invites us to consider not only which devices we collect, but also how we make them operational, whom we invite to use them, and which epistemologies guide their interpretation. This book is an essential resource for anyone committed to building a more equitable and inclusive future for film and media studies.”

**EDGAR VILLEGAS IRIARTE, PROFESSOR OF FILM AND AUDIOVISUAL MEDIA,
UNIVERSIDAD DEL MAGDALENA**

“Where during the analogue era the study of the often noisy ‘apparatus’ in relation to content was key, in the digital age the miniaturized, often invisible, electronic apparatus is beguilingly masked by silent computer software. The 25 chapters in *Exposing the Film Apparatus: Global Laboratory Perspectives* are written by pre-eminent scholars who examine the technological underpinnings of contemporary imaging, imagining and imagination.

This book explains why we need to be cognizant of imaging histories, the histories of imaging technologies, and how and why they were invented and used worldwide. This is an archeology from the past into the future. And what a future it has become.”

KEYAN G. TOMASELLI, DISTINGUISHED PROFESSOR, UNIVERSITY OF JOHANNESBURG,
AND THE AWARDED AUTHOR OF *THE CINEMA OF APARTHEID*

CRITICAL ACCLAIM FOR EXPOSING THE FILM APPARATUS. *THE FILM ARCHIVE AS A RESEARCH LABORATORY* (2016):

“If dreams come true! The long desired collaboration between film archivists and film scholars has never been as fully realized as in this work, which is, itself, a genuine ‘research laboratory.’ Adopting an approach that constantly combines fundamental and applied research, the ‘materiality of the medium’ is studied here in an entirely novel way. Starting with the digital turn, the essential problems of technique and technology have (finally!) returned to academic zeitgeist. Not surprising since the digital, which transformed our habits and customs as spectators and researchers, promotes a daily hands-on contact, producing a shockwave in the process. By ‘bridging archival and scholarly work on film apparatus’ and recognizing the impact of the material turn (see the Introduction), *Exposing the Film Apparatus* will undoubtedly contribute to the upheaval of research methods and practices in cinema.”

ANDRÉ GAUDREAU, CANADA RESEARCH CHAIR IN CINEMA AND MEDIA STUDIES,
UNIVERSITÉ DE MONTRÉAL

“[This] rich and extensive collection edited by Giovanna Fossati and Annie Van Den Oever represents a major book that significantly maps and expands perspectives and trajectories in the archaeology and history of technological media, and it represents a thought-provoking reflexion on the digital transition in the archival world.”

ANDREA MARIANI, *HISTORICAL JOURNAL OF FILM, RADIO AND TELEVISION*

“We are only a handful of decades into the adventure of moving images, yet already there are so many common misunderstandings about the contexts in which and for which they have been produced. This is in large part because we neglect the technologies of moving image production. This excellent collection fizzes with new approaches to understanding the apparatuses of cinema. These machines once gave life to images; now it must be our mission to give life back to these machines.”

JOHN ELLIS, PROFESSOR OF MEDIA ARTS, ROYAL HOLLOWAY UNIVERSITY OF LONDON

“This eclectic series of essays avoids the danger of prescribing how we each experience but more likely use the moving image, whilst providing a matrix of approaches to thinking about how and why those experiences are the way they are. As such, they will engage graduate and post-graduate audiences.”

MIKE LEGGETT, *LEONARDO REVIEWS*

EXPOSING THE FILM APPARATUS



FRAMING FILM is a book series dedicated to theoretical and analytical studies in restoration, collection, archival, and exhibition practices in line with the existing archive of Eye Filmmuseum. With this series, Amsterdam University Press and Eye aim to support the academic research community, as well as practitioners in archive and restoration.

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EDITED BY GIOVANNA FOSSATI
AND ANNIE VAN DEN OEVER

EXPOSING THE FILM APPARATUS

Global Laboratory Perspectives

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TABLE OF CONTENTS

Acknowledgements	9	
Introduction	13	
		<i>Giovanna Fossati and Annie van den Oever</i>

PROLOGUE

- 1 The Moving Image Archive as Research Laboratory Ten Years On 25
Giovanna Fossati and Christian Gosvig Olesen
- 2 On Teaching Media in the Apparatus Archive, Hands-On 55
Annie van den Oever

PART I

SMALL AND PORTABLE

- 3 Camera Obscura 79
Tom Gunning
- 4 The “Bande-Cache,” or: The Material Art of Light Filters 93
Miriam De Rosa, Andrea Mariani and Warshadfilm
- 5 Teaching from the Archive in Black-and-White 35mm:
Analogue Nostalgia in Post-Apartheid South Africa 107
Landi Raubenheimer and Bongani J. Khoza

6 Socio-Technological Margins as Research Topic for Media Archaeology 119
Liri Chapelan

7 How to Re-Activate the Endangered Archive of a Historical Science Film Festival: A Speculative Approach 131
Silvia Casini

8 The Kinora as an Intermedial Dispositif of Early Twentieth-Century Home Cinema 143
Tim van der Heijden

9 The Homemade Film Projector 157
Guy Edmonds

6 |

10 Amateur Archaeologies and Hybrid Thinkering with the Kodak Reels Film Digitizer 171
Sanna McGregor

11 Double Vision: William Kentridge and the Stereoscope 187
Josef van Wyk

PART II

MEDIUM AND NOT EASILY PORTABLE

12 The Mazo Cinématographe Mixte: A Hybrid Media Apparatus 201
Frank Kessler and Sabine Lenk

13 Bending Efforts and Beams: The Use of the CRT Projector in Video Art Installations 213
Evelyne Snijders and Ellen Jansen

14 A Projectionist and His Percepto: Personal Archives and Embodied Film Education 227
Keith Bennie

15 The LAPA Scanner and the Possibilities for Sovereign Film Preservation 239
Carolina Cappa and Isabel Wschebor

16 Nostalgia: Emulation as a Service 251

Seán Cubitt

17 Caring for Obsolete Technology “in the Wild”: Former Users as Caregivers in the Maintenance and Repair of the U-Matic Video System 263

Sergio Minniti

18 The Anabasis of Super 8 275

Gülce Özkar

PART III

LARGE

19 Film Inspection Tables as Historical, Operational and Learning Devices 289

Simone Venturini

| 7

20 Jan Bot: Exposing the Bits & Pieces Collection Using AI and Algorithmic Montage 303

Pablo Núñez Palma

21 Moving on a Budget: The Mahlase-Roodt Eco Dolly 317

Tumisho Mahlase and Waldo Roodt

22 Rear Projection in Brazilian Silent Movie Theatres: Sobrados, Wet Screens and Alternative Media History 333

Rafael de Luna Freire

23 Empowerment or Digital Colonialism? Indigenous Virtual Reality in Colombia’s Sierra Nevada de Santa Marta 349

Andrew Simon Tucker

24 Sensing Film Archival Data: The Film Catcher 363

Christian Gosvig Olesen

25 Ancestral Images, Cultural Protocols and the Politics of Digital Storage: Restricted Storage at the National Film and Sound Archive of Australia 377

Nikolaus Perneczky

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This book addresses the growing awareness of the historical collections of film and media apparatuses in film archives and media museums all over the world, and it reflects on the new developments played by media technology in a range of social, cultural, curatorial and educational practices, as well as in storage, presentation and research strategies internationally. It investigates how media awareness impacts not only the strategies of media use, but also the archival and curatorial consciousness of those working in film and media archives, and at science, technology and media museums. | 9

To evoke the richness of the topic, over thirty archivists, curators, projectionists, theorists, film and media historians, new media specialists, media archaeologists and educationists have offered dedicated reflections on the new developments in their own archival and curatorial practices, as well as their research and teaching. They bring a variety of approaches to the topic, while reflecting on a wide range of film technology-related issues. They do so in the spirit of the series, *Framing Film*, in which theoretical and analytical studies in restoration, collection, archival and exhibition practices are addressed to support the academic research community, as well as practitioners in audiovisual archives. We are grateful to the series editors for inviting us to make this book. It owes much to them—Frank Kessler, who never fails to generously add precision and oversight to the discussion around the *dispositif*, and Nanna Verhoeff, who always offers her creative and positive views on the conceptualisation of the (media) apparatus.

One of the challenges of this project was to bring together a group of specialists from different disciplines and academic and curatorial traditions. The real pleasure of making this book was to see all the different inputs come together, sometimes surprisingly complementing each other, as they excavated forgotten corners of history and evoked forgotten practices of use. Together

they form a written film museum of a kind. The exploratory dialogues with the contributors from which the book grew were in themselves inspirational. Therefore, we wish to express our sincere gratitude to all the contributors for their enthusiastic and unwavering support and extremely generous intellectual contributions to this book in every phase of its becoming. So many authors have been inspirational in framing their chapters from the collaborative perspective of academic research and hands-on experiments and curatorial work. We sincerely thank Andrew Simon Tucker, Carolina Cappa and Isabel Wschebor, Christian Gosvig Olesen, Ellen Jansen and Evelyne Snijders, Frank Kessler and Sabine Lenk, Gülcé Özkar, Guy Edmonds, Josef van Wyk, Keith Bennie, Landi Raubenheimer and Bongani J. Khoza, Liri Chapelan, Miriam De Rosa and Andrea Mariani and Warshadfilm, Nikolaus Perneczky, Pablo Núñez Palma, Rafael de Luna Freire, Sanna McGregor, Seán Cubitt, Sergio Minniti, Silvia Casini, Simone Venturini, Tim van der Heijden, Tom Gunning, and Tumisho Mahlase and Waldo Roodt.

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At Eye Filmmuseum, we thank in particular Bregtje van der Haak, Maral Mohsenin, Anne Gant, Gerdien Smit, Eleni Tzialli, Meike Bartlema, Soeluh van den Berg and Hans van der Kraan for their support of this project and, in

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We also want to pay tribute to our copy editor Elizabeth Rankin who, as a Professor Emerita of the University of Auckland, New Zealand, cheerfully applied her expert knowledge of historical art objects in the copy-editing phase of this project, and engaged with each chapter and each author in an exceptionally thoughtful and constructive manner.

As always, we are immensely grateful to Maryse Elliott who, as Senior Commissioning Editor Film, Media and Communication at Amsterdam University Press, has been extremely supportive of the whole series, as well as of this volume. Her passionate involvement, prompt replies and intellectual engagement as a peer have made this and so many other book projects in the AUP thrive.

We also sincerely thank Amsterdam University Press for the publication of this and the preceding volume in open access, in particular Jan-Peter Wissink and the staff members who did wonderful work for this and the preceding books: Irene van Rossum, Inge Klompmakers, Mike Sanders and, last but not least, Chantal Nicolaes for the flawless production of our manuscript.

Giovanna Fossati and Annie van den Oever
Amsterdam / Johannesburg, 2025

Introduction

GIOVANNA FOSSATI AND ANNIE VAN DEN OEVER

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| 13

In the last decade, there have been significant developments in the media landscape, in the field of archival and curatorial practices and policies, and in the research on apparatuses and education done in the archive. There is an evident and increasing focus in media historiographical reflections on the fact that, for so long, the essential materiality of media technologies was not brought to the fore in film and media studies. This has changed now that apparatuses are made available for study and have been collected and presented in apparatus collections around the world. Their “persistent materiality” is evident, and the need to study them is imperative, as Benoît Turquety put it in 2024, when he argued that some changes need to be made because the left-overs of media history have been “preserved” mostly “as they are”—that is, as apparatuses that are *not used*, but are safely kept behind glass. Increasingly, this has raised the question of whether a history of film, or media or technology *can* be constructed if questions concerning the *operations* of these apparatuses are kept outside of media research.

The centrality of operations in the history of technology throws into relief the absence of the operational dimensions of apparatuses in the archive, and is a keen reminder of the necessity of a shift in focus—from the objects themselves to the historicity inscribed in these objects, that is, the very qualities that made them a part of history. From an archival perspective, it begs the question of how to archive the supposedly immaterial gestures that are key to technical

operations. Is there an “archivability” to gestures? Is there an implicit hierarchy between technical objects and technical practices? And how should one record and assess the “specific differences in their evolutions,” which demand that they not be separated but studied together, as “the philosophy of technique has shown, from André Leroi-Gourhan to Gilbert Simondon,” in Turquety’s words.

The position of apparatus collections within film studies and film archiving has changed quite considerably in the past twenty years. As already discussed in our 2016 book *Exposing the Film Apparatus: The Film Archive as a Research Laboratory*, “with disciplines such as media archaeology becoming an integral part of media studies programmes, and film museums displaying their collections in new forms of exhibitions, the shifting role of apparatus collections, from the periphery to the center, is quite palpable.” In retrospect, it is evident that *Exposing the Film Apparatus* sprang from the still fairly new

14 | awareness of the relevance of apparatus collections for research and education, and was inspired by the media technologies that were quickly gaining prominence in daily life at that moment in time. As a result, *Exposing the Film Apparatus* focused on the question of how the new awareness impacted the archival and curatorial consciousness of those working in film archives, science, technology and media museums at the time.

Ten years later, we find ourselves in the midst of archival concerns triggered by questions and ideas that go beyond archival objects and even their operability. These are questions about the survival of historical media objects in a present and future marked by ever-accelerating technological shifts, with a desire to revive the past—both as it was and as it functioned within its analogue context, and as it might be recreated through new technologies and as-yet-undeveloped uses. While growing movements of DIY laboratories—as extensively discussed by Scott MacKenzie and Janine Marchessault in *Process Cinema: Handmade Film in the Digital Age* (2019)—show how lively these developments are; Sarah Kenderdine, among others, is leading the way toward “speculative futures” in her recent exhibition project, *Geneva Public Portal to Anticipation* for the Swiss Pavilion at the Osaka World Expo 2025. Equally important to highlight is that, compared to a decade ago, it is now clearer than ever that these developments are also taking place outside institutional archives and on a collaborative scale globally.

These recent and on-going shifts are central to the two introductory essays and are clearly illustrated throughout the 23 chapters in this volume, which aims to map recent developments in the fields of collecting, curating, archiving and exhibiting, as well as the use of apparatus collections in research and teaching. While specifically interested in questions that have so far been overlooked and topics that have been understudied, we have also attempted to

address these new developments from a global, diverse and inclusive post-colonial perspective. In addition, we have prioritised the presentation of examples of apparatuses otherwise undervalued or ignored, because we think that they open up pathways to knowledge situated in the social, cultural, historical and often marginal(ised) environmental contexts in which they are produced. As such, these examples are particularly relevant, as they may help to renew and redefine the field, both theoretically and historically, by questioning what we think we already know. As a result, many of the chapters in this book challenge the dominant, Global North-centric narratives in film historiography.

In addition, a number of general, practical questions are being addressed in this book: Who studies these collections? How are they archived and curated? How (if at all) are apparatuses kept operational in a time they were not (technically) made for? Who uses them and to what effect? What is their merit for research and education?

In line with the format adopted for the 2016 book, we feature 29 contributors in 23 chapters in total, each focusing on a different device. A short technical description and a theoretical framework open each of these chapters to announce its topic and approach. And an accompanying full-page illustration of the technology under discussion also emphasises the focal point of the arguments unfolded by the author(s), and provides a visual record of its materiality. These chapters are written by (and for) archivists, curators, projectionists, theorists, film and media historians, media artists, media archaeologists, educationists and new-media scholars, and these perspectives are reflected in the choice of, approach to and reflections on a specific device in each case. In other words, the technical and theoretical reflections on the devices brought together in this book differ, depending on the authors' interests and expertise. As editors, we encouraged and purposefully supported a great variety of approaches, the aim being to present as wide a spectrum as possible of overlooked and marginalised topics and devices, to question existing knowledge of film and media history, and to reflect on and explore the new developments in our field.

Preceding these 23 chapters are the two chapters dedicated to overarching themes. The first reflects on the new developments in film archiving and curating in the last ten years and looks in particular at moving image archives used as a research laboratory. This chapter, written by Giovanna Fossati and Christian Gosvig Olesen, reflects on three areas in which current moving image archive practices have shifted over the past decade, posing new conceptual challenges. These are: (1) digitization and its impact on preservation, access, research, and the presentation of film apparatuses; (2) the research laboratory as both a local and distributed site of knowledge production, shaped by changing global actors; and (3) the future role of moving image archives

in shaping sustainable, future-oriented technological imaginaries that challenge prevailing developments and explore their links to archival apparatuses. This chapter draws especially on insights from *The Sensory Moving Image Archive* (2017–2020), *Narratives from the Long Tail* (2021–2025), and the *Global Audiovisual Archiving* (2022–) projects, connecting them to wider debates in film archiving.

The second overarching chapter connects these debates in film archiving to discussions of the materiality of media in the field of media archaeology and their impact on developments in media archiving—among them the “radical” and “hands-on” approaches to apparatus collections used for research and teaching by film and media scholars with access to such collections. Central to this chapter, written by Annie van den Oever, is a consideration of the omnipresence of the smartphone as a black-boxed *cinematic* device, which is designed to be “handled” and touched. It asks whether the smartphone

16 | has inspired new directions in archival and curatorial practices and media archaeology—among them the collection and cataloguing of apparatuses for research and educational purposes; exhibiting them in ways that cater to the hand the way the smartphone does; and putting such collections at the disposal of researchers and students who were not even allowed to touch them in the past. The potential merits of such new developments for education and research are explored in a workshop with students in post-apartheid South Africa.

Of further importance are ever-relevant general questions about the role of apparatus collections in the history and development of film and cinema, and their role and significance as objects of teaching and research in film and media historiography, restoration and archiving, both inside and outside the archive or museum.

Apart from its origin in the 2016 *Exposing the Film Apparatus* volume, this book also finds its inspiration in the research project *The Sensory Moving Image Archive: Boosting Creative Reuse for Artistic Practice and Research*. A collaboration between the University of Amsterdam (Media Studies and Computer Studies), the Amsterdam University of Applied Sciences, Eye Filmmuseum, the Netherlands Institute for Sound and Vision, and the creative industry partner Studio Louter, the project, which ran from 2017 to 2020, was funded by the Dutch Research Council (NWO). Extensively elaborated in the chapter by Fossati and Olesen are reflections on the project’s results. More importantly perhaps, their chapter also assesses the lesson learned from this project, including the objectives that could not be met but are awaiting translation into new projects.

APPARATUSES AND APPROACHES IN THIS BOOK

As we did in the 2016 *Exposing the Film Apparatus* volume, we have chosen once again to organise the contributions based on the size of the apparatus discussed by the author, from the smallest to the largest, highlighting their material existence. We have organised them in three categories: small and portable, medium and not easily portable, and large and not portable. In some cases, we have opted to focus on one aspect of the apparatus to define its size and portability. For instance, we open the first section with the camera obscura, where we took the size of its pinhole as its unique characteristic, no matter the dimensions of the apparatus as a whole, which can vary enormously. (Not to mention that a pinhole and a light beam are not really portable.) Similarly, in the case of a Virtual Reality apparatus, we focused on the virtual space in which the user moves and (inter)acts, which is neither real nor portable, rather than on the device itself. Clearly, as in our first volume, our organisational criteria are fundamentally random.

| 17

SMALL AND PORTABLE

Tom Gunning's chapter on the camera obscura opens the first section, as we have privileged the pinhole as its most inherent characteristic. Here, Gunning discusses the history of the device, considering its important role in painting and photography, and as a metaphor for vision and ideology. But he also addresses its status as a form of visual entertainment to emphasise the camera obscura's effects of wonder as one of its primary aspects.

In the second contribution, Miriam De Rosa and Andrea Mariani, in a close collaboration with Warshadfilm, focus on the "bande-cache," a punched-tape that functions as a light filter and colour grader during the film printing process. The authors discuss its historical use and its creative possibilities, and explore how the options can be extended by way of an experimental approach.

Inspired by experimental media archaeology and practice-based teaching and learning, Landi Raubenheimer and Bongani J. Khoza investigate black-and-white 35mm film stock as used by students in a collaborative teaching project on analogue nostalgia at the University of Johannesburg. They reflect on the continued imbrication of digital and analogue media in post-digital society, as well as the usefulness of the archive in hands-on teaching.

Liri Chapelan examines the use of the MiniDV cassette in a Romanian Roma community to show that obsolescence is not uniform or simultaneous, but layered and uneven. Her study reveals social, economic and cultural divides through the coexistence of distinct techno-aesthetic paradigms across different communities.

Combining a media archaeological approach with James Secord's 2004 notion of "knowledge in transit," Silvia Casini focuses on the U-matic tape in the archives of The International Festival of Scientific and Educational Film (1956–1975), the historical science film festival. She defines a science film festival as a network of relations that comprises and combines different apparatuses, spaces and discourses, and points to the significance of the choice of the U-matic cassette to preserve a selection of IFSEF's 16mm and 35mm films for digital storage and circulation.

Drawing on the concept of the dispositif, Tim van der Heijden's chapter explores the Kinora as an early twentieth-century home-cinema technology. He positions it as an intermedial dispositif, "in between" nineteenth-century optical toys and early cinema, film and photography, and individual and collective modes of viewing.

Looking at a home-made device, the George Pell 9.5mm film projector, 18 | Guy Edmonds presents an object-led enquiry into the practice of self-building "artisanal" film technology. Edmonds analyses this and other examples of homemade projectors he has collected in the broader framework of DIY culture and amateur film making.

Sanna McGregor examines the Kodak Reels Film Digitizer to situate the personal practice of digitizing Super 8 family films in a home context. She outlines how today's amateurs (re)engage with small-gauge technologies, both analogue and digital, and how their creative approach to hybrid practices can enrich experimental media archaeological research and pedagogy.

In the last chapter in this section, Josef van Wyk takes the F-71 magnifying stereoscope as its starting point, to look at William Kentridge's sustained engagement with stereoscopic devices, imagery and vision in his studio in Johannesburg. Van Wyk discusses the ways in which "double vision" is employed by Kentridge as an aesthetic, political, and metaphorical strategy, demonstrating the evocative and generative power of comparisons.

MEDIUM AND NOT EASILY PORTABLE

Frank Kessler and Sabine Lenk's chapter opens the section on medium-sized apparatuses that are not easily portable. The mixed-media projector *Cinématographe Mixte* (1912/13), designed to accommodate both still and moving images, is discussed from a media archaeological viewpoint. They show that the development of film is not a linear one where new technologies straightforwardly render older ones obsolete, by shifting the focus of cinema historiography from theatrical to non-theatrical presentations.

Examining the CRT projector, Evelyne Snijders and Ellen Jansen trace the

technological migration of Nam June Paik's *Sistine Chapel* (1993) to its later reactivation with LCD projectors. They advocate for conservation practices that account for embodied affordances, emphasising the dynamic, interpretative nature of time-based media art and its reliance on evolving technologies and human interpretation.

Keith Bennie discusses the Percepto! device devised by William Castle for *The Tingler* (1959), which required projectionists to create seat vibrations to enhance dramatic effects during the projection of the film. Looking at a model held by the Toronto International Film Festival (TIFF) Film Reference Library, Bennie highlights projectionists' vital role in preserving apparatus history and the educational potential of such material for teaching media history.

The scanner developed by the Laboratorio de Preservación Audiovisual (LAPA) at the Universidad de la República de Uruguay is an obsolete telecine apparatus refigured into a frame-by-frame scanner. Looking at this device, Carolina Cappa and Isabel Wshebor reflect on efforts to build a self-sufficient system, independent of unaffordable industrial solutions, for Uruguay's film digitization, and the symbolic struggles over cultural sovereignty tied to the politics of memory.

| 19

Seán Cubitt highlights the importance of remembering the diversity of early computational media and platforms before their consolidation in the twenty-first century. In his discussion of the *Emulation as a Service Infrastructure* (EaaSI) platform, Cubitt addresses technical, legal, and cultural challenges in preparing games, encyclopaedias, commercial interactives, and networked art for contemporary use, including emulation of hardware, acknowledging the potency of the nostalgia that is generated to reanimate pasts, presents and futures.

Adopting the conceptual framework of "care," Sergio Minniti examines maintenance and repair practices around the U-Matic video system, a technology often overlooked and undervalued in media history and technoscientific heritage. He shows how former users become caregivers in informal, distributed networks that sustain obsolete media beyond institutional settings.

Gülce Özkar examines Super 8's role in Eric Baudelaire's *The Anabasis of May and Fusako Shigenobu, Masao Adachi, and 27 Years Without Images* (2011), tracing Japan-Palestine solidarity through the lens of *anabasis*. The chapter explores how Baudelaire uses Super 8's dual legacy to confront visual erasure, and proposes *anabasis* as a media-archaeological concept, and as a practice that reactivates obsolescence and turns it into a generative form of historical engagement.

LARGE AND NOT PORTABLE

The first non-portable apparatus in this section is the film inspection table as discussed by Simone Venturini. This chapter examines its historical, epistemic and media-archaeological significance in archival, research and training contexts. Though rarely studied, this enduring device remains vital for analysing film material artefacts and as such it continues to serve specific functions within archival practice.

Pablo Núñez Palma explores the filmmaking algorithm behind *Jan Bot*, an experimental programme that used AI and film fragments from EyeFilmmuseum's *Bits & Pieces* collection, in combination with current news items, to generate over 25,000 short films. The project shows how experimental uses of emerging technologies can help reimagine audience engagement with film heritage.

20 | In South Africa, as in so many lower-income countries, using a dolly in film and television production can only be afforded by high-budget productions. Drawing on film production studies, Tumisho Mahlase and Waldo Roodt explain how a DIY Eco film dolly can be made using inexpensive materials found at a local hardware store, or even discarded items, while still achieving the same function as custom-built dollies used by the industry.

Rafael de Luna Freire examines the widespread use of rear projection in Brazilian silent-era cinemas, drawing attention to the overlooked role of space and geography in early cinema and media archaeology. Revealing how the use of rear projection was a response to the restricted spaces of *sobrados* (townhouses) where films were shown, this chapter reevaluates marginalised practices in Brazil, challenging Global North-centric narratives in film historiography.

Focusing on a co-created project with the Indigenous Kogi community of the Sierra Nevada de Santa Marta in Colombia, Andrew Simon Tucker examines Virtual Reality as a device shaping sound, vision, embodiment, and agency through specific cultural and epistemic logics. In pointing out the enabling aspects of VR technology, but also acknowledging how it can undermine important Kogi beliefs, Tucker challenges the idea that emerging technologies inherently empower communities, advocating for more nuanced, community-led practices that resist digital colonialism.

Christian Gosvig Olesen analyses Eye Filmmuseum's installation *The Film Catcher* through film cataloguing and digital heritage theory, arguing that this installation embodies a convergence between film scholarship's desire for multimedia retrieval and museology's recent shift toward sensory access. Moving beyond text-based entry points, *The Film Catcher* promotes greater participation, agency and inclusivity.

The last chapter of this section examines the storage “apparatus” for culturally restricted Aboriginal images and sounds at the National Film and Sound Archive of Australia. Drawing on Fernando Domínguez Rubio’s concept of storage as a complex apparatus, Nikolaus Perneczky explores and challenges analogue and digital protocols, gendered access and co-design, to reframe conventional approaches and propose storage as a cross-cultural conservation site that is shaped by Indigenous authority and control, acknowledging obligations of care and the need to share authority with stakeholders.

To conclude, the wide variety of devices, examples and perspectives presented in these chapters is selected to reflect the recent developments in the fields of collecting, curating, archiving and exhibiting, as well as the use of apparatus collections in research and teaching. In addition, we attempted to address these new developments from a global, diverse and inclusive post-colonial perspective, to contribute to the renewal of the field, theoretically, historically, and politically, by disrupting the dominant, Global North-centric narratives in film historiography. At this point in time, we expect this to be the most significant shift in the field. And precisely because this process is in its early stages, we felt that closing the volume with an epilogue would not be fitting. Instead, we chose to leave an open ending that invites the continuation of conversations and collaborations that will shape future research and expand this still-developing field.

NOTES

1 We are summarising and quoting here from Benoît Turquety's argument, presented in his FCAM colloquium at the University of Groningen, 23 April 2024, entitled "Operating Media: Persistant Im_Materialities," <https://www.rug.nl/research/icog/research/research-centres/artsinsociety/news-and-events-ais/2024-04-23-fcam-turquety>.

2 See also Turquety's reflection on Simondon, "Instructions for Use: Thinking Body, Machine, and Technicity with Simondon," in *Technics: Media in the Digital Age*, eds. Nicholas Baer and Annie van den Oever (Amsterdam: Amsterdam University Press, 2024), 103–124. To Turquety, the French philosopher Gilbert Simondon has been a source of inspiration in the study of the operational dimensions pivotal in the history of film technology yet understudied. As early as 1958, Simondon attempted to sketch a philosophy of the history of technology beyond the duality of form and function (Simondon, *Du monde d'existence des objets techniques* [Paris: Éditions Aubier, 1958]). However, Simondon's works were scarcely read or appreciated outside French-speaking countries. In Anglo-American film and media studies, his oeuvre is only more recently gaining resonance.

22 | 3 Sergei Eisenstein's notes on gestures have been a point of interest from early in his career, offering a case in point that in the cinema an awareness of gestures has been present from early on. See the Special section on #Gesture, edited by Miriam De Rosa for *NECSUS—European Journal of Media Studies* (Autumn 2019): https://necsus-ejms.org/portfolio/autumn-2019_gesture/. See also Irina Schulzki, "'The Underlying Gesture': Towards the Notion of Gesture in Jean d'Udine and Sergei Eisenstein," in *From Sensation to Synesthesia in Film and New Media*, eds. Rossella Catanese, Francesca Scotto Lavina, and Valentina Valente (Newcastle upon Tyne: Cambridge Scholars Publishing 2019), 102–115.

4 Benoît Turquety, "Toward an Archaeology of the Cinema / Technology Relation: From Mechanization to 'Digital Cinema,'" in *Technè / Technology*, ed. Annie van den Oever (Amsterdam: Amsterdam University Press, 2014), 52.

5 Giovanna Fossati and Annie van den Oever, eds., *Exposing the Film Apparatus: The Film Archive as a Research Laboratory* (Amsterdam: Amsterdam University Press, 2016), 27.

6 See Scott MacKenzie and Janine Marchessault, "Introduction," in *Process Cinema: Handmade Film in the Digital Age*, eds. Scott MacKenzie and Janine Marchessault (Montréal: McGill-Queen's University Press, 2019) and <https://actu.epfl.ch/news/epfl-premieres-public-portal-to-anticipation-at--4/>.

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| 23

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CHAPTER 1

The Moving Image Archive as Research Laboratory Ten Years On

GIOVANNA FOSSATI AND CHRISTIAN GOSVIG OLESEN

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| 25

ABSTRACT

This chapter reflects on three areas where current moving image archive practices have shifted over the past decade, posing new conceptual challenges. These are: digitization and its impact on the preservation, access, research and presentation of film apparatuses; the research laboratory as both a local and distributed site of knowledge production, shaped by changing global actors; and the future role of moving image archives in shaping sustainable, future-oriented technological imaginaries that challenge prevailing developments and their links to archival apparatuses. The chapter draws especially on insights from *The Sensory Moving Image Archive* (2017–2020), *Narratives from the Long Tail* (2021–2025), and the *Global Audiovisual Archiving* (2022–) projects, connecting them to wider debates in film archiving.

KEYWORDS

Audiovisual archives; film apparatus; digitization; laboratory; North-South collaboration; archiving futures

INTRODUCTION

Complementing Annie van den Oever's essay for this volume and, as with her chapter, taking the 2016 Introduction to *Exposing the Film Apparatus* as starting point,¹ this chapter reflects on three aspects in which we consider how current moving image archive practice has been changing and presenting significant new conceptual challenges during the ten years that have passed. These aspects are: *digitization* and its impact on the preservation, access,

26 | research and presentation of film apparatuses; the notion of *research laboratory* as both a local and distributed site of knowledge production, and the (changing) actors involved that redefine what counts as a laboratory in a global context; and, finally, *the future* and the role that moving image archives (can) play in developing sustainable, future-oriented technological imaginaries that challenge current developments and their entanglements with archival apparatuses. Structuring our contribution around these aspects, while allowing for porosity between them and letting their foci bleed into each other so as to highlight interconnections, each section draws on experiences and examples from the research projects we have carried out in collaboration in the past ten years. In particular we will draw on insights from *The Sensory Moving Image Archive* (2017–2020), *Narratives from the Long Tail: Transforming Access to Large-Scale Audiovisual Archives* (2021–2025), and the *Global Audiovisual Archiving* network (2022–), while making connections to broader debates and developments in film archiving, as reflected, among others, in chapters in the present volume.

PART 1: FROM DIGITIZATION TO DATAFICATION

Over the past ten years, the terms, coordinates and scope of discussions around digitization in the context of film archiving have changed significantly. Comparing the 2016 book to the chapters in the present volume and the directions our own research has since taken, it is noteworthy that discussions no longer relate solely to concerns about how to render and secure the survival of analogue film materiality, or how to counter the digital image as its only or primary premise. They also consider film preservation as part of a more

all-encompassing and amorphous process of datafication—the process of “transforming all things under the sun into a data format and thus quantifying them,” to cite José van Dijk—that affects a wider range of archival materials and resources.² As part of this development, film archiving increasingly engages with approaches from digital heritage. For instance, for the analysis of moving image features and the enrichment of archival metadata, it can employ computational means, both to fundamentally reconceptualise collection access, and to find new ways of engaging with film materiality. Addressing this development, we first want to highlight how concerns for analogue film materiality and the future of their supporting infrastructures are far from resolved, while indicating how new approaches informed by practices of digital heritage and scholarship can productively reshape our engagement with film materiality, preservation and collection access.

| 27

Countering and Reimagining Film Materiality Against the Digital Rollout

The 2016 discussion introducing *Exposing the Film Apparatus* primarily related moving image archive digitization to contemporary developments in moving image artists’ work and installation, contrasting digitization to the artistic rekindling of analogue techniques and practices. At the time of the publication, the work of found-footage filmmakers, such as that of Gustav Deutsch and Bill Morrison, and, in particular, Tacita Dean’s *FILM* installation, were considered representative of a material turn constituting “a *counter effect* to large-scale digitization.”³ Highlighting the imminent threat of analogue cinematic apparatuses’ disappearance, contemporary works by these artists reflected a broader tendency to recentre the materiality and processes of analogue filmmaking at the core of film archiving.

In the past ten years such work has only intensified. Networks of artist-run film labs that emerged in the 1990s have further solidified and begun collaborating more closely to find new, experimental approaches to film development and keeping traditions of expanded cinema alive, while also exploring new directions.⁴ The collaborative project *Re-Engineering the Moving Image* (REMI, 2016–2017), involving Mire in Nantes, the Filmwerkplaats in Rotterdam and Berlin’s LaborBerlin, and funded by the European Union’s Creative Europe Programme, is an illustrative example. The work being undertaken by labs in this network (although not exclusively), simultaneously focuses on the photochemical duplication and processing of film—usually small-gauge (Super 8 and 16mm)—and on developing alternative and experimental methods to produce film emulsions and coat film supports. The latter is undertaken

through engagement with the physical artefacts and apparatuses that enable photochemical filmmaking and film projection—film emulsions, film stock, cameras, projectors, printers, processing baths, etc.—and skills acquisition relating to photochemical technologies.

Beyond REMI, good examples are the work of various contemporary filmmakers and artists such as Lindsay McIntyre, whose practice deeply connects to Indigenous filmmaking traditions, and Erin Weisgerber, who recently presented her research into film emulsions at the 2025 FIAF Congress in Montréal.⁵ Summarising these developments, the volume *Process Cinema: Handmade Film in the Digital Age* (2019) testifies to how such developments are part of global developments in “counter-practice to the rise of digital filmmaking.”⁶ In their Introduction to that volume, Scott MacKenzie and Janine Marchessault characterise these approaches as “process cinema,” to highlight how artists fuse experimental artistic practice and material research by drawing on “a creative tradition in alternative filmmaking that is unscripted, improvisational, participatory, and based on the manipulation of the very materiality of film.”⁷

Thus, artists’ approaches to analogue filmmaking, development and preservation have remained vital. However, this does not mean analogue practices are necessarily becoming less precarious or more sustainable as skills. Expertise and venues continue to disappear, just as the preservation of analogue film culture on an industrial scale remains fundamentally challenged. Regarding the latter, there is an essential difference between industrially produced film stock and DIY or process cinema film stock to be kept in mind. The former ensures standardised results through large-scale production and is suitable for duplication of historical or contemporary films originally shot on film. Conversely, DIY or process film stock is inherently experimental and cannot guarantee consistent results across batches produced under different conditions and with varying chemical compositions. The precarity of film stock as a core component of the traditional photochemical film dispositif remains and intensifies, both as a physical strip of film, as discussed by Leenke Ripmeester in the first *Exposing* volume,⁸ and as part of a broader dispositif encompassing the artefacts, apparatuses and practices involved in film as an art and an industry, from shooting to screening. In spite of a clearly growing movement among artists and filmmakers to return to film materiality, photochemical film as an industrial product and living practice has undeniably been in decline for over a decade.

This shift can be traced back to the so-called “digital rollout,” which occurred globally around 2010 to 2012.⁹ Since then, many film manufacturers have closed—some completely (such as Fuji and Agfa), and others partially. For instance, Kodak drastically reduced its production lines and discontinued

many of its film stocks, making a range of previously available applications no longer accessible to filmmakers. After its downsizing, Kodak still produces motion picture film stock—alongside film for photography, which has also been greatly reduced—but, although Orwo too continues to produce black-and-white film, these are now the only two industrial manufacturers left of the many that once populated the history of analogue film.¹⁰ Symbolically, the moment when Kodak filed for bankruptcy in 2012, together with its previous dramatic downsizing of activities, including its Research and Development department, marked a key turning point, implicitly announcing the demise of photochemical film as an industrial product.¹¹ Indeed, an industrial product without an investment in research and development is essentially doomed, its future affordances effectively denied.

This development also profoundly impacts many commercial film laboratories whose services and operations are integral to the sustainability of film archives. Since the digital rollout, many commercial laboratories have closed down or merged. Haghefilm in the Netherlands—which has a long-standing collaboration with Eye Filmmuseum, the George Eastman Museum, and the Danish Film Institute, among others—was taken over by L’Immagine Ritrovata, the laboratory connected to the Cineteca di Bologna. L’Immagine Ritrovata had also previously acquired the former Éclair laboratory in Paris and opened an office in Hong Kong, becoming a reference point for high-profile international restorations.¹² A number of film archives still operate internal photochemical laboratories, such as the Cinemateca Portuguesa’s Arquivo Nacional da Imagem em Movimento (ANIM); the laboratory at the BFI National Archive; and the lab at the Thai Film Archive in Bangkok.¹³

| 29

In this respect, it is clear that the industrial dimension of the medium no longer has a future tied to its photochemical materiality, and this has far-reaching consequences for the preservation work of film archives. DIY film stock and the practices of producing it in artist-run labs—and, as we shall discuss below, approaches emerging in the context of digital heritage projects such as *Narratives from the Long Tail*—may eventually become the only way to sustain photochemical filmmaking and film duplication as a living practice, once industrial production ceases entirely and existing film stock supplies are exhausted.

Yet, the work of artist-run labs should not be reduced to merely taking on a role of preserving or ensuring the longevity of analogue film culture where the industry fails. While such labs have indeed taken it upon themselves to conserve artistic traditions, and artisanal and handmade approaches flourishing in artist-run film labs in recent years continue to position themselves as counter-practices, they do not, as Chris Gehman aptly remarks, primarily reflect a “reactionary” position driven mainly by “anxiety about the obso-

lescence of film.”¹⁴ Artist-run labs are in equal measure spaces for radically speculating with film, in order to reimagine sustainable infrastructures for analogue film production and preservation, while raising pressing questions that also connect to broader, contemporary concerns in media studies. For instance, handmade practices are increasingly rearticulating experimental film traditions and preservation from the viewpoint of environmental perspectives, to reevaluate how both film development and the preservation of analogue film may become more sustainable. In the conclusion of their 2018 article “Handmade Films and Artist-Run Labs: The Chemical Sites of Film’s Counterculture,” Rossella Catanese and Jussi Parikka identified one of the key perspectives that has increasingly guided reflections on laboratory counter-practices in recent years, by stating how the surge in handmade film development practices should also warrant a reflection on artist-run film labs in the broader context of “an environmental history of media.”¹⁵ Working with a similar line of inquiry, media artist and researcher Işıl Karataş has recently taken a sensory, practice-led approach to working with sound as a medium, and with acousmatic listening, to explore the auditory settings of Filmkoop Vienna and LaborBerlin as a way to emphasise “cinema’s destructive industrial roots and eco-centric media futures.”¹⁶ Likewise, filmmaker Karel Doing’s ongoing *Phytography* project, which explores “the internal chemistry of plants for the creation of images on photographic emulsion,” has recently been prominent in carving out a space for more eco-critical approaches to film development.¹⁷

30 |

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Hybrid Materialities and the Digitization of Archival (Knowledge) Apparatuses

While digitization, understood primarily as the digital rollout of commercial cinema, remains opposed to analogue practices and continues to provoke new creative approaches to film materiality, we also observe that, conversely, contemporary debates surrounding film preservation are premised to a lesser extent on the dichotomy of analogue/digital that characterised the first 10 to 15 years of the twenty-first century. Boundaries between any clear medium specificities tied to concepts such as analogue and digital have been porous since the emergence of digital production, distribution and restoration. In terms of what we encounter on screens in experimental venues and museum contexts, materiality increasingly becomes hybrid rather than distinct. In this respect it is worth noting that DIY and artist-run laboratories, such as the ones discussed above, typically also follow a hybrid approach, by critically combining photochemical and digital tools for both post-production and restoration, adhering to—and challenging—industry standards.¹⁸ Likewise, expertise pertaining to

analogue filmmaking and preservation increasingly circulates through digital knowledge infrastructures, including collaborative wikis, databases, blogs, online video platforms, libraries and digital humanities projects.¹⁹ As Jiří Anger has recently argued, the emergence of 4K-scanning has become an impetus for reconsidering structuralist and found footage traditions of filmmaking, affording new analytical means for scrutinising film's material layers and circulations in different dispositifs, while interrogating film's ontology anew.²⁰ Thus, in this sense, creative engagements with and speculation about archival film can be said to be characterised to an increased extent by new hybridities, which expand the sense of what is meant by digitization.

Beyond discussions of film restoration and materiality, in recent years this development has also extended to several knowledge apparatuses of film archival work as a consequence of digitization, in particular cataloguing, databases and exhibition, which in turn make visible new historical lineages and imaginaries of preservation.²¹ For instance, as testified by this volume, recent years have seen increased integration of the mechanical and manual operations of inspecting and identifying films at viewing tables with computer vision tools, as a way to automate cataloguing through semi-automated annotation.²² Several contemporary devices—for instance, inspection tables appropriated for scanning and automated recognition of concepts in moving images during scanning—offer combined scanning and metadata creation.²³ As Venturini argues, such datafication of film archives can be traced back to scanning and viewing devices from the 1970s and 1980s that could “inspect a large amount of film prints and their stop-on-splice or similar functions automatically detect damage.”²⁴

| 31

Equally, while not necessarily relying on such machinery for this purpose, the practice of “computerising” cataloguing and access in film archives more broadly can be placed within a history dating back to at least the 1970s, from FIAF's early interest in MARC (Machine-Readable Cataloguing) to recent pan-European projects such as I-Media Cities.²⁵ Increasingly, as Christian Gosvig Olesen has discussed in more detail elsewhere, such projects testify to a datafication of film archives insofar as they seek to foster “synthesis between large-scale digitization, interoperability, and access to catalogue metadata and digitized archival films, data enrichments resulting from computational analysis and video annotation by researchers.”²⁶ Such applications tend to favour an emphasis on traditional film archival concepts, in particular named entities such as places, names or objects, or aspects of film style, sometimes in connection to less semantically classifiable categories of moving image features such as movement or composition. In this respect, film archiving's datafication nurtures closer ties to multimedia information retrieval in order to offer new entry points for collection access through data enrichment.

By engaging with film archival concepts as a basis for data enrichment, this development retrospectively brings to the fore how critical dimensions of metadata creation have hitherto been neglected. A case in point is the increased focus on outdated terminology. For instance, a project such as *DE-BIAS: Detecting and Cur(at)ing Harmful Language in Cultural Heritage Collections* (2023–2024) has been instrumental in this regard, by reassessing established vocabularies in film archiving, and in cultural heritage collections more broadly, while also indicating possible alternatives, both by creating data-driven tools to detect outdated terminology and by applying guidelines for working with affected communities. Within established institutions, such work gives rise to the notion of film archival metadata as “legacy data” that must be understood as reflecting shifting assumptions and hierarchies of knowledge that have sedimented within catalogues throughout decades.

In addition, it has also become increasingly clear how metadata creation³² | has ignored features without a clear semantic specificity and has assigned these little heuristic values for the discernment of relations between archival items. For instance, lower-level, syntactic features—such as colour or motion—have tended to be seen as less valuable features on their own. Such features have previously been interpreted as meaningful primarily in relation to other more traditional categories pertaining to classic stylistic foci, such as director, period or genre, to name but a few. In this respect, concurrently with types of browsing afforded by Big Tech companies like Google as part of their Arts & Culture or Image Search initiatives, the cultural heritage sector more broadly has reconsidered the value of exploring collections based on syntactic categories alone. As discussed elsewhere in this volume, this development is fuelled by recent ambitions in a broad range of institutions and artistic contexts to offer alternatives to text-based search, and go, as designer and researcher Nadia Piet phrases it, “beyond the search box.”²⁷ This approach currently feeds into contemporary exhibition design and collection access, and forms a basis for reshaping collection access and experiencing connections between archival films in a number of projects.²⁸

The Eye Filmmuseum’s *Film Catcher*, building on a sensory heritage approach initiated in *The Sensory Moving Image Archive* project (SEMA, 2017–2020), is one example of how computer vision can contribute to developing sensory hands-on approaches to digitized film collections in museum spaces. As discussed in Christian Gosvig Olesen’s chapter elsewhere in this book, which focuses in particular on the *Film Catcher* installation that translated some of the project’s findings into a hands-on museum experience, SEMIA succeeded in achieving many of the aims set out at its inception. It proposed a method for exploring digitized audiovisual collections through visual sensory features at a time when such approaches were applied primarily to still imag-

es, preceding the launch of AI tools in this direction by major tech companies. In doing so, SEMIA bypassed in part the biases inherent in how collections are typically catalogued, based on historically and culturally specific perspectives on film, film history, and individual titles. This was only partially achieved, however, because, as we are all aware, there are biases embedded in AI tools as well, including, in the case of SEMIA, the neural networks used for image analysis within the project.²⁹

Taking these developments into account, digitization has become less synonymous with digitization of films, but now also implies a process of datafication encompassing a wider range of preservation activities, including cataloguing, metadata creation and exhibition. While on the surface such developments could be understood to deemphasise film materiality as a core concern for film archives, it is instead, as we discuss below, exactly through the emerging digital heritage approaches afforded by datafication that engagements with film materiality may be increasingly rendered and centred in the future.

| 33

Rendering Film Materiality through Digital Museology

Although SEMIA's primary target users were artists, researchers and creative industry professionals who found a more inclusive way of searching collections based on the data produced in the project, there were other approaches the project did not manage to realise, in particular how to account for the material characteristics of the collections analysed. As specified in the original grant proposal, it was from the outset a stated ambition to also enable browsing based on "the visual features of objects [that] are often related to the material-specificity of the artefacts they derive from."³⁰ In this respect, however, one of the main obstacles was the significant processing power required to analyse moving images at high resolution. Only resolutions of 2K or higher allow for meaningful analysis of aspects such as film grain or original colour systems, but processing files at this resolution would have exceeded the available project budget. As a result, the team worked with lower-resolution files that did not permit a full exploration of such material features.

In this particular area, film archiving projects that involve a computationally driven digital heritage approach are currently lagging behind research on other arts, where the exploration of material aspects of heritage artefacts and collections is traditionally well-developed. Not only is it a longstanding focus within conservation and restoration studies but also a common focus in curatorial practice in museums, which often provide context about the materials used in art objects (e.g., paintings) or detailed (visual) documenta-

tion of restoration processes.³¹ Some pioneering museum installations have addressed these questions in innovative ways. Sarah Kenderdine and her team have developed several examples—first at the Applied Laboratory for Interactive Visualisation and Embodiment (ALiVE) at the City University of Hong Kong (with Jeffrey Shaw, 2010–2017), and more recently at the Laboratory for Experimental Museology (eM+) at the École Polytechnique Fédérale de Lausanne. Notably, the 360-degree installation *Pure Land AR* presents a striking early example of fully immersive audience interaction with the Buddhist wall paintings in Cave 220 of the UNESCO World Heritage site, Mogao Grottoes at Dunhuang, China.³²

While such high-resolution explorations were already possible for still images over a decade ago—as in *Pure Land*, where the wall paintings were digitized at 600 dpi—high-resolution installations for moving images have remained a technical and financial challenge.³³ Processing moving images

34 | at 24 frames per second at high resolution requires substantial computing resources. Jeffrey Shaw and Sarah Kenderdine did engage with moving images in their seminal *T_Visionarium* installation, but this work focused on “the role of interactive narrative in the cinematic reconstruction of televisual information,” rather than on the sensory aspects or materiality of the images.³⁴

The relative lack of attention to materiality in the visual exploration of moving images is not only due to technical limitations. It also stems from disciplinary traditions. Film and media studies have long privileged textual and narrative analysis over material approaches.³⁵ In fact, as argued by Erkki Huhtamo, even “archaeological” approaches to film became a consolidated perspective within film studies only in the 1990s.³⁶

In terms of film and museological research and of museum presentation practice, we sought to nurture a shift in this area in the project *Narratives from the Long Tail: Transforming Access to Audiovisual Archives*, led by Sarah Kenderdine.³⁷ In this context, a key sub-project—the *BiographScope* installation, developed in collaboration with Eye Filmmuseum and the University of Amsterdam—positioned the interaction with film materiality at its core. As its name suggests, the *BiographScope* centres on Eye’s 68mm Mutoscope & Biograph Collection, a collection recently added to the UNESCO Memory of the World Register, which contains approximately 200 large-format films, footage of both non-fiction views and more fictionalised scenes, made between 1897 and 1903.³⁸

The eM+ lab team was provided with 8K scans of approximately 70 films from the collection and collaborated closely with University of Amsterdam (UvA) researchers and Eye curators to develop the installation. One of the main curatorial goals was to immerse museum visitors—both general and specialised audiences—in the materiality of the original 68mm film strips.



FIGURE 1

The “film strip forest” in the *BiographScope* installation. ↴

These unperforated, large-format, highly detailed images can no longer be projected in their original analogue form due to the (so far) complete loss of 68mm projection apparatus.

In the installation resulting from this collaboration, first presented during the 9th Eye International Conference in 2024, visitors could freely browse the films while walking through a “film strip forest” (see fig. 1). They could select titles, watch them, zoom in, and explore image details up close. Eye and UvA emphasised an open-ended, but archival mode of engagement: visitors could explore the films in depth, but were not permitted to alter or augment them in any way.³⁹

Although working with a completely different technical set-up to that of the artist-run labs discussed above, it is nonetheless pertinent to make a link back to the discussion on the fragility of film material, based on the example of the *BiographScope*. Once film stock ceases to be an industrial product, apart from the examples of DIY laboratories and experiments with handmade film emulsions—which will at least preserve the original practices of film duplication and processing—installations such as the *BiographScope* can also demonstrate alternative future approaches for engaging with film material and its hybridities, based on digital and/or AI tools, that simulate historical engagement with film material.

To conclude, while debates surrounding the digitization of film archives tended to be shaped by an analogue/digital dichotomy ten years ago, debate

increasingly centres on digitization as a process of datafication, not only of film artefacts, but also film-related materials, metadata, collection access and curation. This development has highlighted and brought to the fore how archival technologies and collections are embedded within specific knowledge regimes, hierarchies, legacies and genealogies, which require critical reflection to be able to sustain a more diverse set of perspectives. In turn, datafication can also drive new material engagements with films, as a way to respond to and highlight film's obsolescence. In this respect, we have discussed a few possible approaches and first critical steps that have been taken towards challenging both knowledge hierarchies and legacies of digital film collections: there remains, of course, much more work to be done.

PART 2: LABORATORIES

36 |

While we have touched upon the phenomenon of the artist-run film laboratory extensively above, and also more indirectly that of the digital heritage laboratory in our discussion of eM+, we find it crucial to also zoom out and look at the notion of laboratory in a broader sense. In order to contribute to a revised and expanded discussion of this notion, we need to ask how it has been changing and what new configurations have emerged. And, in order to contrast the point in time of the present chapter with the definition offered in 2016 and trace changes, it is instructive to first go back and look at how the previous Introduction discussed and defined this term.⁴⁰

The definition of a laboratory the authors offered in 2016 was expressly linked to a collaboration between two institutions based in The Netherlands driven by a shared pedagogical ambition, namely the Film Archive of the University of Groningen and the Eye Filmmuseum. Sharing a wish to integrate perspectives on film materiality in research and education premised in key tenets of media archaeology, they advanced the idea of “the archive as a *research laboratory*, that is, a place that allows for hands-on research on its objects and enables us to study the materiality of the medium.”⁴¹ This model of “laboratory” as an inter- and transdisciplinary collaborative effort was stimulated through conferences, research events and publications.

Yet, as we have seen above, and as other chapters in this volume testify, engagements with the material history of film, its apparatuses and the research dispositifs within which such engagements take place have been flourishing across a highly varied range of sites in recent years: from DIY artist-run labs, community-led online video annotation platforms, state-of-the-art labs for digital heritage and museology, to initiatives such as Colorado University’s Media Archaeology Lab founded by Lori Emerson in 2009, as

discussed in Annie van den Oever's chapter. To these examples, one may add digital humanities labs, which have become significant sites for reimagining the study of archival films and their circulation, drawing on long-standing scholarly traditions as well as experimental artistic practice-based research.⁴² Likewise, as has become increasingly clear in recent years, digitization work, film-centred digital heritage and humanities projects, and hands-on engagements are far from limited to established research institutions and archives in the West, which has been the primary regional focus when previously defining the laboratory. They also emerge in the context of community spaces, global online collaborations or meetings, "accidental archives," and alternative venues, as well as initiatives in the Global South.⁴³ In this respect, an expanded and more inclusive discussion of what can constitute an archival research laboratory is needed.

Complementing Van den Oever's chapter and expanding on the discussion of artist-run-labs above, we wish to extend the scope of what we consider a laboratory to include broader initiatives outside "traditional" institutions in often less formalised formats, which foster archival-academic collaboration and (hands-on) research, drawing from very different disciplines, backgrounds and expertise, as well as different cultural, economic and geographic contexts. In doing so, we do not aim to be exhaustive but rather to reorient the discussion on laboratories as we think, and hope, it will continue to take shape in the next decade, based on our own projects and initiatives in the past years. In the spirit of the original intention for this volume, we focus on a more global approach to the idea of the laboratory as an inter- and transdisciplinary collaborative effort. A global approach to the topic informed by post-colonial perspectives was one of the main starting points laid down by the editors when preparing the Call for Proposals for this volume, expressing the ambition to map recent transformations in the thinking and practices surrounding apparatus collections—across collecting, curating, archiving, exhibiting, research and teaching—bringing to the surface under-studied topics and questions.⁴⁴

| 37

Global Collaborations as a Research Laboratory

Building on the mission statement expressed by Fossati in 2021, the 7th Eye International Conference, organised by Eye Filmmuseum, the University of Amsterdam, and the Association of Moving Image Archivists (AMIA) in 2022, focused on the theme *Global Audiovisual Archiving: Exchange of Knowledge and Practices* (GAVA).⁴⁵ This choice was driven by a strong need to break down geographical, cultural, institutional and economic barriers within our field—especially in the face of rising nationalisms and the growing economic and

technological divide between richer and poorer countries. The conference also responded to an increasing demand within our communities of film archivists and scholars to create a platform for long-term North–South knowledge exchange and dialogue, and to foster the sharing of practices between audiovisual scholars and archivists from all regions.⁴⁶

The first GAVA edition was supported by an extensive Advisory Board, which today includes around 20 archivists and scholars active across the globe. Following the success of the 2022 conference, the Advisory Board decided to remain in place as an informal network, with the aim of organising a travelling biennial conference and related initiatives. These efforts are intended to address gaps in the broader audiovisual archival landscape by operating within and across multiple existing networks—complementing rather than duplicating current initiatives and building meaningful connections. Among others, the aim of the GAVA network is to build on important projects such

38 | as the Audiovisual Preservation Exchange (APEX) promoted by New York University; the collaboration between the University of Jos, the Nigerian Film Corporation, the Goethe University, the Deutsches Filminstitut & Filmmuseum, Arsenal–Institute for Film and Video Art, and, more broadly, the African Film Heritage Project, a partnership between the Pan African Federation of Filmmakers (FEPACI), the Film Foundation, and UNESCO. GAVA also builds on the *After the Archive* symposia organised by Arsenal in 2021 and 2023, and the recent FIAF Congress held at the Thai Film Archive in April 2023, which focused on film archives in the Global South. Another key source of inspiration is the *Archive/Counter-Archive* project, a groundbreaking initiative that links academic research with archival and artistic practices by minoritised and racialised communities.⁴⁷ This project was the lead partner in the second GAVA Conference, hosted by TIFF Lightbox in 2024.

In the same spirit, the 2023 open-access publication *Accidental Archivism*, edited by Stefanie Schulte Strathaus and Vinzenz Hediger, brought together more than 50 authors to offer programmatic statements and proposals exploring an artistic space between archiving and activism.⁴⁸ While the alternative or counter-archival practices reflected in these initiatives are not new—consider, for instance, the work of Caroline Frick, who in 2011 questioned the traditional role of institutional audiovisual archives in Europe and North America from a heritage studies perspective—they have never before been so central to discourses on media heritage in both academic and professional spheres.⁴⁹ This direction signals a potentially transformative shift in future research on film dispositifs that have long been structured around the logic of national cinema, and may give rise to fundamentally global theoretical frameworks for discussing film practices. Elsewhere in this volume, such emerging frameworks are reflected in Carolina Cappa and Isabel Wschebor’s and Rafael de

Luna Freire's chapters, among others. We want to add two recent initiatives to the perspectives discussed in those chapters—the Cimatheque in Egypt and Ajabu Ajabu in Tanzania—that may be taken to further exemplify current developments and future paths and are instantiations of how global networks may also foster new types of laboratories.

In several respects, the Cimatheque—Alternative Film Centre based in Cairo, Egypt, can be said to resonate with the approaches proposed by Cappa and Wschebor. Cimatheque was presented at the first GAVA conference in 2022, and is described on its website as: “A multi-purpose space that offers facilities, training and programming for the independent filmmaking community, [...] but also a moving image archive open to researchers and the public, a Super 8mm and 16mm analog film lab equipped with a full set of analog tools and equipment for filming, developing, and editing, a unique multi-format film scanner.”⁵⁰

As a collective archive, laboratory and expertise centre, focusing on Egyptian, Arab and international alternative cinema history, Cimatheque engages with archiving, preservation and restoration in a way that differs markedly from larger, institutional FIAF archives. It represents the growth of novel (counter) archival forms—especially collective and grassroots ones—which are influencing the reassessment of institutional practices and contributing to theoretical reflections on participation and representation, by questioning whose heritage is preserved and presented by heritage institutions. In addition to their growing visibility at international archiving conferences, a clear indication of their influence is Cimatheque's recent inclusion as an associate member of FIAF—one of the first collective archives to join this traditionally institutional network.⁵¹

Cimatheque is a collaborative laboratory on many different levels: it brings together artists and film professionals to print, process, digitize and digitally edit films, functioning as a DIY and artist laboratory; it digitizes and digitally restores archival films, functioning as an archival laboratory; it brings together makers, archivists and scholars in exchanging knowledge and practice. The latter happens at their recurrent events but also in the context of training initiatives such as their recent *Remastered* programme.⁵²

Another example of collaborative effort that brings together very different expertise and backgrounds, all focusing on the film dispositif, is the collective Ajabu Ajabu (Swahili for “peculiar”), based in Dar es Salaam, Tanzania. We highlight it here not only as an example of a laboratory but also as a case of a “future archive,” based on shared and participatory practice, and as a cinematic dispositif that draws on traditions of film-as-performance and travelling cinema, and promotes a more collaborative, bottom-up approach to preservation and activation of archival and contemporary films.

Ajabu Ajabu supports film culture and African film heritage by collabo-

rating with DJs who reinterpret old films and screen them for local communities. They also produce films and facilitate discussions about film heritage in Tanzania. A central part of their work is a critique of the power imbalances embedded in global cinema culture, encouraging open, inclusive reinterpretations of films according to their evolving cultural relevance. One of their notable projects is the re-interpretation and re-release of the 2001 Tanzanian film *Maangamizi: The Ancient One*. Despite international acclaim, the film had remained virtually unseen in Tanzania and Africa—a situation that, as we know, is all too common for works of African cinematic heritage. Ajabu Ajabu collaborated with local “pirate” distribution networks and cinemas to bring the film back to Tanzanian audiences. This included working with DJ Black, a local film translator who recontextualised the film in a format more familiar to local viewers. The filmmakers welcomed and applauded the initiative. As expressed by Ajabu Ajabu on their website: “This collaboration has led towards collective thinking processes around a reimagining of the act of preservation along modes of non-hierarchical access.”⁵³

While such projects reflect vital approaches to reorienting discussions surrounding film archiving beyond traditional institutional contexts and laboratory infrastructure, and in turn changing them within established organisational frameworks such as FIAF, much work still remains to be done. This volume can be taken as a case in point. As mentioned above, it was intended to include a more global approach than its 2016 predecessor. However, including projects and voices from outside Europe and North America remains a challenge. While pleased to include several contributions from Latin America and Africa, in a volume of 25 contributions, the continuing predominance of contributions from the Global North shows how much work still remains to turn the ambition of global exchange into practice.⁵⁴ In hindsight, the typical approach of circulating a Call for Proposal through institutional and personal contacts proved to be an insufficient strategy for reaching beyond existing networks of knowledge, and a much more proactive approach is needed. This could entail working with a broader and more geographically spread editorial team or advisory board, facilitating multi-lingualism and not assuming English-language publishing is possible or acceptable for all potential contributors, or a multi-format approach that includes conversations and/or audiovisual essays to guarantee a more inclusive final result.

That said, in the last decade, during the GAVA conferences and other events discussed above, numerous highly relevant and promising projects have been presented from beyond the traditional Western community. They deserve greater attention in future film (archival) research, especially those that address historical and possible future dispositifs, to facilitate long-term and sustainable growth of laboratories as global networks of exchange of

knowledge and practice. Acknowledging the need for more work, continuing on this future-oriented note, we want to make a transition into our final section that addresses how, in addition to exploring new avenues of digitization and global collaboration in laboratory networks, a significant shift in how to think about the future of film archives since the 2016 Introduction to *Exposing the Film Apparatus* is also taking place.

PART 3: FILM ARCHIVING FUTURES

Drawing on a variety of media archaeological perspectives, the 2016 Introduction mapped how engagements with media technologies in academic and archival settings could contribute to excavating forgotten futures, to critically interrogate contemporary narratives of media history and configurations, with an emphasis on how media were once imagined and experienced, as well as the paths not taken. In this regard, the piece also hinted at a knowledge gap and new directions by asking: “[t]oday, much is known about the interaction of past audiences with new media, but what about future media experiences and insights?” While media archaeology’s excavations of forgotten media imaginaries and genealogies have occasionally intersected with future-oriented literary genres such as science fiction, steam- or cyberpunk—as in the case of Bruce Sterling’s *Dead Media* project or Jussi Parikka’s writings, for instance—one may say that it has primarily focused on understanding contemporary mediascapes’ configuration through past media, rather than thinking about possible future media configurations.⁵⁵

| 41

In the time that has passed, this question has become increasingly urgent and has emerged as a central starting point for archives and cultural heritage institutions to respond to pressing crises—ecological, political, financial—and for imagining better future engagements and developments of technology. One can point to a plethora of cultural heritage projects in recent years that take a future-oriented perspective, by engaging with different types of futurisms, and referring to “futures” in the plural.⁵⁶ Of projects we are involved in, we could pick out the seminar and lecture series *Decolonial Futures of Audiovisual Archives and Archiving* (2024–2025), held at Eye Filmmuseum and carried out in the context of the University of Amsterdam’s *Decolonial Futures* research priority area; or the ongoing project *Archival Landscapes of AI: Challenging Extractive AI Practices with Moving Image Art Installations* (2025–2027), which seeks to engage digitized collections in imagining more sustainable uses of AI, while highlighting environmental histories through archival film.⁵⁷ Likewise, Sarah Kenderdine’s recent exhibition project *Geneva Public Portal to Anticipation* for the Swiss pavilion at the Osaka World Expo 2025 relies on gen-

erative AI to create near-future speculative fictions, working with a timeframe of 5, 10, and 25 years, with images that enable visitors to explore and reflect on future scenarios for science, education and art, among other domains.⁵⁸ In doing so, her exhibition seeks to challenge technological determinism and empower visitors to shape future developments through critical reflection and imagination.

These examples demonstrate a current shift away from the many pathways opened by media archaeology to engage with and re-activate archived media apparatuses in collections as a basis for understanding primarily contemporary media configurations, to instead project such inquiry on to the future. Yet, while projecting its temporal scope differently, future-oriented approaches share with media archaeology the feature of not producing linear or teleological accounts of media histories with clear end points. To quote Caitlin DeSilvey, Simon Naylor and Colin Sackett's concise definition of futurology

42 | in the context of environmental heritage studies: "[f]uturology isn't about the long-range weather forecast. It's more like archaeology, excavating the future, dusting off different signals and imagining possibilities which explain what we're finding."⁵⁹ Instead of reporting on media developments to come and predicting trends, such approaches speculate and work creatively with scenarios that may not become real, but can highlight dystopian or utopian accounts of the future, for instance, as a basis for discussion and reflections on contemporary conditions.

To a large extent, the emergence of future-oriented approaches in cultural heritage institutions has been driven by an impetus to counter a generalised sentiment of "lost futures," which has propelled the writings of such cultural and music critics as Mark Fisher and Simon Reynolds in their variations on Jacques Derrida's concept of *hauntology*. At its core, as Reynolds points out, this notion takes its cue from the observation that contemporary electronic and popular music, instead of developing rapidly as in the 1980s and 1990s, has become obsessed with the past and synonymous with a cultural "retroscape" that seeks to reproduce and refine past decades' expression in a nostalgic mode.⁶⁰ Invoking Svetlana Boym's classic distinction between restorative and reflective nostalgia, Reynolds reminds us how nostalgic engagements with the past often oscillate between a longing for retrieving a unified past, which is often underpinned by nationalist ideals, and an idiosyncratic type of nostalgia that accepts loss as a precondition for experiencing time and history, while not necessarily projecting a future.⁶¹ Along a similar line of argument, Fisher extends this to Western societies more broadly to diagnose mainstream leftist politics as having become incapable of imagining post-capitalist futures beyond the neoliberal politics that emerged in the late 1970s. Modernist ideals, in Fisher's view, have been reduced to "frozen aesthetic style," which

no longer holds potential for subversion or points to future alternatives.⁶² In recent years, as Grafton Tanner has highlighted, nostalgia increasingly feeds into the organisation of social media platforms and the ways in which vast amounts of historical materials circulate online and become embedded in the experiential modes of platforms. As Tanner contends, this has engendered a “futurelessness” that, in the worst-case scenario, weaponises media heritage at the service of the agendas of alt-right and populist movements.⁶³

To bring this perspective back to the field of audiovisual archiving and preservation, as Marije Miedema, Susan Aasman, Anne Beaulieu and Sabrina Sauer remind us, drawing on Derrida’s well-known writings on archives, “[t]he archive is also a potential resource for liveable futures, as a source of experience, and as a repository for possible forms of social organizations.”⁶⁴ In the context of archival projects, such developments raise the question of how moving image archives can shape the process of creating archival technologies and infrastructures to more critical ends. This may involve bringing the field of film archiving into dialogue with genres and creative strategies that have traditionally not been part of mainstream preservation discourse, such as science fiction, speculative design and future-scenarios thinking. These genres share the feature of affording a great deal of freedom in exploring possible avenues for archiving and preservation through artistic strategies of futurescaping (rather than retroscaping), stimulating debate and discussion, while leaving room for a great deal of uncertainty. In debt to artistic currents such as SciArt, device art or culture jamming, this approach can involve subverting the purpose of commercial technologies or imagining new apparatuses, often of an experimental nature, without the ambition of putting these into commercial production, in order to probe, among others, ethical, legal and social issues of archiving technologies.⁶⁵ Going beyond primarily object-centred (read film-centric) accounts of film archiving and restoration, such scenarios give agency to machines, environmental factors and other non- or more-than-human actors as key in determining the future course of film archiving, prompting us to reimagine our interaction with technology in archival settings. With an eye to engaging with such approaches to a greater extent, key questions that emerge would be how moving image archives can position themselves to engage with speculative design and fiction and future-oriented approaches informed by media archaeology, and, by the same token, reconceptualise moving image archives as sites for imagining alternative futures.

While not working within an explicitly stated mode of speculative fiction and design when conceived, a number of projects we were involved in, carried out in collaboration with Eye Filmmuseum, may retrospectively be posited as falling into such categories. The short film *Alien Visions* (2020), developed in the context of the SEMIA project by artist-duo Bram Loogman and Pablo

Nuñez, could be seen as a speculative fiction on the role of datafication, data enrichments and machine vision in the film archive. Using the data enrichments developed in the SEMIA project, the makers created, in their own words, a film

about the mysteries of sense-making, about how machines are capable to create [sic] logical patterns that are impossible for humans to understand. In other words, trying to understand a machine can be literally like trying to understand an alien from a distant planet. And then we thought: what if we were the machine and the human was the alien? That was the experiment.⁶⁶

Challenging the persistent analogy between the human brain's classification and computer vision's pattern detection, the short film reverses this analogy's logic by embedding SEMIA's data enrichments in a short science-fiction narrative, where the enrichments are seen entirely as a result of human association. Centring on a human/alien locked in an isolation room after being caught in space by machines, a machine voice, present throughout the film as an acousmêtre, explains how the isolation room's setting allows for pacifying the alien and scanning its "deep mind." Alternating between shots from the room where we see different parts of the alien's body being scanned, which involves the projection of archival films onto its body, and clips from Polygoon newsreels retrieved on the basis of similarities in shape, the film's structure suggests that we move between the external clinical setting of the lab and the alien's mind, which is probing fleeting clips of propaganda, fascist parading and industry. In this way, the clips we are shown as part of the human/alien's deep mind appear internalised and arranged in an order that is logical to the human/alien, but completely foreign to the machine.

While on the one hand, the film stages a literal, and in many respects traditional, opposition between human interpretation and machine vision, the film's sci-fi concept of film archiving is also articulated through what is not explained, explicitly stated, or implied by the film's temporal setting. The future depicted in the film is not only one in which humans have achieved the capability to travel to corners of outer space that we do not (yet) know of—such as planet 2GR and star system 3KM67S, which are the spatial coordinates the film provides—the setting also seems to imply a future when DNA storage has become a fully developed technique of film archiving. After all, the archive scanned and probed by the film's machine is not one of a brick-and-mortar institution in a classic sense, but a human body. Seen from this perspective, the film can be taken to raise questions not only about future storage technologies but also how the body may become entangled with the archive as an

ideological apparatus and system of surveillance. As Mél Hogan has highlighted, it may come to be seen, along with other black-boxed “communication apparatuses” and “infrastructures,” as “spectres,” “aliens” or “digital ghosts,” with the potentially dark consequences coming with such systems.⁶⁷

The Loogman-Palma artist-duo has pursued a similar line of inquiry in other recent projects. Their Jan Bot project, an algorithmic bot with a dedicated website that created approximately 25,000 remix films based on Eye Film-museum’s *Bits & Pieces* collection, analysed and linked to trending topics over a period of seven years, can be read about in Palma’s chapter in this book.⁶⁸ In a spinoff of this project, the duo took their artistic reflection further to comprise NFT-based art when ending the project in 2023. In a dramatic gesture, which involved erasing almost all the films produced, a tiny fraction were preserved and launched as limited NFT editions during an official “funeral” for Jan Bot at Eye’s collection centre.⁶⁹ In exploring the format of the NFT edition for archival remixes, the project was a response to the (then arguably stronger) fad for cryptoart, which also hinted at subversions of blockchain technologies—a technology whose emergence is tightly interwoven with libertarian and extreme-right movements—as a means of preservation and value creation at an intersection of moving image archiving, media art, and digital preservation.⁷⁰ Operating in a nearer future than their *Alien Visions*, the project can be said to have anticipated the renewed prominence of discussions surrounding artificial intelligence, creativity and value, by deliberately creating scarcity and uniqueness out of a collection that had in the first place proffered a witty dadaist commentary on the abundance of digital images and the circulation of historical material online. As digital preservation, also of audiovisual archives, is beginning to take an interest in blockchain technologies, among others for authentication and digital rights management, the questions provoked by such future-oriented, speculative artistic interventions become all the more pertinent to contemporary discussions.

| 45

CONCLUSION

Tying the different threads of this chapter together, we want to highlight how the future-oriented question raised in 2016 and addressed in our last section, may have become the most salient challenge to keep in mind for (at least) the next ten years to come. While, as we have argued here, our aim is not to predict where things will stand in another decade, we firmly believe that the ambition to imagine a (better) future by engaging with creative approaches is one that film preservationists and scholars should not shy away from as a way to respond to current challenges and impending crises because of a fear of not

offering immediate and concrete solutions. Many changes that have occurred in the past years were impossible to predict: the resilience of DIY-run labs and their increased organisation in international networks, and crucial contribution to current media studies debates; the emergence and momentum of global audiovisual exchanges and collaboration in archival practices and research; and the reemergence of artificial intelligence—arguably a term still largely considered retrofuturist in 2016 by many—as a key site for radically reimagining archival access and preservation. These developments testify to a dynamic and lively field undergoing visible growth, alongside rapid changes in expertise and alliances between knowledge fields. In this respect, the future-oriented approach we suggest is not one that may deliver immediate solutions but rather one in which, to quote Anthony Dunne and Fiona Raby, “reality will become more malleable and, although the future cannot be predicted [...] can help set in place today factors that will increase the probability

46 | of more desirable futures happening.”⁷¹ In encouraging film archivists and scholars to imagine future scenarios, we see speculation, scenarios-thinking and “what if”-questions as offering ways to transcend the current boundaries of our field and productively address current challenges. Driven by new collaborations and (creative) alliances, we can go beyond the institutional contexts that have traditionally anchored definitions of the film archive as a research laboratory.

NOTES

- 1 Giovanna Fossati and Annie van den Oever, "Introduction," in *Exposing the Film Apparatus: The Film Archive as a Research Laboratory* (Amsterdam: Amsterdam University Press, 2016), 13–42.
- 2 José van Dijk, "Foreword," in *The Datafied Society: Studying Culture Through Data* (Amsterdam: Amsterdam University Press, 2017), 11.
- 3 Fossati and Van den Oever, "Introduction," 27.
- 4 Nicolas Rey, "Expanding Film Communities," *REMI* 1, no. 1 (2017): 19.
- 5 Kristin L. Dowell, "Lindsay McIntyre: Indigenous Handmade Cinema," *JCMS* 62, no. 2 (Winter 2023): 183–188, and Erin Weisgerber, Paper Presentation at the FIAF Congress in Montréal, 27 April–2 May 2025.
- 6 Scott MacKenzie and Janine Marchessault, "Introduction," in *Process Cinema: Handmade Film in the Digital Age* (Montreal: McGill-Queen's University Press, 2019), 16. See also <https://re-mi.mire-exp.org/>.
- 7 Ibid., 3.
- 8 Leenke Ripmeester, "The Erasure of Analog Film Projection," in *Exposing the Film Apparatus: The Film Archive as a Research Laboratory*, eds. Fossati and Van den Oever (Amsterdam: Amsterdam University Press, 2016), 65–73.
- 9 Frank Kessler and Sabine Lenk, "Digital Cinema or What Happens to the *Dispositif*?" in *Exposing the Film Apparatus: The Film Archive as a Research Laboratory*, eds. Fossati and Van den Oever (Amsterdam: Amsterdam University Press, 2016), 301–310, and Giovanna Fossati, *From Grain to Pixel: The Archival Life of Film in Transition* (Amsterdam: Amsterdam University Press, 2018), 41–45.
- 10 Dashiell Bennet, "Kodak Files for Bankruptcy," *The Atlantic* (19 January 2012), <https://www.theatlantic.com/business/archive/2012/01/kodak-files-bankruptcy/332934/>.
- 11 Fossati, *From Grain to Pixel*, 41–45.
- 12 See <https://variety.com/2019/film/festivals/italys-limmagine-ritrovata-expected-take-over-frances-eclair-cinema-1203372619/>, and https://screenanarchy.com/2015/06/limmagine-ritrovata-asia-opens-in-hong-kong-gallery.html?utm_source=chatgpt.com.
- 13 For a more complete overview of currently operating photochemical laboratories, see the lists maintained by the FIAF Technical Commission and by the University of Indiana: <https://www.fiafnet.org/filmlabslist>, and <https://collections.libraries.indiana.edu/IULMIA/exhibits/show/film-lab-list/comprehensive-list-of-film-lab>.
- 14 Chris Gehman, "Toward Artisanal Cinema: A Filmmakers' Movement," in *Process Cinema: Handmade Film in the Digital Age*, eds. Scott MacKenzie and Janine Marchessault (Montréal: McGill-Queen's University Press, 2019), 172.

15 Rossella Catanese and Jussi Parikka, “Handmade Films and Artist-Run Labs: The Chemical Sites of Film’s Counterculture,” *NECSUS European—Journal of Media Studies* 7, no. 2 (2018): 57.

16 İşil Karataş, “Sonorous Materiality of Analogue Film,” *NECSUS—European Journal of Media Studies* 11, no. 2 (2022): 69–93.

17 Karel Doing, *Ruins and Resilience: The Longevity of Experimental Film* (London: Goldsmiths Press, 2024), 3.

18 These standards are at times questioned in terms of their sustainability and inclusivity. Typically set by Western industry and archival perspectives, such high standards can deepen the divide between well-resourced institutional or commercial archives and those in politically or economically unstable regions, as well as non-institutional (counter)archives. This issue is addressed in Giovanna Fossati, “For a Global Approach to Audiovisual Heritage: A Plea for North/South Exchange in Research and Practice,” *NECSUS—European Journal of Media Studies* 10, no. 2 (2021): 127–133; Carolina Cappa, “Sur, paredón y después. La conferencia internacional Eye 2022,” *Journal of Film Preservation*, no. 107 (2022): 29–35, and Caroline Cappa and Isabel Wschebor, “The LAPA Scanner and the Possibilities for Sovereign Film Preservation,” in this volume, page 239.

19 For instance, in a Dutch context, the expertise of Filmwerkplaats has directly fed into the project CRAFTED, funded by the Dutch National Research Agenda’s Arts route. See <https://artistcommunityknowledge.org/Crafted-page.html>.

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21 Fossati, *From Grain to Pixel*, 332–336.

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| 51

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54 | of *Visualizing Film History: Film Archives and Digital Scholarship* (Indiana University Press, 2025).

CHAPTER 2

On Teaching Media in the Apparatus Archive, Hands-On

ANNIE VAN DEN OEVER

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| 55

ABSTRACT

In line with the call on film museums to use their archives as research laboratories in *Exposing the Film Apparatus* (2016), this chapter discusses new developments since, among them: radical media archaeology (Ernst, Emerson) and the “materiality of media” (Kittler); and the effects of the exposure to the smartphone as a black-boxed *cinematic* apparatus, which allows its users a closer and more physical relationship with the technological devices for filmmaking than ever before in history (Odin). This begs the question whether this omnipresent device that asks to be handled and touched has inspired new directions in archival and curatorial practices and media archaeology. This underlying assumption forms the heart of a hands-on workshop with students in a post-apartheid setting.

KEYWORDS

Apparatus collections; materiality of media; (radical and experimental) media archaeology; sensorial approaches to past media; the smartphone

INTRODUCTION

When Giovanna Fossati and I prepared *Exposing the Film Apparatus* and called on film museums and archives to open their vaults, to turn them into research laboratories, and to put their apparatus collections in the hands of film and media scholars to expose them to the material and technical properties of media, we were inspired by our own collections of apparatuses and certain developments that helped us focus on them more closely.¹ One such development

56 | was media archaeology, a field closely associated with the latest developments in the media landscape, vividly branching off into new directions at the time. Other developments were in early cinema studies; inspiring archaeologies of early projection practices; the use of magic lanterns, tripods and the hand cranks by the projectionist, and the position of the spectators in so-called early “film shows” in terms of their historical *dispositif*.²

Early cinema scholars’ excavations of the historical responses to early film screenings from the 1980s onwards have changed the field. The name they coined for it, New Film History, marks a shift in paradigm that matters to this day. However, early cinema researchers paid relatively little attention to the archaeologies of apparatuses at the time, and the focus on building collections of film apparatuses is of a later date, as is the close collaboration between the archivists and curators of apparatus collections and film scholars (many of them media archaeologists).³ Although it is something of an understatement to say that the ur-father of media archaeology, Siegfried Kittler, was not really interested in film or the cinema, many film scholars were nonetheless attracted to his idea of the *materiality* of the media and in media archaeology (or in the archaeologies of media). His Foucault-inspired reflections of the 1980s and 1990s rubbed off on film scholars, including some of the relatively small group of early cinema historians who drove the paradigm shift initiated at the FIAF conference in 1978.⁴

Today, the study of so-called historical film apparatuses in museums, universities and private collections—though partly inspired by Foucault and Kittler—is, by and large, different in focus, priorities and approach. Increasingly, well-curated apparatus collections drive the archival research. They allow hands-on work with the devices as *material* objects and invite technical, sensorial and performative probing. Although Kittler certainly inspired

some of this in a number of researchers, to many more film scholars Laurent Mannoni's seminal study *The Great Art of Light and Shadow: Archaeology of the Cinema* has been a lasting source of inspiration.⁵ Mannoni wrote *The Great Art* at the Cinémathèque française, using its extraordinary apparatus collection, and he helped to strengthen the collaborations between film scholars and film museums. His archive-driven and curatorial approach to the historical devices at his disposal—as *material* objects with a distinct sensorial presence and a *performative* potential that expressed itself in a range of historical practices of use for scientific and entertainment purposes—is revered as a model for film curators, as a 2025 interview with him confirms.⁶

This chapter, then, will look into newer developments with the aim of exploring where they may take us in film and media research and education. Its special focus is on the most recent developments related to apparatus collections being used in (academic) teaching, hands-on, in a “lab” context.⁷ Because Kittler's notion of the “materiality of media” had a notable impact on film studies as it refocused on studying apparatuses, this chapter opens with a consideration of his outspoken reflections on “materiality.” In this context, I question the materiality of the smartphone as a *cinematic* device, which deserves a place in an apparatus collection in a film museum because it turned its users into filmmakers, editors, archivists and curators almost overnight, as the French filmmaker and semio-pragmatist Roger Odin argues in the opening chapter of *Exposing the Film Apparatus* in 2016.⁸

| 57

The question today is whether this (now omnipresent) individualised apparatus with a considerable cultural impact made a difference to our field of studies. It is an at once typically digital-era black-boxed technology (a mini-computer, if you will) that does not allow insight into its inner workings, yet at the same time its material properties seem designed to make this device overtly present in our lives, functionally as well as sensorially. Questions to be asked in this chapter are: Is the smartphone designed to have a pronounced presence to the senses, to be hand-held, and to be carried on the body? Did its sensorial omnipresence rub off on the activities of curators, researchers and educationalists? Did it perhaps work as a catalyst behind some of the newer directions under discussion here, geared to the tactile, sensorial and experiential dimensions of media use? To explore these questions, I devoted a hands-on workshop to the smartphone's actual material and sensorial presence today: it is part of the explorations of newer developments undertaken in this chapter. The point of focus here is a workshop with design students and colleagues from the University of Johannesburg, in the spaces where they keep their apparatus collection—the studio, the gallery, the classroom. The observations of this workshop form the heart of this chapter, and they will be followed only by an Epilogue, devoted to the question of where this type

of lab-like work on apparatuses can take film and media research and education.

THE MATERIALITY OF MEDIA

Friedrich Kittler famously postulated the *materiality of media* as a key point in the study of media and his reflections on it have visibly born fruit. However, we must ask ourselves today what Kittler's proposition to focus on the "materiality of media" actually meant to him. Two long-term insiders, Geoffrey Winthrop-Young and Bernhard Siegert, while warning readers that Kittler has always been a *provocateur*, recently argued that his emphasis on the materiality of media is pivotal to his rejection of the Enlightenment thinking underpinning the Humanities in the 1980s. It may be hard to grasp for current-day readers, then, that to Kittler materiality points to "that which has no meaning," and that precisely this total *lack of meaning* is "the most important definition of what *materiality* means for Kittler," as Winthrop-Young and Siegert have observed.⁹

When Kittler started his fight against Enlightenment ideas, it was a different era altogether, and he was, by and large, battling other forces than media archaeologists today. It may also be worth mentioning that his fight "against interpretation" was different from Susan Sontag's in the 1960s, if only because she pleaded against an overfocus on meaning and argued for the study of the sensorial and evocative qualities of the arts. Hence her famous dictum in *Against Interpretation* that "[i]n place of a hermeneutics we need an erotics of art."¹⁰ Kittler, on the other hand, pleaded for the study of the materiality of the media by speaking elaborately about the hardware of the computer, the typewriter, the gramophone and film—that is, by speaking about the sheer *materiality* of the meaning-making systems that he was repulsed by. The *anti-humanist* point he wanted to drive home was that *humans* only played a very small part (and far smaller than the name Humanities suggests) in what he alternatively called the discourse systems, the sense-making systems, the "sense-making machines," and these "sense-making dispositifs or apparatuses," because their "materialities" (or hardware) are all the more powerful exactly because they are merely machines without any meaning of themselves. As Bernhard Siegert put it, "the transcendental signified, the origin of all meaning, has a place in the empirical, *material* world."¹¹

The term materiality itself, then, is an important one in Kittler's system of thinking, and it certainly has had an impact on the study of media as apparatuses. Yet we must consider today that its meaning is at once underdetermined and overdetermined in his thinking. "The materiality of media" is oversigni-

fied in the attack on the Humanities as the meaning-making practice Kittler loathed and rejected. But at the same time, “materiality” is underdeveloped conceptually and philosophically and, seen from an archival or curatorial standpoint, it is certainly not particularly deep or refined. Nevertheless, as a provocateur, Kittler was effective: he drew attention to the material existence of media apparatuses such as typewriters, gramophones and film, which have been collected, preserved, curated, exhibited and studied ever since.¹² Furthermore, Kittler (more than Foucault who was his main source of inspiration) did inspire an epistemological and critical approach to media in what we now call *media studies* (a term Kittler was not sure he liked) and *media archaeology* (yet another term Kittler was not sure he liked).¹³ The Humanities have changed since Kittler’s interventions in the 1980s and 1990s, as has the media landscape itself, and his provocation lost its grip on the imagination of media scholars: the brand of (classical) media archaeology that he had inspired branched off in a number of new directions.¹⁴

| 59

APPARATUS COLLECTIONS AND THE RADICAL ‘SCREWDRIVER’ ARCHAEOLOGIES

The meaning of the term *apparatus* as used by Kittler (and Foucault, for that matter) is different from the use of this term by so many archivists and curators in the fields of film and (new) media today. Kittler’s use of the term was inspired by Foucault’s *Archaeology of Knowledge*, as is so much else in his work. In what Kittler called the *sense-making dispositifs or apparatuses*, there is the resonance of Foucault’s notion of the (state) apparatus as an ideological apparatus. However, by adding the dimension of hardware, Kittler framed the focus of media archaeology. Neither Kittler nor Foucault had the cinema or visual media in mind as a prioritised object of study, and Kittler was keenly aware of Foucault’s lack of interest in it. Remarkably, at some point Kittler reproached his intellectual father Foucault for his lack of engagement with the so-called technical media *outside of the written media*. He deemed it a limitation that Foucault’s analyses “while based entirely on the written archive stored in libraries and other repositories, [...] do not acknowledge that writing is just one technical medium amongst others.”¹⁵ Kittler felt that he himself had to *add* the missing reflections on the *other* technical media, because, as he wrote in 1999, (Foucault’s brand of) “[d]iscourse analysis cannot be applied to sound archives or towers of film rolls.”¹⁶

In addition, Kittler (in contrast to Foucault) was also keenly aware of the aura of the apparatuses in the Media Archaeological Fundus at Humboldt University in Berlin. In his view, such a collection of technical devices added an “auratic” element to his provocation of the Humanities.

Wolfgang Ernst, as Kittler's successor at Humboldt University, is an example of a self-named *radical* media archaeologist with a focus on the materiality of the media in Kittler's sense. Ernst famously and provocatively starts many of his research seminars with a screwdriver in his hand for the study of the hardware steering the digital era—that is, with old computers, which are taken apart and studied. Ernst described his radicality in 2017 in *NECSUS* as a turn away from nostalgia for older media and towards a Kantian sense of archaeology as making “explicit the deep principles of knowledge.”¹⁷ Lori Emerson is another radical with a lab of her own at the University of Colorado Boulder. There she keeps a collection of computers that she approaches similarly and equally radically with a screwdriver in her hand as part of the newer “situated practices” in media research and education, to which she and her co-authors devoted *The Lab Book*.¹⁸

60 | The drive, approach and terminology of “radicals” such as Ernst and Emerson is somewhat different, it seems to me, from those of film archivists and curators who take the basic cinematic apparatus as a point of departure for their study of the materiality of media. More often than not, the latter use the term *apparatus* (as in “apparatus collection”) as a synonym for *device* or *technology* or what Jean-Louis Baudry more exclusively called *l'appareil de base*, referring to the basic apparatus used for shooting and projection film—the camera, the projector, the screen, and so on. He used the term *basic apparatus* in opposition to the *ideological apparatus* he deemed pivotal to the cinema *dispositif*, which he was analysing in the seminal study on which so-called apparatus theory is built.¹⁹ The basic apparatus forms the material basis for making and projecting film and as such it is archived, preserved, exhibited and researched by film heritage institutions today, as by universities, for that matter.²⁰ Together with the material traces left over by *historical* film spectators (as opposed to the hypothetical spectator in Baudry's apparatus theory), they are key to most archivists and curators today.²¹ This is exactly the background against which Roger Odin spoke about the *actual* use of the smartphone as a *cinematic* device in 2013.²² More than any other device, the smartphone transformed our relationship to cinema, making it more physical and intimate than ever before in film history, because, as Odin argued, we can now all make, edit and distribute films, simply because most of us carry with us this extraordinary invention, in which the integration of the film apparatus and moving image archive is realised.²³

In hindsight, there is a remarkable simultaneity between the emergence of the smartphone as a cinematic device and the new curatorial practices affecting media research and education in a notable way. It begs the question whether the phone has been a catalyst behind some recent changes in collection, preservation and presentation practices and policies—the collection and

cataloguing of *apparatuses* for their own sake; curating them in a manner that caters to the hand rather than only the eye, the way the smartphone does; and putting such collections at the disposal of researchers and students who were not even allowed to *touch* them before. The potential merits of such new developments for education and research will be explored and discussed in the next sections.

ON THE RE-SENSITISATION TO THE MATERIAL, SENSORIAL AND TACTILE PROPERTIES OF PAST MEDIA. A WORKSHOP

The point of focus of the particular workshop I am discussing, then, was to undertake a small experiment with the smartphone, hands-on, to see how students handle it and how they respond to its material and sensorial properties.

My assumption was that habituation, in the process of routine use, would have smoothed out initial sensorial effects, but that these can actually be brought back into play, and that “the cycle of wonder” can be reversed, as Tom Gunning argued in his “Re-Newing Old Technologies.”²⁴ By re-sensitisation, I mean that the habituation effects that make a user *overlook* the material and sensorial properties of the hardware can be diminished by a hands-on exploration of the device, encouraging the sensorial reappropriation of the medium.²⁵

For this purpose, I designed a hands-on, low-key experiment,²⁶ which did not include a *technical* or *operational* exploration of the smartphone as described by Tim van der Heijden and Aleksander Kolkowski in 2023.²⁷ The experiment was designed to observe the phone’s actual material and sensorial presence today, in the hands of students who use them routinely. The mobile (feature, flip, smart) phone’s popularity on the African continent is vast as the statistics confirm.²⁸ The experiment I initiated was included in an exhibition at the University of Johannesburg (UJ), and was part of a teaching programme founded by Landi Raubenheimer and Bongani J. Khoza, who discuss it in depth in their chapter in this book. The question driving the experiment was: what role can phones play in re-sensitising students to the material, sensorial and tactile properties of past media? The experiment was only the first part of the workshop. It prepared the students for the material, sensorial and technical exploration of a number of historical photo cameras in the UJ collection, among them the Polaroid ZIP Land Camera, the Kodak Instant Camera Colorburst 250, and the Kodak EK2 Instant Camera. Included in the workshop were also some found “vintage” family photo albums and photos made with the Fujifilm Instax Mini 12, a reissued instant photo camera. Making and exhibiting these photos was part of the UJ exhibition *In Black and White: The FADA Photo Booth* (see fig. 2).

IN BLACK & WHITE

THE FADA PHOTO BOOTH

CURATED BY: Dr. Landi Raubenheimer & Bongani J. Khoza

10 APR - 24 MAY | 17:30 for 18:00



CREDIT: Tshiamo Kallelo Tsosie - 2024

The gallery is transformed into a creative space where students and visitors can experience the 'instant past' through hands-on experiments with nostalgic technologies and devices.

Iconic black and white photographs by
Ruth Seopeedi Motau
Santu Mofokeng
Andile Bhala
Lebohang Kganyi
Sabelo Mlangeni
will be on display
alongside media
objects from the
EMA Archive's
collection.



EMA
STUDIO



FIGURE 2
In Black and White: the FADA Photo Booth. Poster. 2025
(Courtesy of Landi Raubenheimer and Bongani J. Khoza). ↵

At the very beginning of the workshop, I announced to the students that we were going to explore a number of analogue instant photo cameras *with our five senses*, which I had simply written on a piece of paper and held up in the air; SEE FEEL HEAR TOUCH TASTE. For the duration of the experiment, all of us were standing, and able to move around freely.

I then invited the students to take the cover (if any) of their own phone and explore it with their hands, *with their eyes closed*, if they preferred, and to share their observations with their peers. The observations, as I will point out below, were made by either (one of the) students or me, mostly during the workshop, some afterwards.

BLACK-BOXED DEVICES

The smartphone as an emblem of the recent digital era came to us (in the 2010s) as a technology that is a typical digital-era black-boxed minicomputer that does not allow insight in its inner workings. Yet, at the same time, quite paradoxically, it is a device, as the students observed, that seems to be *designed* to have a pronounced presence to the senses, regardless: its “black box” fits the hand and is a sheer pleasure to touch. It seems designed to be overtly present in our lives, functionally as well as sensorially. And it begs the question of whether its considerable cultural impact was partly induced by its sensorial presence.

SMOOTH AS THE SKIN OF A BABY

Its “skin” is as smooth as a baby’s, as one student observed, and it is a pleasure to repeatedly touch it, even caress it, and bend over it as one does with a baby (see fig. 3).

Similarly, they observed that these phones seem designed to be carried on the body: they are light and tiny, and their size caters to the hand. All these

| 63

FIGURE 3
Student holding and touching her phone. Photo: Surprise Nkomo.
(Courtesy of Landi Raubenheimer and Bongani J. Khoza). ↴



features not only tend to lower any barriers to the use of the device but also support its routine use.

The perhaps most pivotal observation made by the students during the workshop was the way some of them held the phone in their hand and *held their phone close* in a way they recognised and acknowledged meant something to them. The gesture suggests that the phone's presence is precious to them, that they care for it and want to hold on to it and protect it against loss. This (more broadly) begs the question whether the urge to *hold on to the device, to touch it, reflect on it, and keep it*—all the things archivists and curators do too—is perhaps somewhat overlooked as an urge that *drives* archival research and invites touching the devices in archive-driven education the way these students were doing. Clearly, all of this comes so easily to them, as they pointed out themselves during this workshop. It was also obvious that the students were easily and effectively re-sensitised to their phones almost instantly, and

64 | that they readily observed and commented on their phone's material properties and the effect on their experience. They had a similar response to the analogue instant photo cameras and vintage photos, including observations concerning the other four senses too. There were some particularly striking results regarding *tasting* one of the cameras in the workshop, but I have no place for a full analysis here.

One remarkable moment from a later part of the workshop that needs to be part of this discussion concerns the pseudo-vintage instant photos made

FIGURE 4

Student holding a photo as something precious.

Photo: Surprise Nkomo. (Courtesy of Landi Raubenheimer and Bongani J. Khoza) ↵



by one of the re-issued photo cameras. As one of the students noticed, a peer held on to a photo the way others held on to their phones, that is, as something fragile and precious (see fig. 4).

The group also confirmed the similarity in “feel” between their phones, the pseudo-vintage photos made with re-issued cameras, and the (rare) vintage photos found in the family albums kept in the UJ collection. As they observed, all are remarkably similar in that they are hand-size and thus cater to the hand and to touch: all of them have skins as smooth as a baby’s as well. Being design students, they immediately discussed the question of whether these objects might in fact have been *designed to hold on to and care for* as if they are the cherished family members who are present rather than represented on our phones and our photos—as if, as André Bazin wrote in “Ontology of the Photographic Image,” their “bodily appearance” is snatched “from the flow of time” to provide a “defense against the passage of time.”²⁹ In other words, these images respond to this “basic psychological need” (Bazin).³⁰ And the *materialities* of these images—be it photo paper or a phone’s glass-coated transparent screen made of indium tin oxide—cater to this need *in the same way*, by offering a smooth, hand-size surface to hold on to.

A last remark on smoothness, from a media archaeological point of view: so many older black-boxed screen devices have remarkably smooth “skins” too, among them the early (consumer-used) television sets of the 1950s, with smooth and precious, French-polished wooden exteriors, in addition to their screens made of lead glass or a barium-strontium glass, which initially were only about the size of a hand, that is, between the size of phones and tablets today. Pivotal, though, in terms of size and scale, such a screen size allows the human face (from chin to fringe) to be shown in close-up, near to real-life size. In short, such screens facilitate the naturalisation or familiarisation of the mediated human face.³¹ As such, television and phone screens not only lowered the barriers to daily use, but they also brought a closer and more physical relationship to the filmic image and to film history than ever before.³²

| 65

ANALOGUE NOSTALGIA

In their chapter in this book, Landi Raubenheimer and Bongani J. Khoza discuss a number of other dimensions of black-and-white photography and the so-called black-and-white aesthetic within the context of analogue nostalgia, among them the holding on to the self-same aesthetic features that today evoke, one might even say represent, the revolutionary ethos of the anti-apartheid era.³³ More generally, a nostalgia for analogue media has been noticed at the moment of wide-spread digitization in the 2000s, giving the “old-fash-

ioned” film cameras and projectors and editing tables a new “allure,”³⁴ at the very moment of their disappearance—paralleling the cinema’s “death” at the moment of the emergence of the “on demand” and streaming services.³⁵ Looking back on the workshop now, it seems to me that holding on to past media is indeed a major thing for so many media scholars, and that it is no coincidence that the sudden allure of a medium as an object of study surfaces at the very moment of its disappearance (or the disappearance of an era). The urge to “stay in touch” with it can be understood as *nostalgic*, what Laura Marks called “analogue nostalgia.” It is the technical term now more widely used to describe how *digital* media (such as the re-issued photo cameras which are part of the UJ apparatus collection) can be used to imitate the characteristics of analogue photo cameras, specifically by mimicking what Marks called the “medium-specific noise” found in analogue formats like vinyl and film.

66 |

THE MATERIAL TURN

Looking beyond this workshop, the “material turn” is a wider phenomenon across the humanities over the past two decades. This tendency was already evident when *Exposing the Film Apparatus* was written, and it remains the key context for understanding how film digitization has promoted a “longing for the experience of the materiality of the medium,” rather than for its virtual representation.³⁶ It seems obvious in retrospect that the digital era somehow *revitalised* the interest in and a sensitivity to the past—analogue—media. Film reels, cameras and projectors re-emerged in archives and museums as special objects of interest to curators and scholars alike—if only to hold on to an era that seemed to be vanishing. Today it is also clear that the material turn is a response to the increasing sense of immateriality cultivated by *black-boxed* digital media. Whereas the famous screwdriver, then, exemplified a radical attack on the industry-induced notion of the immateriality of generative and other media by opening the black boxes and laying bare their inner workings, the experimental method is meant to re-sensitise researchers to the material and sensorial dimensions of these supposedly immaterial media—and to put the questions concerning their materiality on top of the research agenda.

THE MEDIA SCHOLAR’S MADELEINES

The students’ observations during the workshop also begged the question whether past and disappearing media function as *madeleines* for media scholars in search of lost times. The sense of loss of a medium’s cultural impact

seems as real as the loss of the objects themselves, and they are indeed being studied as part of the experience of their disappearance. As a case in point: look at our interest in the smartphone at the very moment that generative technologies are changing the media landscape and our experience of it. Famously, both Baudrillard (in *Forget Foucault*) and Kittler (in *Gramophone, Film, Typewriter*) have observed that Foucault's *Archaeology of Power* was not only entirely based on the written archive, but was written at the exact moment writing was losing its privileged position as a medium,³⁷ at the exact moment it was being replaced by the audiovisual media.³⁸ This undoubtedly limited the explanatory potential of Foucault's theory, as Friedrich Kittler pointedly wrote in 1999: to reiterate, “[d]iscourse analysis cannot be applied to sound archives or towers of film rolls.”³⁹

EPILOGUE

| 67

In 2011, Vivian Sobchack spoke of media archaeologists' “almost fetishistic interest in the ‘presence’ of otherwise neglected objects.” She identifies their “insistence” on engaging with “the things themselves” as a constructive and productive activity because it comes with a “major challenge” to the “disciplined disciplines” of “history, film and media studies, and cultural studies,” that is, to their “epistemic norms and established values.”⁴⁰ Sobchack made the notion of “presence” stand out with quotation marks. Remarkable here is her sensitivity as a phenomenologist to the media archaeological interest in objects offering an experience of “presence.” To Hans Ulrich Gumbrecht, this is a crucial sensitivity to these objects as *tangible* and *notable* in their impact on our senses, our bodies, our experiences.⁴¹ In line with such a sensitivity, Sobchack explicitly pleads for the act of “closely looking at and, when possible, touching, operating, and performing the object of study.”⁴² I contend that, in hindsight, the emergence of the experiential and sensorial approaches to media apparatuses in museums and universities was far more closely associated with the emergence of the smartphone than many of us realised at the time. In addition, it seems likely that it inspired some of the new directions media archaeology has taken more recently.⁴³

Looking back, smartphones seem designed, materially, as objects to be constantly present to our senses, particularly touch, as we hold them in our hands. The one discussed by Odin in 2016 weighed less than 7 oz (200 g) and measured less than 5 x 2.5 inches (13 x 7 cm).⁴⁴ It is the size of a hand, and it is marketed as a hand-held device. Regardless of the exact model we are talking about, smartphones have a distinct sensorial presence, inviting us to handle and touch them. These are the very qualities that seem to have rubbed off on

archival and curatorial practices and policies in the last decade. Film curators, now convinced that the smartphone is indeed a *cinematic* apparatus that belongs in the film archive, have included the smartphone in their exhibitions in prominent ways.⁴⁵ Equally important to many film curators must have been the smartphone's impact on the senses and particularly the way this device caters to the hand and typically invites the repetitive touching suggestive of a certain tactile pleasure (the last not discussed by Odin at the time, but by Wanda Strauven).⁴⁶ However, from a curatorial point of view, *touching* goes against the *do-not-touch*-policy that is part and parcel of the ethos of archivists responsible for unique and precious objects in museums.⁴⁷ In contrast to this, in *Vesper Flights*, natural history curator Helen MacDonald makes a comparison with visitors to a cabinet of wonders, who were encouraged to "pick up and handle the objects [...]; feel their textures, their weights, their particular strangenesses," and that "[n]othing was kept behind glass, as in a modern museum or gallery."⁴⁸ In retrospect, the smartphone seems to have helped (some) film museums to let go of the *do-not-touch*-policy, inviting tinkering with historical apparatuses as with smartphones (or with replicas) in ways that are beneficial for film and media research and education. As Odin wrote, "Examples of this kind of approach are now growing in number." Clearly, the "educational value is obvious—the motivation afforded by the aim of sharing encourages students to acquire full mastery of their subject."⁴⁹

For their input in this chapter, I cordially thank Wanda Strauven, Sanna McGregor, Landi Raubenheimer, Bongani J. Khoza, and the UJ students who took part in the FADA workshop.

NOTES

- 1 Giovanna Fossati and Annie van den Oever, eds., *Exposing the Film Apparatus: The Film Archive as a Research Laboratory* (Amsterdam: Amsterdam University Press, 2016), 13–42.
- 2 See our reflections on early cinema as a source of inspiration in the Introduction to *Exposing the Film Apparatus*.
- 3 On the relation between film studies and media archaeology, see Wanda Strauven, “Media Archaeology: Where Film History, Media Art, and New Media (Can) Meet,” in *Preserving and Exhibiting Media Art: Challenges and Perspectives*, eds. Julia Noordegraaf, Coseetta G. Saba, Barbara Le Maître, and Vinzenz Hediger (Amsterdam: Amsterdam University Press, 2013), 59–79. <https://www.jstor.org/stable/j.ctt6wp6f3.7>.
- 4 That emblematic conference brought about a new “focus on the archival treasures to (re)write film history” through increased dialogues between archivists, theorists and historians, which ultimately led to a “New Film History” (Fossati and Van den Oever, *Exposing the Film Apparatus*, 27). For a recent reflection on early cinema’s archaeologies and the closer collaboration between film scholars and archivists, see Malte Hagener and Annie van den Oever, “The Past Is Always Changing: An Interview with Tom Gunning,” *NECSUS* (Autumn 2022), <https://necsus-ejms.org/the-past-is-always-changing-an-interview-with-tom-gunning/>.
- 5 Laurent Mannoni, *The Great Art of Light and Shadow: Archaeology of the Cinema* (Exeter: University of Exeter Press, 2000).
- 6 See Victor Flores and Beatriz Saraiva, “Curating Moving Images: Laurent Mannoni on His Archaeology of the Cinema,” *International Journal on Stereo & Immersive Media* 8, no. 1 (2025): 20–33. <https://doi.org/10.60543/ijsim.v8i1.10015>.
- 7 Lab is a term used here in the sense of *Exposing the Film Apparatus*, where we proposed to reframe the archive as a research laboratory, that is, a “place that allows hands-on research on its objects and enables us to study the materiality of the medium, the specific formats used, its experiential impact, and its discursive context. The ‘laboratory’ is a place where old media can be tested and where historical practices of use can be taken into consideration by simulating them in order to study effects as part of research” (Fossati and Van den Oever, *Exposing the Film Apparatus*, 24–25). A wide spectrum of meanings of the term have been discussed by Darren Wershler, Lori Emerson, and Jussi Parikka, *The Lab Book: Situated Practices in Media Studies* (Minneapolis, MN: University of Minnesota Press, 2022).
- 8 See Roger Odin, “Cinema in My Pocket,” in Fossati and Van den Oever, *Exposing the Film Apparatus*, 45–54. For an in-depth reflection on the emergence of the term “smartphone,” see Wanda Strauven, “Coming to Terms with the ‘Smart’ Phone,” *Technics: Media in the Digital Age*, eds. Nicholas Baer and Annie van den

Oever (Amsterdam: Amsterdam University Press, 2024): 201–220. Though “cell phone” is the term used by Odin, for reasons of simplicity, I will settle on the more popular “smartphone” for the rest of this chapter.

9 I am drawing from a recent interview by Geoffrey Winthrop-Young, “Material World: An Interview with Bernhard Siegert,” *Artforum* 53, no. 10 (Summer 2015): 324–333,

<https://www.artforum.com/features/material-world-an-interview-with-bernhard-siegert-224303/>.

I also returned to “Rethinking the Materiality of Technical Media,” my dialogue on Kittler with Winthrop-Young published in *Technè/Technology: Researching Cinema and Media Technologies—Their Development, Use, and Impact*, ed. Annie van den Oever (Amsterdam: Amsterdam University Press, 2014), 219–239. See also the dialogue between Ranjodh Singh Dhaliwal and Bernhard Siegert, “Knowing, Studying, Writing: A Conversation on History, Practice, and Other Doings with

70 | Technics,” In *Technics: Media in the Digital Age*, edited by Nicholas Baer and Annie van den Oever (Amsterdam: Amsterdam University Press, 2024), 125–152.

10 Susan Sontag, *Against Interpretation and Other Essays* (New York: Dell Publishing, 1964), 14.

11 I am drawing here from the recent dialogue between Siegert and Winthrop-Young, as its 2023 perspective is so helpful for this retrospective assessment of Kittler’s key term. See Winthrop-Young, “Material World: An Interview with Bernhard Siegert,” *Artforum* 53, no. 10 (Summer 2015): 324–333.

12 Kittler’s apparatus collection, kept at Humboldt University in Berlin, has functioned as a model for several later collectors of digital devices, as presented in Wershler, Emerson and Parikka, *The Lab Book*. Apparatus collections in film archives mostly spring from donations from filmmakers, as a byproduct of their filmic legacy. See Fossati and Van den Oever, *Exposing the Film Apparatus*, 25–28.

13 On Kittler’s terminological affinities and aversions, see Geoffrey Winthrop-Young, *Kittler and the Media* (Cambridge: Polity, 2011) and Erkki Huhtamo, “Media Studies as an ‘Archaeology’: Elements of Genealogy,” *Early Popular Visual Culture* 18, no. 4 (1 October 2020): 340–367.

14 About the newest developments in this field, see Erkki Huhtamo and Doron Galili, “The Pasts and Prospects of Media Archaeology,” *Early Popular Visual Culture* 18, no. 4 (1 October 2020): 333–339,
<https://doi.org/10.1080/17460654.2021.2016195>.

15 For further discussions of this point, see Nele Wynants, ed., *Media Archaeology and Intermedial Performance: Deep Time of the Theatre* (Cham: Palgrave Macmillan, 2019), 17, note 4, <https://doi.org/10.1007/978-3-319-99576-2>. See also Michael Goddard, “Opening up the Black Boxes: Media Archaeology, ‘Anarchaeology’ and Media Materiality,” *New Media and Society* 17, no. 11 (2015): 1761–1766,
<https://doi.org/10.1177/1461444814532193>.

16 Friedrich Kittler, *Gramophone, Film, Typewriter* [1986], trans. Geoffrey Winthrop-Young and Michael Wutz (Stanford, CA: Stanford University Press, 1999), 5.

17 Ernst, quoted in Elodie A. Roy, “For a Radical Media Archaeology: A Conversation with Wolfgang Ernst,” *NECSUS* (Spring 2017), <https://necsus-ejms.org/for-a-radical-media-archaeology-a-conversation-with-wolfgang-ernst/>.

18 For more on her work, see Wershler, Emerson and Parikka, *The Lab Book*; and Emerson’s website and blog: <https://loriemerson.net/>.

19 See Jean-Louis Baudry, “Le Dispositif [the apparatus]: Approches Métapsychologiques de l’impression de La Réalité,” in *Communications* 23 (1975): 56–72, and Fossati and Van den Oever, *Exposing the Film Apparatus*, 14–15.

20 Ibid., 25–28.

21 On historically and empirically oriented audience research, see Ian Christie, ed., *Audiences* (Amsterdam: Amsterdam University Press, 2012).

22 Odin presented this argument for the first time at the 2013 symposium The Film Archive as a Research Laboratory (Groningen, 15 February 2013), which formed the basis for Fossati and Van den Oever, *Exposing the Film Apparatus*.

23 Odin, “Cinema in My Pocket.”

24 See Tom Gunning on “cycles of wonder” in “Re-Newing Old Technologies: Astonishment, Second Nature, and the Uncanny in Technology from the Previous Turn-of-the-Century,” in *Rethinking Media Change: The Aesthetics of Transition*, eds. David Thorburn and Henry Jenkins, 39–59 (Cambridge, MA: MIT Press, 2003). See also the early plea by Andreas Fickers and me to “resensitise” the researcher to the material and sensorial properties of (past) media in “Experimental Media Archaeology: A Plea for New Directions,” in *Technè/Technology*, ed. Annie van den Oever (Amsterdam: Amsterdam University Press, 2014), 272–278, <https://doi.org/10.1515/9789048519903>.

25 See Andreas Fickers and Annie van den Oever, “(De)Habitation Histories: How to Re-Sensitize Media Historians,” in *Hands on Media History: A New Methodology in the Humanities and Social Sciences*, eds. Nick Hall and John Ellis (London: Routledge, 2019), 58–75.

26 The term experiment has been used in experimental media archaeology in a programmatic sense, as by groups of avant-garde artists—as exhibited again only recently in Tate Modern’s 2025 exhibition “Electric Dreams.” See the exhibition guide: Tate Modern, “Electric Dreams: Art and Technology before the Internet,” Tate.org.uk, 2025, <https://www.tate.org.uk/whats-on/tate-modern/electric-dreams/exhibition-guide>. See also Andreas Fickers and Annie van den Oever, *Doing Experimental Media Archaeology: Theory* (Berlin: De Gruyter Oldenbourg, 2022), 68–72, <https://doi.org/10.1515/9783110799774>.

27 Tim van der Heijden and Aleksander Kolkowski, *Doing Experimental Media Archaeology: Practice* (Berlin: De Gruyter Oldenbourg, 2023).
<https://www.degruyterbrill.com/document/doi/10.1515/9783110799767/html>.

28 For phone use in sub-Saharan Africa as analysed by Isaac M. Mbiti, see Mbiti, “Mobile Phones and Economic Development in Africa,” CGD Working Paper 211 (Washington, DC: Center for Global Development, 2010), <http://www.cgdev.org/content/publications/detail/1424175>.

29 André Bazin, “Ontology of the Photographic Image,” trans. Hugh Gray, *Film Quarterly* 13, no. 4 (1 July 1960): 4.

30 Ibid.

31 See my “The Aesthetics and Viewing Regimes of Cinema and Television, and Their Dialectics,” in *Audiences: Defining and Researching Screen Entertainment Reception*, ed. Ian Christie (Amsterdam: Amsterdam University Press, 2012), 113–128.

72 | 32 The last part of the argument is drawing on Odin, “Cinema in My Pocket,” 49–52.

33 See also the long reflection on analogue (media) nostalgia by Landi Raubenheimer, *District 9: Johannesburg as Nostalgic Dystopia*, Series: Contemporary Cinema, vol. 10 (Leiden: Brill, 2025).

34 For more on digitization in the field of film, see Giovanna Fossati, *From Grain to Pixel: The Archival Life of Film in Transition* (Amsterdam: Amsterdam University Press, 2018). <https://doi.org/10.2307/j.ctv8bt181>. For more on the particularities of obsolescence’s “allure,” see the work of Liri Chapelan in this volume, and in Chapelan, “VCR, VHS, and RCP: Reflexive (N)ostalgia in Gabriel Achim’s Visul lui Adalbert,” *Artifact & Apparatus: Journal of Media Archaeology* 1 (Fall 2021): 81–96.

35 See also André Gaudreault, “The Future History of a Vanishing Medium,” in *Technè/Technology*, ed. Annie van den Oever (Amsterdam: Amsterdam University Press, 2014), 261–272.

36 See Mitchell, referenced in Fossati and Van den Oever, *Exposing the Film Apparatus*, 28.

37 Writing is a technical medium too, as Kittler would say; it is a *cultural technique*, as Bernhard Siegert would say.

38 I am drawing from here from some observations made by Goddard, “Opening up the Black Boxes.”

39 Kittler, *Gramophone, Film, Typewriter*, 5, my italics.

40 Sobchack, “Afterword. Media Archaeology and Re-Presencing the Past,” in *Media Archaeology: Approaches, Applications, and Implications*, eds. Erkki Huhtamo and Jussi Parikka (Berkeley, CA: University of California Press, 2011), 326–328.

41 See Hans Ulrich Gumbrecht, *Production of Presence: What Meaning Cannot Convey* (Redwood City, CA: Stanford University Press, 2003).

42 Sobchack, “Afterword,” 327.

43 See Huhtamo and Galili, “The Pasts and Prospects of Media Archaeology.”

44 Odin, "Cinema in My Pocket," 47.

45 Among those exhibiting the smartphone as a cinematic device was Giovanna Fossati, who, as Head Curator of EYE Filmmuseum, decided to include it in their Basement exhibition in the mid-2010s.

46 This argument is not focused on functionality, but on sensorial pleasures. These sensorial pleasures emerged before touching the touchscreen was integrated in its *functional use* by the touchscreen interface that replaced the phones with buttons (such as the Blackberry). See also Wanda Strauven, *Touchscreen Archaeology: Tracing Histories of Hands-On Media Practices* (Lüneburg: meson press, 2021), and her 2014 Kracauer lecture at Goethe University, devoted to "The iTouch Generation: Some Thoughts on the Neo-Spectators of Relocated Cinema" (recording: <https://www.kracauer-lectures.de/en/sommer-2014/wanda-struven/>). Strauven systematically reflected upon the nature of what she labels the *sensual involvement with the touchscreen*, also by using experiments with students (and children) as a tool for thinking. That her *Touchscreen Archaeology* resonated with other film scholars was confirmed with the 2022 Limina Award Best International Film Studies Book.

47 See Wanda Strauven, "7. The Observer's Dilemma: To Touch or Not to Touch," in *Media Archaeology: Approaches, Applications, and Implications*, eds. Erkki Huhtamo and Jussi Parikka (Berkeley, CA: University of California Press, 2011), <https://doi.org/10.1525/9780520948518-009>.

48 Helen MacDonald, *Vesper Flights: New and Collected Essays* (London: Jonathan Cape, 2020), vii. For a full discussion of such a change in the curatorial setup of apparatus collections, see Fickers and Van den Oever, *Doing Experimental Media Archaeology: Theory*, 1–11.

49 Odin, "Cinema in My Pocket," 51.

| 73

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PART I

SMALL AND PORTABLE

Camera Obscura

TOM GUNNING

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| 79

ABSTRACT

The camera obscura consists of an enclosed darkened space with a pinhole aperture that allows a beam of light to enter that converts illuminated scenes, including its colours and movement, outside the camera obscura into an image that it projects onto a surface within. This essay describes the device's history, both as important in the development of painting and photography, but also as a form of visual entertainment. Its role as a powerful metaphor for vision, consciousness and ideology is detailed. The camera obscura's effects of wonder are described as a primary aspect of the device.

KEYWORDS

Optics; camera; photography; painting; ideology; vision



FIGURE 5

Camera obscura.

CAMERA OBSCURA

As a device, the camera obscura is remarkably simple. An optical apparatus, rather than a mechanical one, it consists of an enclosed compartment—the chamber or *camera*, which can be as small as a handheld box or as large as a room. A small aperture is opened at one end through which light, usually exterior daylight, enters. This narrow beam of light, filtered by passing through the small aperture, enters the darkened chamber and projects an image onto a surface opposite it. The image borne by the light paints a picture of illuminated objects located outside the chamber onto a surface within it. Due to the optical effect of the rays of light crossing as they pass through the aperture, this image appears inverted on the surface opposite. The aperture can be fitted with a lens to increase brightness and focus, and sometimes a mirror is used to “correct” the inverted image through reflection. The surface receiving the image can be whitened, or otherwise treated, to increase the brightness of the image.

| 81

THEORETICAL FRAMEWORK

This chapter describes the history of the camera obscura, both as important in the development of painting and photography, and also as a form of visual entertainment, capturing images with vivid colour and movement. Painters used this image to depict proper perspective and achieve greater accuracy. Photography developed chemical means of fixing the image it created. Its role as a powerful metaphor for vision, consciousness and ideology is also explored. Johannes Kepler used it as a way to radically re-describe vision; Rene Descartes used it to understand the relation between consciousness and the world; for Karl Marx the camera obscura imaged ideology’s inverted relation to reality. As important as these crucial approaches to the device have been, their great influence threatens to replace or obscure the primal experience of the camera obscura itself: its creation of an image produced by an existing environment and the sense of wonder that this image generates. Contemporary artists continue to utilise camera obscura images, and digital photography extends the device’s ability to retrieve information outside the frame of an image.

A DEVICE OF WONDER: IMAGES FORMED BY LIGHT ITSELF

The visual effect created by a camera obscura is so simple that it is sometimes encountered accidentally. A brief sequence in Andrei Tarkovsky's 1966 film *Andrei Rublev* stages one such discovery, as a monk sees an upside-down image of men on horseback riding outside cast onto a monastery wall from a hole in a window covering. Small windows in darkened rooms, or a suddenly opened door in a movie theatre before a film is screened, often cast an image from a sunlit exterior onto interior surfaces. Seeing such a virtual appearance creates an experience of surprise or wonder and has at points even been taken for a supernatural event.

The camera obscura can truly be called a device of wonder. It reveals a fact not often recognised by common perception: that the light that renders the things around us visible also carries images reflected from these surrounding

82 | objects. The camera obscura with its small aperture filters out the multiplicity of reflected images that light carries and allows a single image to be visibly cast on a surface. As Antonio Torralba and William T. Freeman put it:

Light rays yielding images of the world do land on surfaces and then reflect back to our eyes. But there are too many of them and they all wash out to the ambient illumination we observe in a room or outdoors. Of course, if one restricts the set of light rays falling on a surface, we can reveal some particular one of the images.¹

Reflected from the world, light broadcasts an unending stream of images, which the camera obscura strains, like an optical sieve, down to a single image, which can then be caught on a surface sheltered in darkness. This filtered play of light creates the image that the camera obscura displays.

In this short chapter I will deal with the way this device played an essential role in both the technical development of a variety of media—most obviously stylistic changes in painting and the development of photography. Parallel to this aesthetic and technical history, the camera obscura has supplied metaphors of key importance in a variety of fields: as a model for optical vision (Kepler); as a way to understand perception's relation to consciousness (Descartes); and as a way to conceive the role of ideology in philosophy, economics and politics (Marx). As important as these crucial approaches to the device have been, their great influence threatens to replace or obscure the primal experience of the camera obscura itself: its creation of an image produced by an existing environment and the sense of wonder that this image generates.

The Latin term *camera obscura* translates literally as “dark room.” The term conveys the essential relation the device creates between light and dark-

ness—of the exterior world and the inside of the chamber. The aperture provides the optical connection between bright exterior scenes and the darkened space containing the surface onto which their image is cast. This describes the technical optics of the camera obscura but cannot express the wonder it creates for the beholder, the pure astonishment at seeing an image that seems to magically transform the world into a moving image in full colour, accurate in every detail. Something of this experience is conveyed in a fictional description from Mary Swan's 2008 novel *The Boys in the Trees*, of students seeing an improvised camera obscura their teacher has created in their classroom:

[...] she'd draped a black cloth right over the only window. She told them to stand on that side, facing the opposite whitewashed wall, to stand still, let their eyes get used to the murky light, and look straight at the wall [...] Something square and beside it a shape in the softest green, still shimmering but coming clearer as he looked [...] *One clue*, Miss Alice said. *It's upside down.*

| 83

One clue was enough, and Easton blinked and knew it. *A tree*, he said, *it's a tree upside down* and he knew it so surely that he couldn't believe that just a moment before he hadn't.

[...] she told them that the light of day bounced around in a jumble, colors flying here and there and all mixed up [...] She showed them a hole she had made in the black cloth, explained that when the sunlight could only come in that one hole, it meant that only a bit of color could get through [...]²

The role of the camera obscura in the history of painting has often been acknowledged, both in the demonstration of perspective and its use by painters to perfect accurate visual rendering. Painter David Hockney has argued that the camera obscura was instrumental in a fundamental transformation—the greater naturalism of depiction around 1420 to 1430 in Flanders. Hockney and other art historians, such as Philip Stedman, have demonstrated the camera obscura's use by Dutch painters such as Vermeer.³ The role of the device as the optical basis of photography is inscribed in the very term “camera.” Photography can be described as the chemical means of fixing and preserving the image which the camera obscura creates.⁴ Yet these broad acknowledgements of its historical and technical role may have eclipsed our familiarity with the device itself, which could be experienced in many parks and amusement centres throughout the nineteenth century. I have found that creating a camera obscura in the classroom, or demonstrating it to fellow scholars, still produces a sense almost of disbelief (and of fascination) in the image's visual acuity. A full understanding of the camera obscura's history relies on rekindling this fundamental sense of wonder.

The camera obscura seems to suck an image of the world through its tiny opening and cast this light-formed image into interior darkness to shine there vividly. Crucially, the camera obscura image possesses not only colour, but life and movement, an aspect lost sight of when the camera obscura is viewed merely as a stage in the perfection of the static image of realist painting or photography. The acuity of most camera obscura images surpasses any other image pictured on a material base, due to its vibrant colour, not dependent on dyes or electronic impulses; its optically produced detail; and its lively motion. This vividness and movement produce an image that, properly seen, exceeds even photographic or cinematic images in realism. If photography and cinema, as Andre Bazin and Roland Barthes have claimed, exceed the ontology of all other images, this link to an existing reality derives from the automatically formed camera obscura image.⁵

84 |

HISTORY OF THE DEVICE

Technology and nature meet in the camera obscura. The image it creates demonstrates the optical laws of light, confounding drawing a hard line between technics and nature. Its intentional invention emerges from processes of accidental discovery. At what point did people deliberately construct a technical apparatus to produce a camera obscura image? Aristotle mentions the effect of light passing through an aperture, although he adds no discussion of a darkened chamber. There are indications of such devices in Chinese optics and more certainly in Arab culture of the tenth and eleventh centuries. Al-Kindi and Alhazen (Ibn Al-Haytham), bold theorists of optical phenomenon, both described aspects of the camera obscura and may have used the device for astronomical observation.⁶ Alhazen was especially detailed in his description and Martine Bubb asks if he should not be considered its inventor.⁷ Roger Bacon and John Peckham, English theorists of optics, described the camera obscura in the thirteenth century for the purpose of viewing eclipses.

As Bubb points out, the early uses of the camera obscura for astronomical observation were not primarily concerned with projecting an image.⁸ This spectacular use of the device became more frequent in the sixteenth century when the camera obscura became a form of entertainment and forged a connection with magic shows. This magical aspect of the camera obscura, immediately palpable when viewed, has been somewhat eclipsed by its metaphorical use in philosophy and its genealogical role in the arts of image-making. But it would be a grave mistake to minimise the importance of magical entertainment and even outright deception the camera obscura's role in developing a culture of the virtual image.⁹ Giambattista della Porta in the second edition of his work

Natural Magic (published in 1589) described the creation of an optical illusion and spectacle through a camera obscura. Quoting a 1658 English translation:

[...] in a dark chamber by white sheets objected, one may see as clearly and perspicuously, as if they were before his eyes, Huntings, Banquets, Armies of Enemies, Plays and all things else that one desireth. [...] I have often shewed this kind of Spectacle to my friends, who much admired it, and took pleasure to see such a deceit; and I could hardly by natural reason, and reasons from the Opticks remove them from their opinion, when I had discovered the secret.¹⁰

Della Porta's description conveys two aspects key to the reception of the camera obscura. First, its illusionary power, capturing the view so accurately that it seems to be actually present; secondly, its role as a deception, a trick, whose attraction persists even when the optical principles have been explained.

The camera obscura's accurate reproduction, especially of motion, caused fascination and wonder, even for those who understood how it was generated. The great historian of the invention of cinema and related devices, Laurent Mannoni, quotes the Jesuit Jean Leurechon's reaction to the device in the seventeenth century:

| 85

Above all, there is pleasure in seeing the *movement* of birds, men and other animals and the shaking of the plants in the wind [...] This beautiful painting, in addition to its being disposed in perspective, innocently represents that which the painter has never been able to place in his picture, namely *continuous movement* from place to place.¹¹

This observation compares the camera obscura image to the painter's art; the device demonstrated the truth of painting's use of perspective but exceeded painting's possibilities by capturing motion. Accounts of the camera obscura by art historians have noted the first aspect (and sometimes neglected the second). Philip Steadman and David Hockney have argued (and I believe proved) not only that the camera obscura served as an important tool for artists from the seventeenth century on, but played a key role in their stylistics (with Vermeer's paintings providing the clearest example).¹² But the waving of plants in the wind, described by Leurechon, highlights the unique depiction of aleatory motion that this device passed on to cinema (film's ability to capture "the ripple of the leaves stirred by the wind," as Siegfried Kracauer's discussion in his *Theory of Film* reveals).¹³ This manifold nature of the perceptual richness of the moving image, while commonly acknowledged, depends on a direct experience of viewing to renew its effect of wonder.

CAMERA OBSCURA AS METAPHOR: VISION, CONSCIOUSNESS, IDEOLOGY

In the sixteenth century, experiencing the camera obscura fundamentally transformed theories of human vision. Risking oversimplification, we could state that, since the Greeks, two primary theories of human vision had contended for primacy. These were *extramission*, which claimed that a ray of vision emerged from the eye in order to capture objects of sight, and *intromission*, which claimed that sight depended on rays of vision coming from the objects to the human perceiver.¹⁴ Both theories posited tiny images, often called *species*, which moved through the air between the objects in the world and the eye to create vision. In the early seventeenth century, Johannes Kepler, after witnessing Tycho Brahe's use of the camera obscura to observe eclipses, abolished this discourse of the transmission of tiny simulacra by theorising that the human eye, in fact, operated like a camera obscura.¹⁵ This insight

86 | had been anticipated by Leonardo and by Della Porta, but Kepler detailed the way the eye's physiology resembled a camera obscura with the small pupillary aperture of the lens of the eye allowing light rays to enter the enclosed eye and the retina to receive the rays as a projected image upon it (rather than being formed on the surface of the eye as previously held).¹⁶ In Kepler's theory, the intermediaries of semi-material simulacra or *species* of images moving through the air as a medium of vision were replaced by the image-forming action of light entering through the eye's pupil aperture and lens, casting an image onto a surface. Vision no longer needed tiny pictures transported by rays to the eye, since the physiology of the eye itself created the optical image. Vision, thus, was explained through optics analogous to the camera obscura. Kepler acknowledged he had simply explained the optics of vision and that other aspects of sight, such as how the mind dealt with the inversion of the image, would have to be explained by the natural philosophers.¹⁷

From the seventeenth century on, the camera obscura became a familiar item and appeared in several contexts: as a tool for tracing pictures for both professional and amateur artists; as a visual entertainment (with large scale camera obscuras constructed in parks and amusement centres, especially during the mid-nineteenth century); and as an analogy for understanding both vision and the mind's access to reality. This last task took up the challenge Kepler had left to philosophers: explaining how the optical image formed on the retina led to actual perception. The camera obscura became not only a means of explaining perception, but, more broadly, the human subject's relation to reality, the mediation between consciousness and the world. As art historian Jonathan Crary has put it, "the camera obscura was not simply an inert and neutral piece of equipment or a set of technical premises to be tinkered with and improved over the years; rather, it was embedded in

a much larger and denser organization of knowledge and of the observing subject.”¹⁸

Thus, in the seventeenth and eighteenth centuries, the camera obscura became not only a model for human sight but a metaphor for human consciousness. For philosophers Descartes, Leibnitz, Locke and Hume, the camera obscura supplied a theoretical model, which Bubb and Crary have seen as essential to the modern conception of the subject’s relation to the world. The camera obscura supplied an image of the interiority of observation, especially in Crary’s interpretation. These philosophers, he claims, saw man’s relation to the world as one of an inspection of interior mental representations based on perceptions of the exterior world. The camera obscura provided a model for the way images of the world became understood as mental representations. Crary claims this camera obscura analogy envisions human perception as a disembodied viewpoint.¹⁹ The dark room of the camera obscura imaged the consciousness of the observer as interiorised. Crary presents a penetrating account of the camera obscura’s role as philosophical metaphor; but we should bear in mind that this description does not exhaust the actual uses of the device, especially its role as a visual entertainment constructed at touristic sites, where the gathering of multiple persons in the darkness could hardly be described as disembodied. (In fact, commentators sometimes decried the behaviour darkness and close physical proximity could occasion.) Moreover, Bubb claims that the absorptive viewings of the camera obscura may recall other experiences than the detached observation of elements of rational experience and even be analogous to Walter Benjamin’s description of his experience with hashish.²⁰

The abstraction that using the camera obscura as a model for consciousness made palpable, as brilliantly analysed by Crary, may well have eclipsed the camera obscura’s actual existence as an experience of virtuality. As a metaphor, the camera obscura derives its power from the range of associations it can produce. Marx’s use of the camera obscura as an image of ideology’s false consciousness focused on the inverted image of reality the device produces. *The German Ideology* of 1846 stated:

If in all ideology men and their circumstances appear upside down as in a *camera obscura*, this phenomenon arises just as much from their historical life-processes as the inversion of objects on the retina does from their physical life processes.²¹

Sarah Kofman combines this inversion with the camera obscura’s enclosed chamber to describe a Marxian image of ideology: “Thus, the camera obscura isolates consciousness, separates it from the real; enclosed, the later constructs

a sort of neoreality analogous to that produced by psychotics.”²² Without losing sight of the camera obscura’s importance as an often-deceptive model for understanding our relation to the world, its role as the first mass media of the virtual image and a device of wonder should not be lost sight of. The complex inheritance of photography cannot, I believe, be fully processed without some acknowledgement of its roots in the camera obscura.

FROM CAMERA OBSCURA TO CAMERA AND BEYOND

For most histories of technology, the camera obscura’s major significance lies primarily in its incorporation into photography; “camera” came to name the principal tool of this new image-making technology. The long-standing desire to fix the ephemeral image produced by the camera obscura lies at

88 | photography’s origin, and the history of photography consists of the progressive attempts to fix this image formed from light and to fix it from fading through chemistry.²³ But I must emphasise the *difference* between the camera obscura and the photographic camera and the image it produces. The desire to fix an image contrasts sharply with the camera obscura’s moving image that fascinated its viewers. Likewise, the bright colours that appear within the camera obscura could not be more different from the black-and-white images that for decades defined the imagery of photography. Even with the rise of colour photography, one can point to the difficulty photographic hues have matching the varied and subtle colours of reality conveyed by the camera obscura.

The camera obscura is not simply a surpassed stage in the dominant image industry. Its wonder may have been obscured by being inserted into a narrative of technical progress, but that amnesia simply calls on us to re-experience and rediscover its magic. Contemporary visual artists have created camera obscura in public places or museums. Installations by Luis Recoder and Sandra Gibson, such as *Topsy Turvy* presented at New York City’s Madison Square Park in 2013, or their *Obscuras Projectum* installed at San Francisco’s Exploratorium in 2016, and subsequently at several different venues, constructed camera obscuras providing contemporary contexts for this device.²⁴

Further, new digital media technologies allow us to explore the possibilities contained in the singular mystery of the camera obscura. Torralba and Freeman in their innovative essay on pinhole and pinspeck cameras have demonstrated that photographs of cast shadows can reveal information contained in the light coming from outside a scene. As they phrase it: “In certain conditions we can use the diffuse shadows produced by occluders near a window to extract a picture of what is outside a room.”²⁵ As media artist Marc Downie clarified, “Shadows are simply negative camera obscura.”²⁶ Computer

processes of subtracting information and reducing noise from a photograph of a room illuminated by a window, with a shadow cast by a figure blocking the light, can yield a recognisable picture of the scene outside the window. Thus, we can recover information carried by the light of a scene outside the image. Downie has explained to me that a single pixel of an image in a digital photograph may be analysed to yield a whole panoply of imagery carried by a beam of light.

Although one of the most ancient of optical image-forming devices, the camera obscura is far from being merely an item whose past can be uncovered through media archaeology. This apparatus merges with the latest advances in digital photography to reveal new aspects of light-formed images. The camera obscura promises to illuminate much that may still seem obscure but can be brought to light as light-based technology continues to evolve.

NOTES

1 Antonio Torralba and William T. Freeman, “Accidental Pinhole and Pinspeck Cameras: Revealing the Scene Outside the Picture,” *2012 IEEE Conference on Computer Vision and Pattern Recognition* (Providence, RI: IEEE, 2012), 374–381, <https://doi.org/10.1109/CVPR.2012.6247698>.

2 Mary Swan, *The Boys in the Trees* (New York: Henry Holt and Company, 2008), 194–195.

3 David Hockney, *Secret Knowledge: Rediscovering the Lost Techniques of the Old Masters* (New York: Viking Studio, 2006), especially 73; Philip Stedman, *Vermeer’s Camera: Uncovering the Truth Behind the Masterpieces* (Oxford: Oxford University Press, 2001).

4 Most histories of photography begin with accounts of the camera obscura. See, for example, Beaumont Newhall, *The History of Photography from 1839 to the Present* [1937] (New York: The Museum of Modern Art, 1982); Helmut and Alison Gernsheim, *History of Photography from the Camera Obscura to the Beginning of the Modern Era* (London: Thames and Hudson, 1969), 17–52; Michel Frizot, *A New History of Photography* (Cologne: Konemann, 1998). I owe a great deal to my colleague Joel Snyder for first pointing out the importance of this characterisation of the photograph as the preservation of the camera obscura image to me.

5 Andre Bazin, “The Ontology of the Photographic Image,” in *What is Cinema*, vol. 1, trans. Hugh Gray (Berkeley, CA: University of California Press, 1967), 9–16; Roland Barthes, *Camera Lucida: Reflections on Photography*, trans. Richard Howard (New York: Hill and Wang, 1982).

6 For accounts of origin of the camera obscura, see Martine Bubb, *La camera obscura: Philosophie d’un appareil* (Paris: L’Harmattan, 2010); Laurent Mannoni, *The Great Art of Light and Shadow: Archaeology of the Cinema*, trans. Richard Crangle (Exeter: University of Exeter Press, 2000); Maurice Bessy, *Le mystère de la chambre noire: Histoire de la projection animée* (Paris: Editions Pygmalion, 1990).

7 Martine Bubb, *La camera obscura*, 53.

8 Ibid., 65.

9 My use of the term “virtual image” does not refer to its strict optical contrast with a “real image,” but rather to the concept of virtuality in contemporary media theory. For further discussion, see my essay “Moving through Friedberg’s Properly Adjusted Virtual Window,” in Tom Gunning, *The Attractions of the Moving Image: Essays on History, Theory, and the Avant-Garde* (Chicago: University of Chicago Press, 2025), 314–332.

10 Giambattista Della Porta, *Natural Magic* [London: Thomas Young and Samuel Speed, 1658] (New York: Basic Books, 1957), 364–365.

11 Laurent Mannoni, *The Great Art of Light and Shadow*, 12. Italics in original.

12 Philip Stedman, *Vermeer’s Camera*; David Hockney, *Secret Knowledge*.

13 Siegfried Kracauer, *Theory of Film: The Redemption of Physical Reality* (New York: Oxford University Press, 1960), lx.

14 Among the many accounts of the theories of vision are David C. Lindberg, *Theories of Vision from Al-Kindi to Kepler* (Chicago: University of Chicago Press, 1976), and A. Mark Smith, *From Sight to Light: The Passage from Ancient to Modern Optics* (Chicago: University of Chicago Press, 2015). Invaluable for a discussion of these theories in relation to the camera obscura is Martine Bubb.

15 See Bubb, *La camera obscura*, 126–144.

16 See Smith, *From Sight to Light*, 354.

17 *Ibid.*, 368.

18 Jonathan Crary, *Techniques of the Observer: Vision and Modernity in the Nineteenth Century* (Cambridge, MA: MIT Press, 1990), 27.

19 *Ibid.*, 41–51.

20 Bubb, *La camera obscura*, 222–223.

21 Karl Marx and Friedrich Engels, *The German Ideology*, trans. R. Pascal (New York: International Publishers, 1947), 14. | 91

22 Sarah Kofman, *Camera Obscura of Ideology*, trans. Will Straw (Ithaca, NY: Cornell University Press, 1999), 17.

23 See the histories of photography cited in note 4 for examples.

24 Michele Pierson, *The Accessibility of the Avant-Garde: Views from Experimental Cinema* (Albany: SUNY Press, forthcoming), 113.

25 Torralba and Freeman, “Accidental Pinhole and Pinspeck Cameras,” 5.

26 Personal correspondence from Marc Downie, email to Tom Gunning, 25 May 2025.

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CHAPTER 4

The “Bande-Cache,” or: The Material Art of Light Filters

MIRIAM DE ROSA, ANDREA MARIANI AND WARSHAD FILM

Fossati, Giovanna and Annie van den Oever, eds. *Exposing the Film Apparatus: Global Laboratory Perspectives*. Amsterdam: Amsterdam University Press, 2025.
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| 93

ABSTRACT

This chapter focuses on what French literature calls the “bande-cache”: a punched-tape that operates as a light filter and colour grader during film printing. This tape strip allows a better control of the amount of light filtering through smaller or bigger holes. It also makes colour-timing possible, in black-and-white film, simply via a variation of the hole size and, in colour film, by covering these holes with primary colour filters (yellow, magenta and cyan). This device is discussed as a “minor medium”, and its creative possibilities are stretched by way of an experimental exploration.

KEYWORDS

Bande-cache; masking tape; contact print; subversion; abstract/absolute film



FIGURE 6

The abstract film resulting from our experiment.

THE BANDE-CACHE

The bande-cache is the way the French technical lexicon refers to a masking strip, usually made of cardboard, with tiny holes that function as a light filter and colour grader during analogue film printing. It is a technology that serves the postproduction processes of the moving image. The bande-cache is positioned inside a special holder that is placed between the internal light source of the printing machine and a small window. The hole in the bande-cache then lets the light pass in the exact amount necessary to light/colour grade that image.

| 95

THEORETICAL FRAMING

To better understand the historical significance of this tiny technology, we adopted a hands-on, experimental approach, emphasising the bande-cache's poetic reuse through a collaboration with the artist-duo Warshadfilm. While thoroughly examining the bande-cache, we explored its shape, materiality and light-manipulating capabilities, experimenting with contact printing. We used 16mm panchromatic film (Kodak Vision Color Print Film 3383) and colour enlarger projection.

THE BANDE-CACHE AND THE GRADER'S "SHRUNK" FILM

This chapter focuses on what French literature refers to as the “bande-cache.” It is a masking strip, usually made of cardboard, with tiny holes that function as a light filter and colour grader during analogue film printing. The strip is typically the same width as the original negative—either 35mm or 16mm. The bande-cache was positioned inside a special holder that was placed between the internal light source of the printing machine and a small window. The complete negative film was prepared for the printer by applying a series of notches along the edge of the print. A notch on the marginal side of the film negative, engraved right on the sequence to be graded, passes over a tensioner that triggers the advancement of the bande-cache, so that the hole in the cardboard film aligns exactly with the shot. The hole in the bande-cache then lets the light pass in the exact amount necessary to light/colour grade that image.

96 | Our interest lies in the bande-cache as a distinct minor medium within the history of analogue image-processing technology, as well as a form of “light-data” management, with connections to the histories of stencilling media, perforated cards, and abstract film. To better understand its historical significance, we adopted a hands-on, experimental approach, emphasising the bande-cache’s poetic reuse through a collaboration with the artist-duo Warshadfilm. While thoroughly examining the bande-cache, we explored its shape, materiality and light-manipulating capabilities, experimenting with contact printing. We used 16mm panchromatic film (Kodak Vision Color Print Film 3383) and colour enlarger projection.

When we refer to the bande-cache as a true minor medium, we aim to highlight its value as a material function and technological body resulting from a subtraction/minimisation of the cinematographic apparatus:¹ it is a tiny, peripheral, yet functionally significant material component inserted into the printing machine—an apparatus that ultimately embodies both the dynamics of projection and recording. Additionally, it is a technology that serves the postproduction processes of the moving image and, paradoxically, functions only by manipulating and corrupting the mechanisms of the projection device. As a result of the bande-cache application, the expertise of the colour timer made it possible to assess the graded image by visually inspecting the film and its contrast qualities directly on the positive print, without the need for projection.² This bande-cache fostered a tacit cinematic intuition in the operator. Finally, the bande-cache is generated, as we shall see, quite literally through a reduction/subtraction of the film. And yet, in its elementary form—as we will observe in the experiment—it establishes a peculiar “quantitative relationship” with the cinematographic apparatus: the bande-cache as minor medium is, indirectly, a reflection of the cinematic apparatus meant as

a dispersed non-unifiable material phenomenon,³ both its residue and, at the same time, its synecdoche.

Instruction manuals for printer machines are invaluable sources in this context, as they provide the first substantial information source: bande-cache tapes were typically sold as accompanying equipment for printer machines. To briefly describe the function of this fascinating media artefact, this chapter draws primarily on the late 1950s Debrie Alternative Printers manuals. In these sources, the bande-cache is described as a mobile and minimal object that plays a crucial role in the image visualisation process. It is a “light/colour” management technology, belonging to a genealogy of technical strips that regulate light intensity and colour in analogue films. The Debrie Alternative Printers for black-and-white and colour films (the so-called Matipo and Tipro models, designed for contact and optical processes) were usually supplied with a variety of bands: the *bande-étalon* for light regulation in black-and-white film, which created an electric resistance to increase or decrease the light intensity during printing; the *bande-pochette* for colour and light regulation using subtractive colour methods, which employed a grey gelatine applied to the band to modulate the intensity of light and colour filters; the *bande correctrice* (or correcting band), used in additive colour methods. The bande-cache for black-and-white and colour film (subtractive methods) has the size and shape of a standard 35mm film strip (academy ratio) or 16mm, featuring perforations along the sides as well. All these bands were used with analogue pre-electronic printers and share a common feature: holes and slits in the tape correspond, according to each band’s specific functional logic, to individual shots, each of which receives the appropriate light variation.

The material was prepared in the following way: by analysing the negative, the colour timer/light grader had the opportunity to test different light exposures, selecting two frames for each shot in the film. This technique made it possible to find the correct grading value on a very small number of film frames: in fact, they ended up with a “sample” of the film in just 50 frames (if black-and-white) or 120 frames (if colour), with one frame taken at the beginning and one at the end of each shot. This “shrunk film” or “mini-film” was called “*chenille*,” corresponding to the English “short end”: it was a parsimonious and economical technique that allowed for the saving of film stock in this process. This crucial practice of reduction of the film is significant because it allows us to reflect on another characteristic of the bande-cache as minor medium. The “short end” entails a manipulation and transformation of the film’s temporal experience. There is not only a material reduction of the film (which is “shrunk” and reduced to a sample strip), but also a radical compression of time. The relevant sequence is reduced to just two frames, meaning that time is either reduced to zero (in the case of accessing the film without

projection, as when it is inspected in the film grader's hand), or to a subliminal flash of 2/24 seconds (if we imagine projecting the strip as though it were an experimental film).⁴ Using this material, the colour timer would rough out the grading until ready to print the full film. The shrunk film is closely linked to the shape of the bande-cache, as it directly influenced the specific characteristics of the cardboard film's perforations. Depending on the graded effects applied during testing with the bande-cache, the operator could intuitively adjust the size of the holes in the cardboard film.

PUNCHED TAPES AND PERFORATED CARDS

98 | The bande-cache was created using a specific perforation machine that punched the cardboard film, creating holes sized according to the required shutter aperture, a feature that potentially inserts the device within the cultural series of perforated cards,⁵ marking a clear genealogical antecedent to computing technology. At this stage, however, unlike perforated cards in the strict sense, the holes served to regulate the amount of light passing through the light source. In other words, the holes in the analogue bande-cache did not yet represent data (e.g., hole = 1, no hole = 0); instead, they controlled the flow of information indirectly by modulating light exposure. This system also made colour-timing possible—in black-and-white film simply via a variation of the holes size; in colour film, by covering these holes with primary colour filters (yellow, magenta and cyan), as we tested in the experiment described below.

This mechanism changed with the introduction of electronic printing when these bands became digital perforated strips proper. In its electronic version, the bande-cache was designed as a kind of punched tape—essentially a tool for machine control and data storage—this time used in conjunction with a protocol that indicated the correct position and exposure time for the band to be placed on top of the film strip. This protocol, typically provided by film stock manufacturers, specified the recommended exposure time based on the type of film in use.

Technically, in the case of punch cards, holes arranged in a grid of rows and columns were read by a feeler arm as the card passed through the machine, triggering associated commands or changes.⁶ A similar principle was later applied to another artefact in the genealogy of early computing: the punched paper tape, which more closely resembles the bande-cache in both form and size. In the case of the electronic printing process, however, no feeler arm is used. Instead, the printer itself activates the detection mechanism, establishing a direct correlation between code, perforations and visual output. More specifically, a system of uniform holes composes a particular code:

the first hole marks the start; this is followed by a group of four slots—three vertical lines separated by a single empty space—which signals a pause in the machine’s operation. These three vertical lines correspond to a single sequence to be graded or, more precisely, to a single grading command. Each line affects a different colour channel: the first adjusts the magenta, the second yellow, and the third cyan.

In collaboration with the Milan-based artist-duo Warshadfilm, we explored alternative uses for this artefact, blending techniques from both the analogue and electronic bande-cache. The aim was to emphasise the operational complexities of this minor medium, suggesting a reconceptualization of its deeper affinity with abstract or absolute cinema, where stencil-like technologies and the language of punched cards appear to merge.

THE EXPERIMENT

| 99

While the film stock used is Kodak 3383 (a 16mm colour print film), our experiment entails both a 16mm and a 35mm bande-cache, used together with a punched tape from a Debrrie electronic printer, exposed on the same film strip, and ultimately resulting in a 90-metre abstract colour film.

Conceptually, we decided to look at their function as a template for “colour transcription,” regardless of their size. If the bande-cache can work as such a model, then the contact printer can be used as a coding machine, whereby the hole-detecting function is taken up directly by the light in the moment it is projected downwards onto the film. This way, the bande-cache works precisely as a screen:⁷ it stops the light in the areas where it screens the film stock lying below, while it lets the light penetrate through the holes onto the film strip, where this is not screened by the paper band. In this sense, the bande-cache not only favours a screening but taps into a projection process proper, scaled down as a sort of miniaturised projection.⁸ Moreover, the materiality of the bande-cache as a screen is conceptually transferred to the light, to its own materiality, and eventually to our own perception as “mediators” interacting with the bande-cache/printer/film-stock/light assemblage. In this, our experiment is reminiscent of Sean Cubitt’s suggestion, according to which the “practice of light” results from “an interconnected web of mutually influencing and translating activities, each open to contingency, but in the ensemble capable of acting as a single, ordered machine.”⁹ The materiality of the very mediation elicited by the bande-cache, then, is technically but also humanly interlinked, and our experiment highlights that these components may well be rebalanced depending on the more or less creative use one makes of the medium.

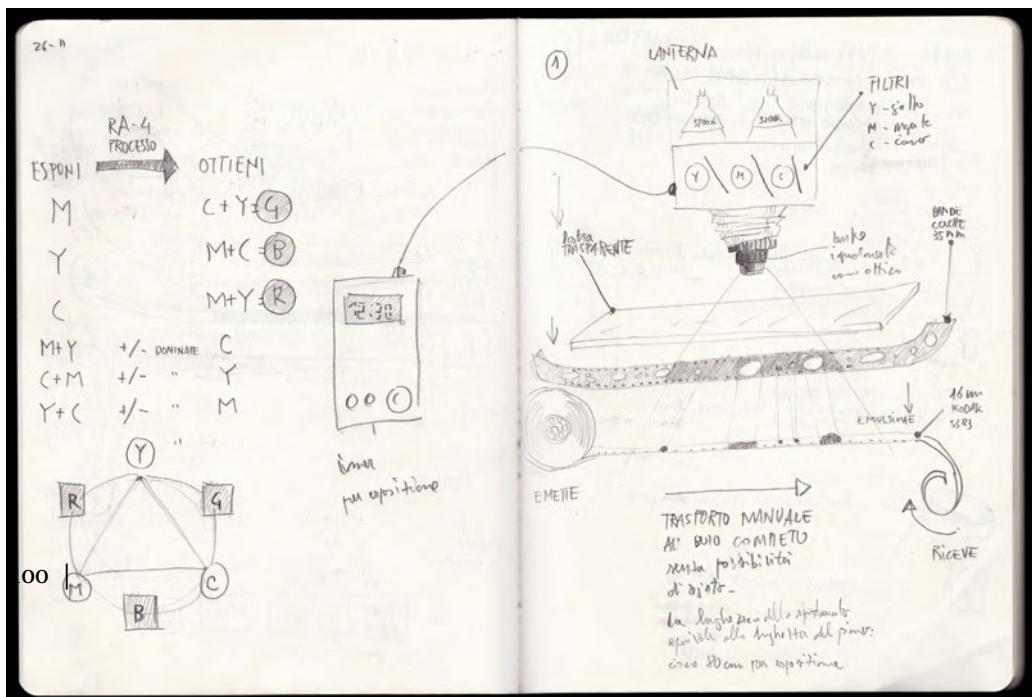


FIGURE 7
Warshadfilm's illustration of the process.

In our experiment, creativity took the shape of a manual exposure process, conducted cameraless, rolling the film under the light ray inside the dark room, paying attention to keep the film and the band either superimposed or covering the film only partially, depending on the forms that we wanted to create on the stock, precisely as one would do with a stencil. As described above, the forms printed on the film resulting from this exposure correspond to the holes punched on the bande-cache: in effect they are characterised by different dimensions, by locations on the film, and by colours, the latter resulting from multiple subsequent exposures to the light, and eventually showing a set of nuances that enhance the nearly pictorial quality of the film stock.

In this process, we subverted the orthodox uses of the film stock and bande-cache on several levels, all taking place in the contact printing process. The first level of subversion in our experiment consisted in mixing formats: while the relationship between the bande-cache format and the film negative is supposed to be 1:1 (i.e., a 35mm bande-cache for the 35mm negative to grade, and a 16mm bande-cache for the 16mm negative), we employed 35mm and 16mm bande-caches on the same 16mm film stock. This functioned as a form of excavation into the materiality of this artefact, by altering its regular

function to find its primal connection to stencilling media. A fundamental implication of this action is to force the inner logics of the analogue bande-cache, that is, a direct correspondence between holes and frames into a *frameless* technology.

A second level of subversion concerns the cameraless approach, which legitimises the removal of the optic block upon which the bande-cache was generally positioned. This implies the misalignment off-axis between the bande-cache and the frames in the negative film: during the exposure, the bande-cache is freed from its mechanical rail so that it can be moved by the filmmaker's hand onto the negative, in order to be exposed across a vast spectrum of positions and oscillations. This subversive action allowed us to abandon the bande-cache's original technical function: it was no longer simply a method to grade the light and colours of narrative films, but rather a tool to embrace a more abstract approach to light and colours in film creation. This move was further underlined by the joint use of analogue and electronic bande-cache. The electronic ribbon, with its codes and symbols, is completely decontextualised from its encoding-decoding system and repurposed as a stencil technology: similar to the frameless use of the analogue artefact, the perforations in the electronic ribbon are disjoined from the pattern and conventions that determined colour intensity and image lighting correspondences. This is apparent in the film where colour spots of different sizes, from analogue to electronic ribbons, are superimposed in multiple exposures, and vertical and oblique lines result from the oscillation of the three bands. The connection between this minor medium and abstract film offers an interesting lens to examine the cameraless filmmaking practice that punctuated the history of experimental film, from the early experiment of Len Lye and Norman McLaren up to more recent (now classical) works such as Paolo Gioli's stenopeic films.¹⁰ While driven by an inquisitive intent, endowed with a modest artistic feature, our experiment sheds light on possible research avenues exploring this genealogy.

Finally, the bright colours offer to the spectator the opportunity of observing a third level of subversion derived from the "improper" use of the filtering system of the analogue bande-cache. While in the regular usage protocol of the bande-cache for colour regulation the holes on the ribbon were usually covered with primary colour paper filters, Warshadfilm decided instead to opt for multiple exposures with continuous changes in the duration and the parameters of the lamp's colour filtering. This way, the proper use of the bande-cache for subtractive colour methods is turned into a technology for additive colour methods. Colour intensity in the resulting exposed film is changed, thanks to multiple passages of the coloured light through the holes of the analogue and electronic ribbons.

ABSTRACT CINEMA PARTITIONS AND THE PUNCHED TAPES

Adopting the bande-cache perforated templates (in their analogue and electronic versions) as a programme for an abstract film, allowed us not just to stress the intertwined media genealogy and archaeology of this minor medium but also disclosed a third crucial affinity to another cultural series: that of the technical notes and the schematic visual partitions illustrating forms and movements for abstract films. The schematism of sketches for abstract film projects is a recurring element in the history of abstract cinema. Artists produced this ephemeral documentation as a method to structure and arrange visual elements in their works. They could take the form of pure drawings (Viking Eggeling's *Symphonie Diagonale*, to mention one) or actual technical notes (Norman McLaren's pitch cards for pairing music and forms in his *Hen Hop*)¹¹ or came in a mixed form (Mieczylaw Szczuka's *5 momentów/*

102 | *zasadniczych elementów filmu abstrakcyjnego*). One of the schemes that can clearly explain the affinity we highlight is Ludwig Hirschfeld-Mack's *Lichtspiel-Apparat* (1922). In László Moholy-Nagy's *Malerei, Fotografie, Film* (1925) we can find a reproduction of Hirschfeld-Mack's instructional scheme and related key terms. What is surprising when looking at this document is its close resemblance (in form and functions) to the electrical punched tape that replaced the bande-cache in the digital age. Hirschfeld-Mack's instructions resemble a true code allowing him to coordinate the different components of his colour and light partition, superimposing different series of instructions (nine lines/layers) where he provides a protocol regarding music bars, colours, the location of the projecting lamps in the performance space, the switches of the lamps, the apertures of the stencilling masks (i.e., geometric shapes), and the resistances.¹² Codes and logic of the electronic punched tape indicate light variations and scene correspondences similarly, condensing instructions for light regulations and colour intensity in a very small scheme. Overall, observing the bande-cache brings into the equation abstract cinema as a historic and codified film practice, which seems to clearly share a lineage with the intertwined cultural series of stencilling media and perforated tapes in the digital era.

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the Punched Cards), and De Rosa of section two (Punched Tapes and Perforated Cards) and three (The Experiment).

The authors wish to thank Marco Pagni of Movie and Sound Lab in Florence for the practical demonstration of creating a bande-cache through a vintage perforation machine and showing us how to use it in his printing machines.

NOTES

1 In adopting this perspective, we owe a particular debt to Ian Christie, “Moving-Picture Media and Modernity: Taking Intermediate and Ephemeral Forms Seriously,” *Comparative Critical Studies* 6, no. 3 (October 2009): 299–318.

2 See Boguska et al. 2024.

3 We derive this assumption from Yuri Tsivian, “What Is Cinema? An Agnostic Answer,” *Critical Inquiry* 34, no. 4 (2008): 775; and Maria Vélez-Serna, *Ephemeral Cinema Spaces: Stories of Reinvention, Resistance and Community* (Amsterdam: Amsterdam University Press, 2020), 14.

4 See Tom Gunning, “Countdown to Zero: Compressing Cinema Time,” in *Compact Cinematics: The Moving Image in the Age of Bit-Sized Media*, eds. Pepita Hesselberth and Maria Poulaki (London: Bloomsbury Academic, 2017), 19–27.

5 On the concept of cultural series, see André Gaudreault and Philippe Marion, “The Unfinished Business of History: Defense and Illustration of the Concept ‘Cultural Series’,” in *The Oxford Handbook of Silent Cinema*, eds. Charlie Keil and Rob King (Oxford: Oxford University Press, 2024), 95–115.

6 Robert S. Wahl, “The History of Punched Cards: Using Paper to Store Information,” in *The Routledge Companion to Media Technology and Obsolescence*, ed., Mark Wolf (New York: Routledge 2018), 27–45.

7 We use the term screen in its etymological sense; see Wanda Strauven, *Touchscreen Archaeology: Tracing Histories of Hands-On Media Practices* (Lüneburg: meson press, 2021).

8 For miniaturisation as an intrinsic modern feature, see Erkki Huhtamo’s pioneering piece “Gulliver in Figurine Land,” *Mediamatic* 4, no. 3 (1990): 101–105.

9 Sean Cubitt, *The Practice of Light: A Genealogy of Visual Technologies from Prints to Pixels* (Cambridge, MA: MIT Press, 2017), 14.

10 On cameraless cinema, see Esther Schlicht and Max Hollein, eds., *Zelluloid. Film ohne Kamera—Cameraless Film* (Bielefeld: Kerber Verlag, 2010); Gregory Zinman, *Making Images Move: Handmade Cinema and the Other Arts* (Oakland, CA: University of California Press, 2020); Kim Knowles and Jonathan Walley, eds., *The Palgrave Handbook of Experimental Cinema* (Cham: Palgrave Macmillan, 2024). On Paolo Gioli, see Alessandro Bordina and Antonio Somaini, eds., *Paolo Gioli: A Man Without a Movie Camera* (Milan-Udine: Mimesis, 2014).

11 Norman McLaren, *Technical Notes (1933–1984)* (National Film Board of Canada, 2006), 65, https://www3.nfb.ca/archives_mclaren/notech/NT_EN.pdf

12 A picture of this scheme is in László Moholy-Nagy’s *Malerei, Fotografie, Film* (Munich: Albert Langen Verlag, 1927), 81.

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WARSHADFILM (TIZIANO DORIA, SAMIRA GUADAGNUOLO) is an artistic duo founded in 2016. They stress film technology as soft media no longer considered for industrial standards but for experimentation, aiming to create new media forms re-appropriating the film production process. Their works have been presented in several national and international venues.

Teaching from the Archive in Black-and-White 35mm

Analogue Nostalgia in Post-Apartheid South Africa

LANDI RAUBENHEIMER AND BONGANI J. KHOZA

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| 107

ABSTRACT

This chapter is an investigation of how black-and-white 35mm film stock was used by students in a collaborative teaching project on analogue nostalgia at the University of Johannesburg between 2022 and 2024. We reflect on the significance of black-and-white to the development of the project, and discuss the establishment of a media archive, which we conceptualised as a teaching and experimental space entitled the Experimental Media Archaeology Studio. After the project's implementation over three years, we consider what black-and-white 35mm can reveal about the continued imbrication of digital and analogue media in post-digital society, and the usefulness of the archive in teaching approaches inspired by Experimental Media Archaeology and practice-based teaching and learning.

KEYWORDS

Black-and-white 35 mm; analogue nostalgia; experimental media archaeology; practice-based teaching and learning; post-digital



FIGURE 8
Ilford Delta 400 black-and-white 35 mm film
(Photo: Letlotlo More, student assistant working
in the archive in 2024).

BLACK-AND-WHITE 35MM FILM STOCK

Black-and-white film stock is associated with early filmmaking and newsreels. In South Africa it has a history of portraying periods of unrest in international newsreels in the 1960s, and it later became associated with the country's tradition of activist documentary photography in the fight against the Apartheid regime.¹ While the black-and-white newsreels of the 1960s were typically shot on 16mm gauge, 35mm, straddling motion picture and still photography, was the stock of choice for South African documentary photographers. Celluloid is the substance that allowed photography to transition from still images to moving images.² Contemporary scholars and practitioners use the term celluloid to refer to this physical film stock, mostly in the context of filmmaking rather than photography, although, since photography preceded motion picture, in earlier discourse the term was applied to both.³ Whichever manifestation one refers to, still or moving images, black-and-white captures a feeling of the past.⁴ The stock portrayed in this image is Ilford Delta 400 professional fine-grain black-and-white film. It is coated on an acetate base measuring 0.125 mm x 5 mm and can be used in all 35 mm cameras with DX-coded cassettes.⁵

| 109

THEORETICAL FRAMING

In this chapter black-and-white film stock is discussed as nostalgic in the post-digital context. It may be seen to represent a phenomenon that reverberates both in South Africa and more widely: analogue nostalgia. For this reason, it was one of the first things we aimed to work with in the archive of the EMA (Experimental Media Archaeology) Studio at the University of Johannesburg.⁶ After using 35mm between 2022 and 2024 in a collaborative theory and practical teaching project, which took inspiration from experimental media archaeology as method, we reflect on the significance of black-and-white 35mm in our archive in the context of post-digital society.⁷ We consider how it may offer insights into the imbrication of digital and analogue media, as well as contribute to developing tacit understanding of media technologies from the past for student users.

TEACHING A POST-DIGITAL GENERATION

Before discussing the project further, some clarification of the term film is important. It has become ambiguous since the advent of cinema's digitization, because it refers to both films (moving image texts) and the film stock itself, and thus there is the potential for confusion and a slippage in meaning. This is exacerbated by how still photographers use the term film to refer to analogue photography specifically as film photography, or "shooting on film," as opposed to digital photography. Here we use the word film to refer to physical film stock and not films or filmmaking, which we refer to as cinema or motion picture.⁸ As mentioned above, we are interested in 35mm as a medium that has manifestations in both still photography and motion picture.

We now return to the teaching project. In a Design Theory module on analogue nostalgia, which had been taught for a few years, it emerged
110 | that the students of current generations simply do not see the difference between analogue and digital images. Growing up in a time where cinema and photography make extensive use of filters, effects and post-production software like Photoshop, students seem to experience images taken on analogue cameras and those captured digitally as much the same. Our students represent a post-digital generation, where digital media are so ubiquitous that one need not call them "digital" anymore.⁹ What is more, digital media have emulated analogue qualities to the point where such qualities appear to be part of the digital visual language. One can think of the flaws once associated with analogue cameras: lens flares, film burn, grain, dust and scratches, that are now easily applied in digital post-production processes to add life and warmth to digital footage.¹⁰

But what is analogue nostalgia? Fundamentally, it is a valorisation of pre-digital media, which offers the fascination of a physicality that digital media lack.¹¹ In their material capacity they offer the allure of authenticity that is associated with their materiality, and some users of digital media, such as motion picture and photography, are driven to emulate the tactile qualities of analogue media forms in digital formats. Other users refuse to let go of analogue media and find hybrid techniques incorporating both. This is evident in cinema from the early 2000s. Even as the medium was evolving into a digital one, some directors and cinematographers yearned for film, and some refused to make the transition, such as Steven Spielberg.¹² Over the last twenty years, the sentiment has not receded into the background. At the 2024 Oscars, several motion pictures evidenced the use of celluloid alongside digital footage, notably *Poor Things* (2023, dir. Yorgos Lanthimos). Meanwhile Instagram is awash with photographs that look as if they were shot on film. Analogue nostalgia is far from over, and the hybrid techniques that are arising

in the combined use of analogue and digital media are what interests us here in the context of black-and-white 35mm.

COLLABORATIVE TEACHING: THEORY AND PRACTICE

In 2022, when we embarked on this project, the question was: how could we make analogue nostalgia clearer to our students? To them, analogue qualities emulated digitally *was* digital in itself. It was our hunch that, if students could use analogue cameras, they would more easily recognise the analogue characteristics so widely emulated digitally. They might also understand why film is so seductive for digital media users. To this end, we decided to establish an archive of analogue technologies, which has since become the EMA Studio. Given that motion picture cameras would be difficult to source in the South African context, and would exceed our budgetary constraints, we opted for refurbished Single-Lens Reflex (SLR) cameras from the 1960s and 1970s, which also presented practical advantages. In the faculty, there had historically been a disparity in the equipment ratio for students required to use Digital Single-Lens Reflex (DSLR) cameras for their Photography projects: two different departments, Multimedia and Graphic (Communication) Design, shared the equipment and often there were not enough cameras to go around. The addition of analogue cameras could address the shortage, and given South Africa's ongoing struggles with power cuts, they would further be advantageous as they do not require battery charging, and the only running cost would be the film. The analogue nostalgia project offered a synergistic point of collaboration, and we decided to teach the Design Theory and Photography units concurrently, so that practical experience with 35mm in Photography would complement how it would be studied in Design Theory. Collaborating on integrating practical and theoretical components allowed us to test an inquiry- and practice-based learning approach with the students.¹³

The project we envisaged had two parts. First, there was the Design Theory unit that focused on analogue nostalgia and its prevalence in cinema and photography, which aimed to unpack how South African photographers and filmmakers engaged with this backward-looking trend. Second, there was the Photography unit which also focused on nostalgic uses of analogue cameras. Here students could "practice" analogue nostalgia—not in its digital iteration, but rather by using analogue cameras to produce nostalgic black-and-white images informed by their theoretical understanding of analogue nostalgia.

In the Design Theory part of the project, students engaged with key texts by scholars, such as Katharina Niemeyer and Elena Caoduro, who investigate analogue nostalgia.¹⁴ The focus was on interrogating the use of analogue

nostalgia by amateur photographers and filmmakers in Johannesburg, such as Andile Bhala and Andile Buka, who interchange and combine digital and film photography. In the Photography unit, the aim was to create a structured, engaging and resource-conscious programme, and to progressively advance to more complex techniques. Students were mentored individually and collectively through the development of a series of critical practice projects that, through practical exercises, brought together reflections on the history of photography and contemporary issues regarding the medium, such as analogue nostalgia. The analogue nostalgia project is part of a larger strategy for introducing analogue media technologies into the three years of the undergraduate Photography module. It is scaffolded as follows: for first-year students, pinhole photography had already been introduced to address the equipment shortage. This provided a hands-on, cost-effective introduction to photography. In the second year of study, students were then introduced to 35mm film photography. This introduction was undertaken through a critical examination of students' photo essays, exploring how a series of images can be used to convey narratives and tell stories effectively. This progression builds on the foundational skills learned in the first year and offers more advanced techniques and experiences with film.

112 | 35mm film photography. This introduction was undertaken through a critical examination of students' photo essays, exploring how a series of images can be used to convey narratives and tell stories effectively. This progression builds on the foundational skills learned in the first year and offers more advanced techniques and experiences with film.

For third-year students, a master-class-style engaged pedagogy was employed. This involved specialised teaching and learning sessions, including workshops by industry professionals. The focus was on encouraging the students to slow down and think critically about the photographic images they wanted to create. A student in the Design Theory class, reflecting on the use of 35mm film, considered that it had encouraged her to enjoy the process of planning and making a photograph and to attach less value to the outcome than digital photography had.

STUDENT REFLECTIONS: HYBRID PRACTICES AND TACIT KNOWLEDGE

Students were encouraged to discuss their experiences with 35mm in the Design Theory tutorial classes in reflective free-writing. In addition to 35mm film and cameras, they were given a range of non-functioning cameras, printed photographs, old photo-albums, slides, projectors, film reels and other pre-digital objects and technologies to look at, hold, open, smell, touch and ponder. This process, akin to the "thinkering" of experimental media archaeology, allowed for looking, doing and writing to all happen in each class.¹⁵ Every session ended with reflective writing exercises to capture students' thoughts while fresh from the interaction.

In a reflection on making images in black-and-white in the Photography

unit in 2024, one student remarked that a particular chair she had photographed looked more interesting in black-and-white than in colour. Silver nitrate presents a cognitively different reality, which “feels” like the past, and has a different optical texture to digital images. This texture draws attention to the physicality of 35mm, evoking the tactile qualities of analogue media, which is so sought-after in analogue nostalgia. South African director Angus Gibson uses black-and-white archival analogue footage of Sophiatown in the 1950s to bookend his story of gangsterism in Apartheid South Africa in the film *Back of the Moon* (2019, dir. Angus Gibson). It is a common technique that immediately situates the plot in the past, because it is associated with documentary movies and, in South Africa, with Apartheid-era conflict. A comparable practice is even more common in amateur photography, perhaps to the point that it seems redundant to comment on it. Black-and-white is the “instant past.”¹⁶

This particular student’s approach further reveals the contemporary relationship between digital and analogue technologies: she used her digital camera (DSLR) to photograph what she was planning to shoot with her SLR. This “revealed” the photograph to her beforehand in both colour and black-and-white. She then copied the settings from the DSLR to configure the SLR camera. Her strategy demonstrates the complex relationship between digital and analogue technologies. Film can be made more accessible, easier to manipulate and access, if one augments it with digital technologies. Digital media can, perhaps surprisingly, provide a way into pre-digital practices.

A last aspect to foreground here is that film photography can open avenues for tacit understanding of media from the past more broadly, since 35mm is readily available and relatively affordable to process. Once students had spent several weeks taking photographs, we conducted a workshop in class where we studied old photo albums donated to the archive. Working in groups, students were asked to select one photograph and imagine the camera needed to make it, producing drawings of the imaginary cameras. The results were astounding. One group explained that they were looking at a blurry portrait of a man. They noticed it looked as though the camera was unsteady and so concluded that no tripod was used. They deduced from the shallow depth of field that the lens used must have been between 35 and 50mm, and from the format that it was probably taken on an SLR camera. Although their suppositions were not necessarily completely accurate, it was striking that students were bringing their tacit understanding of how analogue cameras work to bear on analysing historical visual texts. This immeasurably improved the ways in which they could interpret black-and-white image material in subsequent writing assignments.

PRELIMINARY FINDINGS

Working with black-and-white 35mm in the context of the archive, we have been able to come to several conclusions thus far. First, in the digital context, black-and-white is the “instant past” associated with analogue nostalgia. As a signifier of age, it is evocative of film even when the medium is not present, and its affinity with emphasising texture helps to reinforce its nostalgic qualities. While black-and-white film stock has for a long time conveyed a nostalgic sense of history, it can, perhaps surprisingly, not only illuminate the past but also help contemporary users understand digital media better. Analogue nostalgia, for example, is a specifically digital phenomenon, which ironically can only be understood by looking at bygone media such as film. Furthermore, because film and digital media now exist alongside each other, digital media can offer a way into pre-digital media practices, such as the use of film, 114 | by combining the two in hybrid practices. Finally, using techniques such as “thinkering” with analogue technologies in an educational setting can develop a tacit understanding of media that transfers across media paradigms, enlivening understanding of unfamiliar technologies of the past, and leading to a far deeper understanding of visual texts than studying them in isolation can afford.

Engaging with the practices of analogue photography places users in the shoes of pre-digital users, and lets them see in black-and-white, so to speak. In this way looking back at 35mm film can help users and scholars make sense of future media, as the relationships between past and present media paradigms unravel and are rewoven into an ever-more complex media ecology.

NOTES

- 1 Refer to infamous footage of the horrific events at Sharpeville in 1960, captured both for newsreels and in documentary photographs such as those by Peter Magubane, both in black-and-white: "Peter Magubane: Courageous Photographer Who Chronicled South Africa's Struggle for Freedom," *The Conversation* (4 January 2024), accessed 27 May 2024, <https://theconversation.com/peter-magubane-courageous-photographer-who-chronicled-south-africas-struggle-for-freedom-220558>.
- 2 Due to the use of both gelatin emulsion and later a clear flexible celluloid base, film stock could be made sensitive enough for the short exposure times needed for cinematography, and flexible enough to be fed through a projection device at speed. The celluloid ingredient has since been replaced by acetate and other plastics, but stock used to shoot both moving and still images consists of a clear plastic base (acetate) coated with gelatin emulsion. See S. E. Sheppard of the Eastman Kodak Company, who wrote an early history of photography focusing on the chemical innovations that led to celluloid as a medium; Sheppard, "The Chemistry of Photography. I. Historical Considerations," *Journal of Chemical Education* 4, no. 3 (March 1927), 298–312.
- 3 Ibid., 311. Also refer to Andrea Cuarterolo, who argues that early cinema is inextricable from the influences of photography, especially in sharing aesthetic qualities in formal terms as well as thematically and ideologically; Cuarterolo, "FILM AND PHOTOGRAPHY: An Archaeology," in *The Routledge Companion to Latin American Cinema*, eds. Marvin D'Lugo, Ana M. López, and Laura Podalsky (London: Routledge, 2017), 281–296.
- 4 Dan Streible suggests a useful way of thinking about the changing associations with the word film within the context of media archives. He argues that particular gauges, such as 35mm, are "manifestation[s]" of a motion picture, which might be seen as the "work." See Streible, "Moving Image History and the F-Word: or, *Digital Film Is an Oxymoron*," *Film History* 25, nos. 1–2 (2013), 230.
- 5 "Blue Moon Camera Film Friday—Ilford Delta 400 Film Review," 28 February 2025, <https://bluemooncameracodex.com/film-fridays/ffilforddelta400>. DX coding is a system which lets SLR cameras with automatic settings recognise the ISO of the film through the code on the cassette. See Robert Rogers, "DIY 35mm Cassette DX Coding—The Hole Punch Method," 21 July 2016, <https://www.filmshooterscollective.com/analog-film-photography-blog/diy-35mm-cassette-dx-codingthe-hole-punch-method-6-24>.
- 6 Refer to Andreas Fickers and Annie van den Oever, *Doing Experimental Media Archaeology: Theory* (Berlin: De Gruyter Oldenbourg, 2022) for more on this field, which inspired the name of our archive and studio.

116 |

- 7 Kristin Klein, “Post-Digital, Post-Internet: Propositions for Art Education in the Context of Digital Cultures,” in *Post-Digital, Post-Internet Art and Education: The Future is All-Over*, eds. Kevin Tavin, Gila Kolb, and Juuso Tervo (Cham: Palgrave Macmillan, 2021), 27–44.
- 8 Streible, “Moving Image History,” 227–235. It is furthermore notable that 35mm motion picture film stock can be repurposed for shooting still images in SLR cameras. The Remjet layer needs to be removed, but there are companies that sell such stock: Cinestill film in the U.S. and The Expired Film Company in South Africa.
- 9 Florian Cramer, “WHAT IS ‘POST-DIGITAL’?” *APRJA* 3, no. 1 (2014), 10–24.
- 10 Gil Bartholeyns, “The Instant Past: Nostalgia and Digital Retro Photography,” in *Media and Nostalgia: Yearning for the Past, Present and Future*, ed. Katharina Niemeyer (Basingstoke: Palgrave Macmillan, 2014): 51–67; Dominic Schrey, “Analogue Nostalgia and the Aesthetics of Digital Remediation,” in *Media and Nostalgia: Yearning for the Past, Present and Future*, ed. Katharina Niemeyer (Basingstoke: Palgrave Macmillan, 2014), 27–38.
- 11 See Katharina Niemeyer, “Digital Nostalgia,” *Media Development* 4 (2016): 27–30; Elena Caoduro, “Photo Filter Apps: Understanding Analogue Nostalgia in the New Media Ecology,” *Networking Knowledge* 7, no. 2 (2014), 67–82.
- 12 Christopher Lucas, “The Modern Entertainment Marketplace, 2000–Present,” in *Cinematography (Behind the Silver Screen)*, ed. Patrick Keating (New Brunswick, NJ: Rutgers University Press, 2014), 139–146.
- 13 Integrating inquiry-based and practice-based learning is an example of a disciplinary method used in the visual humanities and design disciplines, particularly in practice-based research. In this approach, academic inquiry and creative practice inform one another. It emphasises the connection between theory and practice by recognising the dual roles of researchers and artists, and by extension is also relevant for students in design and arts disciplines. For more detailed information, refer to Linda Candy and Ernest Edmonds, “Practice-Based Research in the Creative Arts: Foundations and Futures from the Front Line,” *Leonardo* 51, no. 1 (2018): 63–69. Additionally, broader discussions about these strategies in the context of visual humanities and design education offer valuable insights. For more on inquiry-based learning refer to Samuel Kai Wah Chu, Rebecca B. Reynolds, Nicole J. Tavares, Michele Notari, and Celina Wing Yi Lee, *21st Century Skills Development through Inquiry-Based Learning: From Theory to Practice* (Singapore: Springer, 2021), <https://doi.org/10.1007/978-981-10-2481-8>.
- 14 Niemeyer, “Digital Nostalgia”; Caoduro, “Photo Filter Apps.”
- 15 Fickers and Van den Oever, *Doing Experimental Media Archaeology: Theory*, 41–44.
- 16 Bartholeyns, “The Instant Past,” 51–67.

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Socio-Technological Margins as Research Topic for Media Archaeology

LIRI CHAPELAN

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| 119

ABSTRACT

This chapter argues that obsolescence is rarely a “flat” technological regime that imposes the abandonment of a device everywhere, at the same time. Rather, it is a stratified process that espouses social, economic and cultural fracture lines, making them apparent to observers of the mediascape through the coexistence of different techno-aesthetic paradigms originating from different communities. Beginning with Jonathan Larcher’s anthropological study amongst a Romanian Roma community, this text pleads for the introduction of the category of the marginal user in the taxonomy developed in experimental media archaeology. It probes the way such an addition addresses some fundamental concerns of the discipline, and introduces a spatial and social axis alongside the temporal one that has been foregrounded thus far.

KEYWORDS

Experimental media archaeology; user taxonomy; marginal user; technological obsolescence; MiniDV



FIGURE 9
The MiniDV Handycam.

THE MINIDV

The MiniDV is not an official denomination, but a familiar name given to the smallest cassettes (66 x 48 x 12.2 mm) used to store digital video captured using the DV codec. It was launched in 1995 by an association of video camera manufacturers, the most important of which were Sony and Panasonic. These cassettes could store between 14 and 20 GB, the equivalent of approximately one hour of recording of DV video or one-and-a-half hours of HDV. MiniDV tapes were compatible with consumer, prosumer and even professional video recording equipment, but today they are mostly remembered as having been targeted at amateur users and having enacted the mass transition from analogue to digital video production. They became obsolete in the 2010s, when they could no longer sustain competition with the progressive recording and the higher resolutions offered by cameras using solid-state drives or memory cards.

| 121

THEORETICAL FRAMING

This chapter sets out to argue that obsolescence is rarely a “flat” technological regime that imposes the abandonment of a device everywhere at the same time. Rather, it is a stratified process that espouses the social, economic and cultural fracture lines existing in a given space, making them apparent to observers of the mediascape through the coexistence of different techno-aesthetic paradigms originating from different communities. Marginalised populations are more likely to keep using obsolete devices beyond their “expiration dates” sanctioned by international markets but, while the primary motive may be economic, this does not preclude the development of aesthetic gestures, professional hierarchies and technologically mediated power dynamics informed by the specific affordances of these obsolete devices. Beginning with an anthropological study conducted by Jonathan Larcher amongst a Romanian Roma community, this text pleads for the introduction of the category of the marginal user in the user taxonomy developed in experimental media archaeology.

TECHNOLOGY AS EFFECTOR OF OR RESISTANCE TO MARGINALITY? THE MINIDV IN 'ROMALAND'

For his doctoral thesis situated at the confluence of anthropology and media studies, entitled “Des arts filmiques en anthropologie: Enquête, expérience et écologie des images en ‘Tsiganie’”¹ (The use of film arts in anthropology: Investigation, experience and image ecology in “Roma Land”), Jonathan Larcher documented the characteristic modes of production of vernacular images in the Roma village of Dițești, in south-eastern Romania, between 2007 and 2015. With much time and effort, he managed to secure for himself a (relative) insider’s position, by becoming an occasional event cameraman, recognised for his professional equipment. By charting the evolution of his own perspective, which became gradually more involved, as well as that of the community he followed, Larcher’s work aims to interrogate the place given to filmic

122 | arts in anthropology, and to legitimise the lived experience of the subjects of ethnographic research, as well as the status they choose to give to the acts of image-making and image-viewing in their own social and cultural systems. A significant part of Larcher’s observations was conducted during a period (2007–2012) that marked the acceleration and quasi-completion of the digital turn in the sphere of private media usage in Romania. In these years, Larcher witnessed how the Roma community among whom he carried out his study fell behind in the digital transition.² According to Larcher, the local technological infrastructure he was exposed to during his research was characterised by scarcity and disconnectedness:

few people film or own a camera in Dițești. [...] The few MiniDV cameras which circulate in GipsyLand are most often exchanged or salvaged, rarely bought. They work poorly or are seldom used because of the [shortage of other] required components (tapes, cables, computers).³

The mention of the MiniDV introduces at the outset discrepancies in the dominant technological narrative propagated by the leaders of the industry—and often adopted by media historians—supported by sales figures and user practices in affluent communities, according to which the classic magnetic tape-based devices had already been ousted on the global market by tapeless digital recorders: it is a claim that entirely overlooks the existence of pockets of “backwardness.” The latter term is of course chosen on purpose, as it reflects the view of the dominants, but it is also revealing of a trajectory that our material belongings take once they are labelled obsolete: they shift back through the social strata and end up at the margins, before being totally depleted. As demonstrated by the case of celluloid film, whose declining

infrastructure was reappropriated by users situated outside the traditional industry, such as artist-run labs or film archives,⁴ technological obsolescence often entails an atomisation of the power structures that underlie the workings of specific media ensembles. Larcher's investigation of the media usages in Dițești confirms that the depreciated devices spread through networks of repair, exchange and second-hand selling, entering—often in a reduced or stripped form—an economic sphere that is significantly lower than the one in which their initial “configured users” evolved. Even if the reuse culture of Larcher's subjects may have been dictated largely by financial considerations, it is still a form of untheorized resistance to the narrative of seamless replacement and complete disappearance of older versions that is being promoted by tech companies to encourage a guilt-free, unquestioned switching to a new product.

Far from vanishing, tape-based MiniDVs proliferated in disadvantaged socio-economic spaces and left a mark on communities' self-representation through their failings, due to both ingrained technological limitations and their poor connection to a wider network made of auxiliary devices, spare parts, user guides, maintenance, repair expert advice, and so on, all made unavailable by the unilateral decision of the manufacturers to “cancel” their own devices. Larcher writes extensively about the difficulties he encountered when attempting to digitize the images either the locals or he had captured under these precarious conditions:

| 123

Given the poor quality of the optical system, the MiniDV's single CCD sensor, the high rate of the video signal compression and the use [...] of tapes from different manufacturers [...], the digitized images on the hard disk are marked by several losses and recording defects. [T]hese scenes of birthdays, baby baths and family outings at the funfair reappear, punctuated by numerous drop-outs.⁵

It cannot be stressed enough that the imperfect technological quality of the audiovisual memory of a community, its precarity, its inadequateness to fit in traditional exhibition circuits, feeds back into a community's imposed marginality, keeping it at the outskirts of the dominant economy of representation. Simultaneously, however, it opens up a space of freedom, as the broken ties with the larger techno-industrial complex that the obsolete device is deprived of must be reinvented.

THE CASE FOR THE CATEGORY OF ‘MARGINAL USER’

When talking about media uses and users, and especially when approaching them from the prism of bodily manifestations,⁶ the sub-discipline of experimental media archaeology emerges as a particularly suitable framework. Experimental media archaeology is centred on the epistemological forays that may be achieved by sensitising historical media research through the staging and/or observation of direct physical engagements with the devices being studied; accordingly, one of its main objectives consists of establishing typologies of media users. Annie van den Oever and Andreas Fickers have sketched eight such categories, as follows: imagined users, configured (or prefigured) users, expert users, amateur users, remembered users, re-enacted users, artificial users (or artists), and simulated users.⁷ These categories are determined by the types of sources that make them discoverable to the researcher, as well

124 | as by their anchoring in various temporal layers—some of them rooted in a present or even a future tense of the act of use, and others shifting reflections of past applications. The urgency of the issue of marginalisation in a world that grows more polarised by the day, the inviting, non-rigid structure of Van den Oever and Ficker’s taxonomy and my own work on technological obsolescence coalesce in my proposing a new category of users, namely the *marginal user*. This would be helpful in addressing neglected situations of media usage, such as the one featured in Larcher’s study, where a financially and socially disadvantaged community inherits the crumbling vestiges of an outdated technological infrastructure and shapes its self-representations around it.

Let us first attempt to clarify the meaning of the concept of marginality. Marginality can be understood in different ways, according to which set of criteria is prioritised, but it is generally thought to include an imbalance of power between communities, which in turn implies a marginalised subject who is

poised in psychological uncertainty between two (or more) social worlds; reflecting in his soul the discords and harmonies, repulsions and attractions of these worlds, one of which is often “dominant” over the other; [...] and where exclusion removes the individual from a system of group relations.⁸

Alongside being an economic, social and political reality, marginality can also create a feeling of cultural illegitimacy through the underrepresentation or caricaturizing of marginal communities in popular culture, and the exclusion of these groups from the ranks of the legitimate cultural consumers in the dominant imaginary. It can also prompt a withdrawal towards heavily ethno-centric or class-centric forms of expression, which may reach the general

cultural landscape only through more or less conscious processes of self-exoticisation. For all these reasons, the topic of technological disadvantage and its intersection with, on the one hand, questions of the right to control one's own representations and, on the other, the issue of the violence perpetrated on objects as well as humans by planned obsolescence, is highly relevant to the discipline of media archaeology. In addition, it prompts us to interrogate the extent to which the discipline is willing to embrace explicitly militant stances. Bringing marginal technological uses to light would destabilise the liberal narrative of the new globalised media sphere, and engage researchers' responsibility to not only study, but also actively oppose the social ills they encounter in their work.

Returning to Van den Oever and Ficker's original taxonomy, it must be stated that the category of the marginal user does not integrate seamlessly into it, as it muddles temporalities and degrees of professionalism. Marginal users may resort to obsolete media devices without a demonstrative or performative logic, but rather under the pressure of economic hardship; moreover, they will most probably not utilise those devices as dominant past users have done, instead developing hybridisations between hegemonic modes of usage and their own distinct cultural habits. Nevertheless, it would be insensitive to automatically assimilate the marginal user to the amateur, on the basis of their operating outside the dominant media industry, given that marginal communities generate their own parallel professional hierarchies and work practices. To return to the situation explored by Larcher, this French-born researcher did not simply witness the technological backwardness of the community he studied, he actually made it manifest, as his own film gear corresponded to Western standards of quality. But this apparent inequality actually granted Larcher access to the community's rites on two counts. On the one hand, technical equipment became a social link, insofar as it established a correspondence between Larcher and the revered caste of the *läutari*, sought-after and well-paid professional musicians who perform at all the significant events in the community, and who also distinguish themselves through the mastery of advanced technological devices (in their case, sound devices). Larcher describes the type of male sociability that stems from this shared technological privilege as being professional, comradely and defined by a normative tactility, which imposes a respectful distance from another man's gear, unless expressly permitted by the owner.⁹ On the other hand, Larcher becomes the depository of a part of the audiovisual heritage of the community, as he is asked by some of the villagers to record christenings, birthdays and weddings—once again the existence of the superior technology, in the shape of Larcher's device, does not erase the inferior one owned by the locals, but creates a space of hybridity attesting to the co-creation of the heteroclitic

ensemble of collective memory by various technological and cultural regimes. In this case as in many others, the topic of marginal technological uses demonstrates its role as a powerful disruptor of established practices and prejudices and as an impetus to constantly reevaluate sedimented knowledge and design modular, open media theoretical frameworks.

THE CHALLENGES POSED TO MEDIA ARCHAEOLOGY BY MARGINAL TECHNOLOGICAL USES

In their editorial to the 2020 special issue of the journal *Early Visual Popular Culture* dedicated to media archaeology, Erkki Huhtamo and Doron Galili identified three challenges that media archaeology, understood as a fully-fledged scholarly pursuit, has to face in order to continue its development:

126 |

The most important is cross-cultural: media archaeology began in Europe and has been primarily a European initiative, [but] large parts of the global territory of media culture and history remain white spots, and until further steps are taken to amend the situation, the “project” of media archaeology remains incomplete. A second challenge involves theoretical perspectives on gender and sexuality. Even though media archaeologists have attempted to denaturalize media technologies and discuss their relation to living bodies, more often than not they pay too little critical attention to such perspectives. [...] A third challenge involves coming to terms with the prospects and promises of media archaeology itself. [...] [A] greater degree of self-reflexive engagement with the goals of media archaeology is still in order.¹⁰

The issue of the marginal user explicitly addresses the first and third of these challenges, by inviting researchers to look beyond the borders of the symbolic space of dominant media uses, which is also the geographical space of affluent societies and, more specifically, the areas inhabited by economically privileged urban users. Simultaneously, as mentioned previously, embracing the category of the marginal user requires a redesign of the aims of media archaeology, which would make more room for socially conscious approaches to media infrastructures and ultimately for direct research-action.

Regarding Huhtamo and Galili’s second challenge related to gender and sexuality, a return to Larcher’s study demonstrates how gender-specific media usages can be conditioned by the disempowered status of women, in addition to that of members of a marginalised community. Early in his research, Larcher lent a MiniDV camera to a few women from Dițești in order to capture their

gender-situated everyday life.¹¹ After they had familiarised themselves with the technological constraints, some of the women overcame the gap between filming and living situations, and started developing a camera-mediated gaze informed both by their non-threatening position as family member, friend or neighbour, which gave them access to their subjects' most guarded intimacy, and also by the more authoritative one of image-maker. Larcher describes a particularly revealing example of how deeply ingrained traditional gender roles become manifest in the power struggles that the act of recording initiates between those situated behind and those in front of the camera. He relates an occurrence when Maria, one of the few female Roma professional soloists, takes Larcher's MiniDV to a concert with other *lăutari* in a nearby city. She only manages to film a few shots during a break between songs before a fellow male musician takes the camera away from her, and starts shooting various participants, including Maria, thus putting her back in her place as an object of the gaze, and demonstrating

| 127

the extreme difficulty of making images from a dominated social position such as that of female musicians among the *lăutari*, a professional environment where women are isolated and often under-equipped.¹²

Such a difficulty has been minimised by the generalisation of digital technology and of image-recording facilities incorporated into mundane, ubiquitous devices such as mobile phones; Larcher notes that, since 2012, these vernacular images have become the dominant self-representational regime of daily life in Roma communities, and have been predominantly produced and distributed by women.¹³ In this context, the MiniDV can also be seen as an intermediary stage between a male-regulated production of images, which was heavily based on questions of possession and mastery of technological devices—albeit ones which were at the end of their lifespan—and which mostly avoided domestic spaces, and a female vernacular production less centred on the apparatus and more focused on values such as accessibility, adaptability, portability and communicability, and therefore appropriate for the probing of intimacy. The camera turns the social situations in the midst of which it is introduced into experimental situations for testing shifting gender roles, as the capacity to create and impose a certain representation starts being more equitably distributed between men and women. Unfortunately, only a small amount of the recent digital audiovisual materials produced by Roma women within their domestic space, and posted on social media and video-sharing platforms, gets viewed by people outside their close social circle, even if that would be technically possible: while the sensible manifestations of technological backwardness fade with the increased accessibility of the autonomous

technical ensemble constituted by the mobile phone, images become subjected to other constraints, such as the sorting processes of algorithms and their own brand of enforcement of the discrepancy between centre and margins.

I have aimed to use the example of Jonathan Larcher's research, and more specifically his remarks concerning certain circumstances—whether artificially provoked or already existing in the social life of the community he was observing—where the MiniDV camera makes an appearance, in order to emphasise the existence of what Larcher himself calls “inferior technological regimes”¹⁴ and the disturbances they create in the traditional narrative of the social embeddedness of contemporary image-making technologies. Media archaeology and, to an even greater extent, experimental media archaeology may find it interesting to add the axis of socio-economic status to the chronological one they already explore, in order to compose a richer tableau of the trajectory of technological infrastructures. Obsolescence, especially in its

128 | accelerated and strategic contemporary form, creates occasions for the emergence of inferior regimes of use, which often occur in contexts of social disenfranchisement and poverty, and also sometimes cultural marginality. While the device reveals new affordances in these situations, its presence, the new communication and distribution networks it generates, and the new physical and intellectual gestures it entails may also impact the organisation and the possibilities for self-representation of marginalised groups—thus opening many research paths for an anthropologically sensitive and socially conscious media archaeology.

NOTES

1 Jonathan Larcher, “Des arts filmiques en anthropologie: Enquête, expérience et écologie des images en ‘Tsiganie’,” (PhD diss., Université de Recherche Paris Sciences et Lettres, 2018).

2 Ibid., 478.

3 Ibid., 405–406; my translation.

4 Rossella Catanese and Jussi Parikka, “Handmade Films and Artist-Run Labs: The Chemical Sites of Film’s Counterculture,” *NECSUS: European Journal of Media Studies* 7, no. 2 (2018): 43–63, <https://doi.org/10.25969/mediarep/3459>.

5 Larcher, “Des arts filmiques en anthropologie,” 448.

6 When thinking of the wider topic of marginalised communities, this focus on bodily manifestations proves particularly relevant in relation to practices of biopolitics and the devaluation of alternative modes of being, used as tools of oppression and social control.

7 Annie van den Oever and Andreas Fickers, “Doing Experimental Media Archaeology: Epistemological and Methodological Reflections on Experiments with Historical Objects of Media Technologies,” in *New Media Archaeologies*, eds. Ben Roberts and Mark Goodall (Amsterdam: Amsterdam University Press, 2019), 45–68.

8 Everett V. Stonequist, *The Marginal Man: A Study in Personality and Culture Conflict* (New York: Charles Scribner, 1937), 8.

9 Larcher, “Des arts filmiques en anthropologie,” 405.

10 Erkki Huhtamo and Doron Galili, “The Pasts and Prospects of Media Archaeology,” *Early Visual Popular Culture* 18, no. 4 (2020): 334–335.

11 Larcher, “Des arts filmiques en anthropologie,” 404–417.

12 Ibid., 416.

13 Ibid., 405.

14 Ibid., 479.

| 129

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How to Re-Activate the Endangered Archive of a Historical Science Film Festival

A Speculative Approach

SILVIA CASINI

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| 131

ABSTRACT

The U-matic tape, an analogue videorecording cassette format, is one among the many devices held in the archives of The International Festival of Scientific and Educational Film (1956–1975), the historical science film festival under investigation here. Combining a media archaeological approach with James Secord's 2004 notion of "knowledge in transit," I define a science film festival as a network of relations that comprises and combines different apparatuses, spaces and discourses that aim at the circulation of specialised knowledge across different communities. Mine is a speculative and imaginative exercise that invites scholars to take seriously the devices, both technical and discursive, that shape film festivals, ensure their preservation, and re-activate knowledge facilitating its circulation to new audiences, particularly focusing on U-matic tapes.

KEYWORDS

Science film festival; U-matic tape; knowledge circulation; archival practices; media history

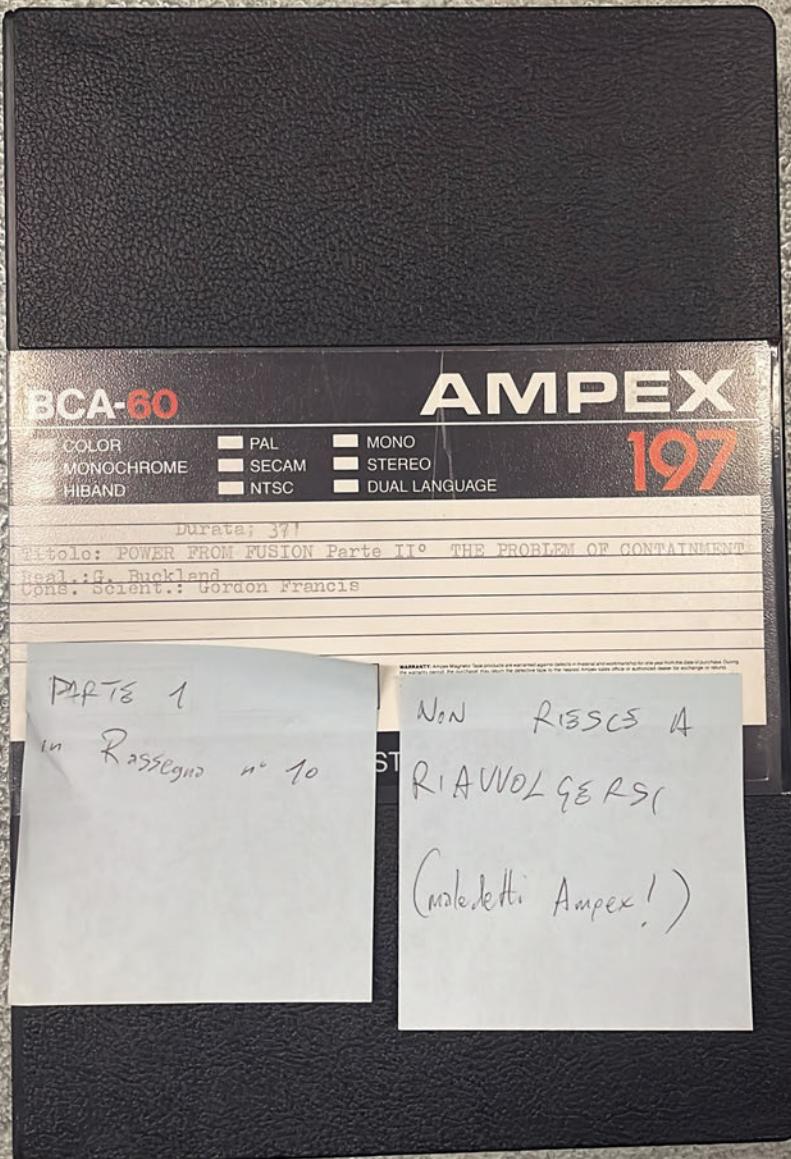


FIGURE 10

U-matic tape of the film *Power from Fusion Part II: The Problem of Containment*, shown in the 11th edition of IFSEF. Two post-it notes, in Italian, read: "Part I in Edition 10th" and "It fails to rewind. Damned those Ampex!" Photo: CDLM.

THE U-MATIC TAPE

U-matic is an analogue recording videocassette format developed by Sony, and by other manufacturers such as Ampex. The standard tape measures 21.99–22cm (width) x 13.7–14 (height) x 3.2–3.8 (depth). It was introduced into the market in 1971 and soon became a key infrastructure for the production and dissemination of visual media, and was a forerunner of home video formats. The success of this format was not only because of its technical superiority but also because of its alignment with the workflows and requirements of broadcasters, corporations and educational institutions. In the eighties, the rise of competing formats like Betacam and VHS, which offered different trade-offs in terms of cost, quality and portability, meant that the U-matic was abandoned, resulting in a flood of surplus equipment entering the second-hand home users' market. Recently, a resurgence of interest in analogue media formats, including U-matic, can be understood as part of a broader nostalgia for pre-digital technologies.

| 133

THEORETICAL FRAMING

The U-matic tape is one among many other devices to be found in the endangered material in the archive of The International Festival of Scientific and Educational Film 1956–1975 (henceforth IFSEF), the historical science film festival of particular interest to this chapter. Combining a media archaeological approach with Oliver Gaycken's concept of "devices" and James Secord's notion of "knowledge in transit," I define a science film festival as a network of relations that comprises and combines different apparatuses, spaces and discourses that aims at the circulation of specialised knowledge across different communities. Mine is a speculative and imaginative exercise that invites scholars to take seriously the devices, both technical and discursive, that shape film festivals and ensure their existence over time. The history of a science film festival like IFSEF can be reconstructed by focusing on the devices (films and miscellanea) that are held in its archives. My focal point is the U-matic cassette as the preferred format to preserve a selection of IFSEF's 16mm and 35mm films, and to then transfer them into digital files, thus ensuring not only the (at least temporary) preservation of the films but also their circulation amongst new audiences.

SCIENCE FILM FESTIVALS: THE CASE OF IFSEF

The Centre for Digital Learning and Multimedia (CDLM) of the University of Padua holds a series of devices in storage: films, U-matic tapes and posters. One of the posters depicts a stylised representation of the anatomical theatre, a landmark of Padua and its university. Inaugurated in 1595 and mentioned in Andreas Vesalius' revolutionary 1543 treatise *De humani corporis fabrica*, the theatre is a symbol of medical knowledge acquired by practice, and is one of the ways in which Padua University presents itself to the world. On the poster, a film strip bears the words 'VIII Rassegna Internazionale del Film Scientifico Didattico' (International Festival of Scientific and Educational Film; IFSEF) and a reference to the Venice Film Festival (VFF), co-organiser of the exposition.

This festival is representative of a broader international group of film festivals (scientific, industrial, educational, etc.) made for purposes other than spectacle and entertainment, which transpired in different nations after WWII.¹ In line with film festivals elsewhere, often created under the auspices of the International Scientific Film Association (an example is the Festival of Films in the Service of Industry held in Harrogate since 1957),² IFSEF attracted entries from around the world as scientists, entrepreneurs and educators competed to create compelling cinematic presentations of the natural and industrial world.

From a transnational perspective, the lifespan of IFSEF—1956–1975—corresponds to a period of great historical and socio-cultural interest. This timeframe is known as “the long 1960s,” an era of “transition and contradiction” world-wide,³ characterised by the expansion of universities in the Western world to meet a civil- and military-industrial need for experts in Science, Technology, Engineering, and Mathematics (STEM) subjects. IFSEF was embedded in and traversed by a wide range of political, scientific and economic phenomena that affected the public sphere and IFSEF programming. The proliferation of subject-specific experts and, at the same time, the emergence of movements of social and cultural change challenged a hegemonic narrative and the belief in the neutrality of scientific expertise.

IFSEF was created in response to needs articulated by the Venice Film Festival. From its birth, the VFF showcased scientific and medical film documentaries among art fiction films. This non-art sub-section was part of collateral sections acting as almost stand-alone small festivals within the VFF.⁴ The VFF section on scientific documentaries had stopped in the year 1953 but was resumed thanks to the institution of collaboration on the Padua exposition in 1956. The aim of IFSEF organisers was to showcase the best science films, seeking to facilitate their circulation within the higher education circuit.

Along with the work of pioneers of scientific cinema world-wide—Éric Duvivier, Eric Lucey, Semyon Raybtur and Norman P. Schenker, among others—IFSEF hosted a small art documentaries section, which further emphasised its ties with the VFF. Across its lifespan, IFSEF tested the permeable boundaries between scientific content and aesthetic form; research and education; public academic institutions; and private industries.⁵

For IFSEF, films were projected in the Ruzante theatre and in educational spaces such as the Morganti classroom at the University of Padua; other public venues in the city of Padua were also used.⁶ The target audience consisted mainly of university students and academics. The films were projected in their original languages and simultaneous translation was offered during the screenings. Before each screening, a short synopsis of the film was read to introduce audiences to the specific film topic.

IFSEF films were mostly in 16mm with a few in 35mm; they were short or medium length; they had magnetic or optical audio bands. The films receiving an award were stored rather than returned to the producer; some of these were transferred in the early 1980s onto U-matic tapes and then into digital format and uploaded on a shared Vimeo channel available to University of Padua staff. Out of a total of 1,227 films screened (averaging 70 films per festival edition), around 300 are kept in a storage space in the CDLM.

| 135

IFSEF was organised by the University of Padua students who created the Centre for Scientific Cinematography (which then became the CDLM), with the goal of providing IFSEF with a permanent organisational structure. Since 1971 the Centre has had several rooms dedicated to different functions, ranging from the projection, recording and editing of films, to functions related to the preservation of the films; there is also a library for consultation purposes.⁷

The current CDLM has a different organisation of spaces and different technologies available to respond to a change of function: nevertheless, the IFSEF films, the miscellanea (photographs, catalogues, film scripts, technical cards on the films), and the U-matic tapes have been stored with a view to being catalogued and made available for public consultation. Each of these devices tells the story of IFSEF and of the reiterated attempts to build and preserve its archive.

The U-matic video tape was a new and a cheaper alternative to film and as such was used in the early 1980s by the CDLM to transfer some of the 16 and 35mm films to tape. Transferring a film to U-matic tape involves a multi-step technical process that bridges analogue film and composite video signals. The first step entails film preparation: the film (16mm, 35mm or other formats) is cleaned and inspected for damage. If the film is silent, an audio track may need to be synchronised separately. For colour films, any correction may be applied during transfer. Second, the film is scanned frame-by-frame using a telecine

machine that converts the analogue film frames into an electronic video signal. Third, the raw video signal from the telecine must undergo adjustments such as colour correction, frame rate conversion, and composite encoding. Fourth, the processed composite video signal is recorded onto a U-matic tape using a U-matic recorder. Finally, the recorded U-matic tape is checked for any video dropout (signal loss due to tape imperfections), audio sync issues, colour fidelity, and so on. Once checked, the U-matic tape is a broadcast-standard copy of the original film, suitable for TV playback, editing or archival storage.

The transition from film to U-matic, then, became one of the ways in which IFSEF could create an afterlife for their archival material, thus safeguarding the circulation of its specialised knowledge to contemporary audiences. However, since the U-matic tape is fragile in its own right, and perhaps even more so than the original film reels—if only because its electronic signal is easily damaged during storage and use—special attention was needed to safeguard

136 | the U-matic collection. As humidity, heat and other factors can cause signal loss, ensuring proper U-matic video cassette storage, professional technical intervention/restoration and, if possible, digitization, is now crucial to avoid losing visual and audio information forever.

RE-ACTIVATING IFSEF'S FILM FESTIVAL AND ITS ARCHIVE THROUGH THE DEVICES OF KNOWLEDGE IN TRANSIT

Science film festivals, as *networks of relations* that comprise and combine different devices, spaces and discourses, offer something that other networks such as film societies, libraries, and archives do not. As *associations* of experts—filmmakers, critics, academics, entrepreneurs, etc.—they foster the *circulation* of specialised knowledge across different communities and audiences, that is, circulation beyond their specific field, thus demonstrating the inherently interdisciplinary nature of their scientific endeavour. Finally, through the awarding process, science film festivals enable the *documentation* and, in some cases, preservation of the best filmic achievements of the year.

The history of a science film festival like IFSEF can be reconstructed by focusing on the devices that are held in its archives: not only the films, but also the para-filmic material. In order to expand the focus of analysis from film content to material, technical and infrastructural aspects, a focus on different technological devices and para-filmic material is necessary to avoid fetishising individual films.⁸ After all, the material of cinema includes much more than just the film—the projector, the venue and so on.⁹ As Giovanna Fossati argues, film exhibition means turning each new screening of a particular film into a different performance.¹⁰

Oliver Gaycken pays special attention to the various physical apparatuses, techniques and strategies employed in early scientific films to captivate and educate audiences.¹¹ The devices include both tangible technologies/contrivances as well as the debates, structural decisions and programming choices that, in the case of IFSEF, stimulated the organisers' search for a distinctive format across the exposition's lifespan. Thus, IFSEF ceases to be a finite event that existed in a precise timeframe—the years between 1956 and 1975—to become theorised as an archive-driven exhibition *process* that comprises the films, the behind-the-scenes organisation and discourses, and all the paraphernalia available in IFSEF archives, which are currently in the process of being preserved and digitized for widening access to scholarship and public engagement.

These devices are the fundamental yet often unspoken components of a film festival as an apparatus that consists of institutional structures and programming and screening practices. Along with the films, these devices—mapped, interrogated and prepared for (re)use—help to activate memories and generate counter-narratives to hegemonic canons at work in science films and in institutional archives. Different devices reflect different phases of the festival: production, projection, storage and distribution.

These are devices of “knowledge in transit,” an expression defined by James Secord in the context of knowledge-making activities, which in themselves are “a form of communicative action.”¹² In IFSEF, knowledge was initially mediated through 16mm and 35mm films that travelled across different spaces—from the Venice Film Festival to the Padua IFSEF; from the backstage of a scientific laboratory to the public stage of a screen theatre; from the laboratory of a research institution to the corporate company; and from there to the university classroom. Once transferred into different formats—from a 16mm film to a U-matic video tape, from a U-matic tape to a digital file for a Vimeo platform, IFSEF films could re-circulate knowledge and thus acquire new audiences. This complex trajectory demonstrates that the circulation of film knowledge is never straightforward and smooth, and rarely concerns one device only. Moreover, it highlights the relevance of including the festival’s protocols and procedures, and analysis of the actors who initiate, facilitate or impede the transition of knowledge.¹³

What the history of use of various filmic and para-filmic devices also demonstrates in the case of IFSEF is the ongoing quest for a novel format that keeps aesthetic values and the scientific dimension in close dialogue. To this end, the organisers classified films according to categories such as scientific rigour, aesthetic and educational value, which were subject to constant debate across the IFSEF’s festival editions. These efforts are a testimony to IFSEF’s ongoing concerns with what a science film festival might become.

Although IFSEF ceased to exist in 1975 due to financial constraints and the competition of other media, television included, its afterlife continues, thanks to the timely archival transitions it made, from 8 and 16mm film to the U-matic tapes (now obsolete), to the digitization of parts of their collection. The CDLM is now coordinating the cataloguing, digitization and, when required, the restoration of the IFSEF films, including the U-matic tapes and the miscellaneous material. Let me close this chapter by saying that thinking through the different formats and devices of IFSEF was relevant and helpful for preserving its afterlife. The *Imaginarium* project, staged in Padua in 2024 to raise awareness on the history of IFSEF and its legacy, provided a helpful instrument to do so, as this mini-festival sought to celebrate the legacy of IFSEF by re-enacting some of its past events through a range of activities, among them a research seminar for archival experts, a series of film screenings and round-table discussions for the general public, and the display of a selection of IFSEF films and miscellanea. It showed how those carefully restored and preserved IFSEF materials act as story-telling devices that allow us access to the sensory and operational dimensions of media use often lost in traditional historical accounts.¹⁴

NOTES

- 1 See Charles R. Acland and Haidee Wasson, *Useful Cinema* (Durham, NC: Duke University Press, 2011); Vinzenz Hediger, Florian Hoof and Yvonne Zimmermann, *Films That Work Harder: The Circulation of Industrial Film* (Amsterdam: Amsterdam University Press, 2023).
- 2 See Patrick Russell and James Piers Taylor, *Shadows of Progress: Documentary Film in Post-War Britain* (London: Palgrave, 2010), 14.
- 3 Jon Agar, *Science in the Twentieth Century and Beyond* (Cambridge, MA: Polity, 2012), 403.
- 4 The VFF “mini-festivals” can be seen in the online archive of ASAC: <https://asac.labienale.org/attivita/cinema/annali?anno=1956>. On the VFF, see Christel Taillibert and John Wäfler, “Groundwork for a (Pre) History of Film Festivals,” *New Review of Film and Television Studies* 14, no. 1 (2016): 5–21.
- 5 Silvia Casini, Paolo Magaudda, and Federico Neresini, “Communicating Science through Films: The Case of the International Festival of Scientific and Educational Film (1956–1975),” *Science as Culture* 34, no. 1 (2024): 1–25. <https://doi.org/10.1080/09505431.2024.2375208>.
- 6 Giorgio Tinazzi, “IFSEF history,” interview with Silvia Casini, Padua, 22 February 2023.
- 7 Paola Robuschi, “Il Centro di Cinematografia Scientifica dell’Università di Padova,” in *Personnel in Charge of European University Organisation for Scientific Cinematography, Research and Audio-Visual Media. Minutes of the Reports and Discussion of the Seminar*, edited by Centro per la Cinematografia Scientifica dell’Università di Padova (Padova: University of Padova, 1975), 92–97.
- 8 Jesse Olszynko-Gryn criticises the idea of exceptionality of the filmic object found in studies of early scientific cinema, privileging instead an intermedial understanding of films in relation to other objects and practices; Olszynko-Gryn, “Filming Fly Eggs: Time-Lapse Cinematography as an Intermedial Practice,” *Isis* 112, no. 2 (2021): 307–314.
- 9 Scott Curtis, *The Space of Spectatorship: Art, Science, and Early Cinema in Germany* (New York: Columbia University Press, 2015), 14.
- 10 Giovanna Fossati, *From Grain to Pixel: The Archival Life of Film in Transition* (Amsterdam: Amsterdam University Press, 2018), 147.
- 11 Oliver Gaycken, *Devices of Curiosity: Early Cinema and Popular Science* (Oxford: Oxford University Press, 2015), 4.
- 12 James A. Secord, “Knowledge in Transit,” *Isis* 95, no. 4 (2004): 661.
- 13 *Ibid.*, 667.

14 On the media archaeological approach see Andrea Fickers and Annie van den Oever, *Doing Experimental Media Archaeology: Theory* (Berlin: De Gruyter Oldenbourg, 2022). For *Imaginarium*, https://www.consultacinema.org/wp-content/uploads/2024/04/Imaginarium_Research-seminar-in-English.pdf.

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The Kinora as an Intermedial Dispositif of Early Twentieth-Century Home Cinema

TIM VAN DER HEIJDEN

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| 143

ABSTRACT

This chapter explores the Kinora as an early twentieth-century home cinema technology by positioning it “in between” nineteenth-century optical toys and early cinema, film and photography, and individual and collective modes of viewing. Drawing on the concept of dispositif, it analyses the materiality, design and use of the Kinora in relation to other media technologies and user practices, including early cinema systems like the Lumière Cinématographe, nineteenth-century optical toys such as the stereoscope and Mutoscope, flip-books, and paper-based animated portrait photography systems. This intermedial positioning allows us to understand the Kinora as a dispositif in its own right—an *intermedial* dispositif of early twentieth-century home cinema that exemplifies a historically specific hybrid constellation of technological, cultural and experiential elements.

KEYWORDS

Kinora; home cinema; dispositif; intermediality; optical toys; early cinema



FIGURE 11
The Kinora viewer and reel.

THE KINORA

Introduced by Auguste and Louis Lumière in 1896, the Kinora was an individual motion-picture viewing device. The apparatus, consisting of a viewer and a reel, was an adapted version of the Mutoscope, invented a few years earlier by American inventor Herman Casler, and based on a similar flipbook-like principle. Various types of Kinora viewers were produced—first in France by the film production company Gaumont, and later in England by the British Mutoscope and Biograph Company and, after 1907, by the London-based Kinora Company and Bond's Limited. This Kinora viewer is a basic folding wooden model, featuring a sheet-metal lens hood in the shape of a stereoscope with two fixed magnifying lenses inside, and a worm gear mechanism that drives the Kinora reel. A reel contains approximately 640 curved paper-based photographic image cards held together by a brass core, which includes a small hole to mount the reel onto the Kinora viewer. By manually turning the rotating handle located on the right side of the viewer, the reel is activated, and one can watch the series of black-and-white image cards in motion through the magnifying lenses. Depending on the speed of rotation, a Kinora reel typically provides a duration of 30 to 40 seconds. This Kinora viewer, including the rotating handle, measures 16.5 cm in width, 29 cm in height, and 28 cm in depth, and weighs 11 kg. A Kinora reel measures circa 12 x 2 cm. Each image card features an image with dimensions of 24 mm x 19 mm, resulting in an aspect ratio of 1:1.26.

| 145

THEORETICAL FRAMING

This chapter discusses the Kinora as an early motion-picture technology designed for home use. It positions the Kinora in relation to other media technologies and user practices, including early cinema systems like the Lumière Cinématographe, nineteenth-century optical toys such as the stereoscope and Mutoscope, flipbooks, and paper-based animated portrait photography systems like the Biofix and Filoscope. The chapter aims to make these synchronic and diachronic intermedial connections visible by analysing the Kinora's position at the intersections of optical toys and early cinema, photography and film, and personal and collective modes of viewing moving images. Focusing on the interrelationships between the object's materiality, design and histories of use, it reflects on the Kinora as an intermedial dispositif of early twentieth-century home cinema.

Home cinema¹ is a ubiquitous practice in today's digital media landscape, shaped by video streaming platforms such as YouTube, Netflix and Disney+. Yet the practice of watching moving images at home has a much longer and more varied history. Since the advent of cinema in the late nineteenth century, a wide range of home cinema technologies has emerged—from analogue film projectors for screening reduction prints to television sets equipped with VCRs, DVD and Blu-ray players. This chapter revisits one of the earliest examples of such home cinema technologies: the Kinora.² Originally invented and patented by Auguste and Louis Lumière in France in 1896, and further developed in England during the 1900s and early 1910s, the Kinora was a popular early motion-picture technology at the time. As film historian Barry Anthony notes in his book *The Kinora: Motion Pictures for the Home, 1896–1914*, it was even considered “the most successful of the ‘home movie’ machines marketed in Britain before 1912.”³

146 | The Kinora system was mainly used for viewing professionally recorded films, reproduced and printed on Kinora reels that could be bought or rented for home use.⁴ Hundreds of these reels were produced, featuring a variety of subjects and genres, including child portraits, moving trains and comedic sketches.⁵ In addition to viewing ready-made reels, it also became possible to have one's own “animated portraits” recorded at the Kinora company's photographic studio in London.⁶ Around 1908, even a Kinora motion picture camera was released, aimed at upper-middle-class families and amateurs who wanted to make their own home movie recordings. By the early 1910s, however, interest in the Kinora system began to decline, as the broader film landscape shifted toward longer, narrative-driven feature films, and “viewing a professional Kinora subject at home no longer equated with the experience of attending a public filmshow.”⁷ Despite efforts to revitalise the system—including the introduction of double-length reels with 1,280 images to extend its running time—the Kinora was ultimately discontinued following a fire at the Kinora factory in Letchworth in January 1914.⁸

This chapter reassesses the Kinora's place in film and media historiography by focusing on its relationships with other media technologies and user practices. Drawing on the notion that “it is almost impossible to analyse any medium from any theoretical or methodological perspective without considering its relationships with other media,”⁹ I examine the Kinora from a media historical and intermedial perspective. This approach reveals how the Kinora is uniquely positioned along three intersecting axes: between optical toys and early cinema, between film and photography, and between individual and collective modes of viewing.

BETWEEN OPTICAL TOYS AND EARLY CINEMA

First of all, the Kinora was positioned between optical toys and early cinema. In the historical sources, the device is sometimes described in relation to nineteenth-century optical toys, such as the Phenakistoscope and Zoetrope. Most notably, the round shape of the Kinora reel, the curvature of the photographic cards, and their successive display in the viewer made the device correspond to the materiality and design of the Mutoscope—also known as the “What the Butler Saw” machine. The mechanism of the Kinora viewer is, as Henry V. Hopwood wrote in his 1899 book *Living Pictures: Their History, Photo-Production and Practical Working*, “very similar in principle.”¹⁰ Media historian Stephen Herbert likewise discusses the Kinora as “a miniaturised mutoscope,” but refers to the stereoscope as “[p]erhaps the viewing device most closely comparable to the Kinora.”¹¹

Although the Kinora shows clear similarities to nineteenth-century optical toys such as the stereoscope and Mutoscope, both in terms of design and functionality, it was, in fact, invented a year after the Lumière Cinématographe. While both devices shared the ability to produce the illusion of moving images, they constituted rather different viewing experiences and modes of spectatorship—ranging from individual-domestic to collective-public. Furthermore, they differed in terms of image size, length of display, and other technological and experiential aspects, such as the ability of the spectator-as-user to directly control or manipulate the images.¹² Despite these differences, the Kinora and the Lumière Cinématographe were initially used in complementary ways. The original 1896 Kinora patent even mentions the Cinématographe as the recording apparatus from which the “successive pictures of an animated scene” could be obtained.¹³ As Herbert notes in his essay on the Kinora, it was “intended originally as a system of home presentation for the growing library of Lumière films.”¹⁴

Consequently, one could argue that the Kinora system was positioned “in between” nineteenth-century optical toys and early cinema. While its materiality, design and functionality share similarities with optical devices such as the stereoscope and Mutoscope, its applications in fact complemented and supported early cinema developments. This is not to say that the Kinora should be considered merely a transitional device. After all, early cinema technologies like the Lumière Cinématographe also retained strong connections to nineteenth-century optical toys and other pre-existing visual media and screen practices.¹⁵ The Kinora once again highlights the parallel trajectories and contingent histories that shaped early cinema—including the history of home cinema.

BETWEEN FILM AND PHOTOGRAPHY

Secondly, the Kinora was positioned between film and photography. The original Lumière patent from 1896 refers to the Kinora as an “Apparatus for the Direct Viewing of Chrono-photographic or Zootropic Pictures.”¹⁶ Though not on a large scale, some Kinora reels were even produced in the form of photo flipbooks. During the 1900s and 1910s, the Kinora was more broadly described as a system for “motion photography,” similar to animated photography systems like the Biofix and Filoscope.¹⁷ The Kinora camera, which took both unperforated celluloid film and light-sensitive paper with a width of one inch (25.4 mm) as recording material, was advertised as “the camera that has revolutionised photography.”¹⁸ Another advertisement reads:

Without knowledge of Photography, without Chemicals, without fuss or focussing, the all-British Kinora Motion Camera makes the most enchanting child-portraits (in motion), pictures of outdoor, sporting and social scenes, studies of golfing strokes for practical use, and every other kind of Living Pictures at a trifling cost. These are viewed in the Kinora [viewer] without lantern or screen.¹⁹

At the time, the Kinora camera’s design reminded Frederick A. Talbot of an “ordinary hand-camera” used by amateur photographers.²⁰ At the same time, its use of unperforated paper film and a sprocketless roller aligned it more closely with the pioneering cinematography cameras invented by Louis Le Prince (which also used light-sensitive paper film), William Friese-Greene (which also featured sprocketless rollers) and Robert Paul (which also accommodated forty feet of film).²¹

In addition to its technological system, certain Kinora user practices were also described in photographic terms. The previously mentioned practice of having family Kinora reels made at the company’s studio in London, for instance, was advertised as producing “animated portraits” and a “living portrait album”:

YOUR OWN Animated Portrait! Or that of your Family and Friends! Arrangements can now be made for photographic sittings of individuals or groups for Kinora Picture Reels. Thereby the Kinora becomes a living portrait album—reproducing in movement and with startling semblance to life the features and forms of dear ones. Parents, Husband, Wife, Children, Friends, Pets, LIVE FOR EVER IN THE KINORA.²²

The discourse of immortality, so prominent in this Kinora advertisement, connects the art of photography and its ability to capture or freeze time²³ to the promise of film as a medium that captures and reproduces movement. One could thus argue that the Kinora, as a motion picture technology, is positioned in between these media. As Herbert puts it: “In a way the paper base of these [Kinora] images ties them to ‘Photography’—but in their movement they attempt to deny the inescapable immobility of the photograph.”²⁴

BETWEEN INDIVIDUAL AND COLLECTIVE VIEWING

Finally, the Kinora can be positioned between individual and collective viewing. Similar to the Kinetoscope, Mutoscope and stereoscope, the Kinora enabled individual viewing practices in its original constellation. In the words of media archaeologist Erkki Huhtamo, it constitutes a domestic “peep media” dispositif, in which moving images are experienced by looking through the lens of the viewer, one person at a time.²⁵ The Lumière Cinématographe, by contrast, was intended for theatrical presentation and enabled *multiple* spectators to watch the images projected on a screen simultaneously—a continuation of the “art of projection” as practised in magic lantern slide performances.

| 149

While the Cinématographe and Kinora seem targeted at two distinct practices and contexts of use, differentiating these moving image screening devices strictly along the lines of personal versus collective viewing is not entirely accurate historically. As early as 1901, only five years after the Kinora was invented, a luxury clockwork-based viewer model was released that actually allowed for multiple spectators.²⁶ In this second “type” of Kinora viewer, the “reel is mounted in a cabinet, which is fitted with two or more lenses, so that two or more people can follow the movement of the pictures simultaneously.”²⁷ This cabinet-type Kinora viewer arguably constitutes a rather different viewing mode compared to the first model. Unlike the peep media dispositif, it allows multiple spectators to watch the moving images from a distance.²⁸

Although the cabinet Kinora viewer with multiple windows made the motion-picture technology more suitable for home cinema as a collective viewing practice,²⁹ the Kinora reel’s limited duration—showing only about 30 to 40 seconds of moving images—ultimately could not compete with the growing popularity of domestic film projection on a screen, which “became the much preferred method of entertainment over the flip-book style.”³⁰ While the original nitrate celluloid film material exposed in the Kinora camera could technically be used for projection after development, its non-standard dimensions and lack of perforations along the edges prevented the negative from being printed on standard 35mm positive film. The images were therefore usually watched exclusively through the Kinora viewer.³¹

CONCLUSION

By positioning the Kinora between optical toys and early cinema, photography and film, and individual and collective viewing practices, we can reassess its place within film and media historiography—or at least offer another perspective on the Kinora as an early twentieth-century home cinema technology and its histories of use. The intermedial perspective reveals the connections between the materiality, design and use of the Kinora and other media technologies, both synchronically (within its time of use) and diachronically (across and beyond its time of use). Making these synchronic and diachronic relationships to other media technologies explicit uncovers both continuities and discontinuities in moving image technologies and their user practices from a long-term historical perspective.³² For instance, it shows how early twentieth-century interactions with moving images were shaped not only by

150 | the technological affordances of the medium, but also by surrounding intermedial discourses. The previously mentioned advertising phrase “LIVE FOR EVER IN THE KINORA,” for example, exemplifies the discourse of immortality associated with both photography and film, but also pertains to the circular design of the reel and the technological affordance of the Kinora as a mechanical apparatus to keep the images moving without the need for rewinding.³³

Furthermore, the analysis provides insights into both historical and contemporary ways in which we engage with moving images. Rather than conceiving the Kinora merely as a precursor to later projection-based home cinema dispositifs, this chapter has positioned it “in between” nineteenth-century optical toys and early cinema, film and photography, and individual and collective modes of viewing.³⁴ This intermedial positioning allows us to understand the Kinora as a dispositif in its own right—an *intermedial* dispositif of early twentieth-century home cinema that exemplifies a historically specific hybrid constellation of technological, cultural and experiential elements.³⁵ Following media historian Andreas Fickers’ call for historicising media dispositifs as a “heuristic tool” to trace the changing meanings and functions of media technologies across their life cycles,³⁶ the Kinora emerges as a lens through which to rethink the historical dynamics of home cinema as a mediated cultural practice. By highlighting both the historical continuities and discontinuities in the practices of watching moving images at home, this media historical and intermedial perspective reveals how home cinema has never been defined by a singular technology or mode of spectatorship, but by fundamentally hybrid and ever-shifting constellations of moving image technologies, discourses, user practices and experiences.

NOTES

1 In this chapter, I use the term “home cinema” not as a fixed technological category, but as a historically variable dispositif: a shifting constellation of technologies, media formats, and distribution systems that shape the cultural meanings and social practices of watching moving images at home.

2 See also Tim van der Heijden, “The Kinora: The First Home Cinema Technology,” *Europeana*, 20 September 2023, <https://www.europeana.eu/en/stories/the-kinora-the-first-home-cinema-technology>; Tim van der Heijden and Claude Wolf, “Replicating the Kinora: 3D Modelling and Printing as Heuristics in Digital Media History,” *Journal of Digital History* 2, no. 1 (2022), <https://doi.org/10.1515/jdh-2021-1009>.

3 Barry Anthony, *The Kinora: Motion Pictures for the Home 1896–1914* (London: The Projection Box, 1996), 3. See also Elizabeth Evans, *The Enchanting Kinora: Domesticating Moving Images in Edwardian Britain* (London: Bloomsbury Publishing, 2025). | 151

4 Anthony, *The Kinora*, 3.

5 Ibid., 9–10.

6 This photographic studio was the Biograph Studio, owned by the British Mutoscope and Biograph Company. After 1911, a studio by Bond’s Limited was used for taking the Kinora portrait pictures. See Anthony, 9–15. For a history of the British Mutoscope and Biograph Company, see Richard Brown and Barry Anthony, *A Victorian Film Enterprise: The History of the British Mutoscope and Biograph Company* (Trowbridge: Flicks Books, 1999).

7 Anthony, *The Kinora*, 13.

8 Ibid., 17–18.

9 Carlos A. Scolari, *On the Evolution of Media: Understanding Media Change* (London: Routledge, 2023), 161. See also Jürgen E. Müller, “Intermediality and Media Historiography in the Digital Era,” *Acta Universitatis Sapientiae, Film and Media Studies*, no. 2 (2010): 18.

10 Henry V. Hopwood, *Living Pictures: Their History, Photo-Production and Practical Working* (London: The Optician & Photographic Trades Review, 1899), 39.

11 Stephen Herbert, “Kinora Living Pictures,” *Photo Historian*, no. 95 (1991): 105.

12 Nick Dulac and André Gaudreault’s distinction between the “player mode of attraction” and the “viewer mode of attraction” is relevant in this context. In the *player mode*, typical of nineteenth-century optical toys, the spectator actively engages with the apparatus, whereas in the *viewer mode*, the spectator is positioned outside the apparatus, at a distance, and no longer controlling the image. See Dulac and Gaudreault, “Circularity and Repetition at the Heart of the Attraction: Optical Toys and the Emergence of a New Cultural Series,” in *The Cinema of Attractions Reloaded*, ed. Wanda Strauven (Amsterdam: Amsterdam University Press, 2006), 239.

13 Auguste Lumière, Louis Lumière, and Benjamin Joseph Barnard Mills, “‘Apparatus for the Direct Viewing of Chrono-Photographic or Zootropic Pictures’. British Patent No: 23,183,” 1896.

14 Herbert, “Kinora Living Pictures,” 104.

15 See, for instance, Charles Musser, *The Emergence of Cinema: The American Screen to 1907* (Berkeley, CA: University of California Press, 1990).

16 Lumière, Lumière, and Mills, “Apparatus for the Direct Viewing of Chrono-Photographic or Zootropic Pictures”. British Patent No: 23,183.”

17 Stephen Herbert, “Animated Portrait Photography,” *History of Photography* 13, no. 1 (1989): 65–78, <https://doi.org/10.1080/03087298.1989.10442169>.

18 Anthony, *The Kinora*, 14.

19 Ibid., 15.

20 Frederick A. Talbot, *Moving Pictures: How They Are Made and Worked* (Philadelphia: J. B. Lippincott Co., 1914), 302.

152 | 21 Ibid., 205, 303.

22 Kinora advertisement, cited in Anthony, *The Kinora*, 11.

23 Roland Barthes, *Camera Lucida: Reflections on Photography* (New York: Hill and Wang, 1981).

24 Herbert, “Kinora Living Pictures,” 111.

25 Erkki Huhtamo, “The Pleasures of the Peephole: An Archaeological Exploration of Peep Media,” in *The Book of Imaginary Media: Excavating the Dream of the Ultimate Communication Medium*, ed. Eric Kluitenberg (Rotterdam: NAI Publishers, 2006), 74–155; Huhtamo, “Elements of Screenology: Toward an Archaeology of the Screen,” *ICONICS: International Studies of the Modern Image* 7 (2004): 31–82. See also Erkki Huhtamo, “Toward a History of Peep Practice,” in *A Companion to Early Cinema*, eds. André Gaudreault, Nicolas Dulac, and Santiago Hidalgo (Chichester: Wiley-Blackwell, 2012), 32–51.

26 Elias Bernard Koopman, “‘Improvements in or Applicable to Apparatus for Viewing “Living Pictures” or “Animated” Photographs and the Like.’ British Patent No: 9879,” 1901.

27 Talbot, *Moving Pictures*, 305.

28 I thank Erkki Huhtamo for sharing this insightful remark about the cabinet-type Kinora viewer during a workshop of the research project “Doing Experimental Media Archaeology (DEMA): Practice & Theory” at the University of Luxembourg in December 2019. For the workshop report, see Tim van der Heijden and Aleksander Kolkowski, “Documenting Media Archaeological Experiments,” *DEMA*, 15 July 2020, <https://dema.uni.lu/documenting-media-archaeological-experiments-report/>.

29 Cf. Herbert, “Kinora Living Pictures,” 105.

30 Eric Faden, “Early Cinematic Objects: Kinora and Double Kinora (Mutoscope),” *Bucknell Digital Commons*, 1 January 2011, <https://digitalcommons.bucknell.edu/cinematic/9>.

31 Talbot, *Moving Pictures*, 303–305.

32 Cf. Tim van der Heijden, “Hybrid Histories: Technologies of Memory and the Cultural Dynamics of Home Movies, 1895–2005” (PhD thesis, Maastricht University, 2018).

33 The Kinora advertisements highlight this ease of use: “When finished, [the Kinora reel] continues to repeat itself without rewinding.” Cited in Anthony, *The Kinora*, 17. See also Dulac and Gaudreault, “Circularity and Repetition at the Heart of the Attraction.”

34 See also Tim van der Heijden, “‘Live Forever in the Kinora’: Motion Photography in between Pre- and Early Cinema,” in *Virtual Worlds in Early Cinema: Devices, Aesthetics and Audiences*, edited by Ángel Quintana and Jordi Pons (Girona: Museu del Cinema, 2022), 67–77.

35 See, for a discussion of the dispositif-concept, Frank Kessler, “Notes on *Dispositif*,” 2007, <http://frankkessler.nl/wp-content/uploads/2010/05/Dispositif-Notes.pdf>. | 153

See also Kessler, “The Multiple *Dispositifs* of (Early) Cinema,” *Cinémas* 29, no. 1 (2018): 51–66, <https://doi.org/10.7202/1071098ar>.

36 Andreas Fickers, “Neither Good, nor Bad, nor Neutral’: The Historical *Dispositif* of Communication Technologies,” in *Journalism and Technological Change: Historical Perspectives, Contemporary Trends*, eds. Martin Schreiber and Clemens Zimmermann (Frankfurt a.M. / New York: Campus, 2014), 46–47.

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| 155

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CHAPTER 9

The Homemade Film Projector

GUY EDMONDS

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| 157

ABSTRACT

This chapter presents an object-led enquiry into the practice of self-building film technology. The “text” of a particular example, constructed by a known individual, is read with reference to other examples of homemade projectors collected by the author. This newly assembled corpus is contextualised through research into the printed discourse surrounding DIY culture and amateur film making. The chapter aims to launch the historical practice of artisanal film technology as a topic for further investigation.

KEYWORDS

Homemade; DIY; 9.5mm film; amateur; media archaeology; collecting

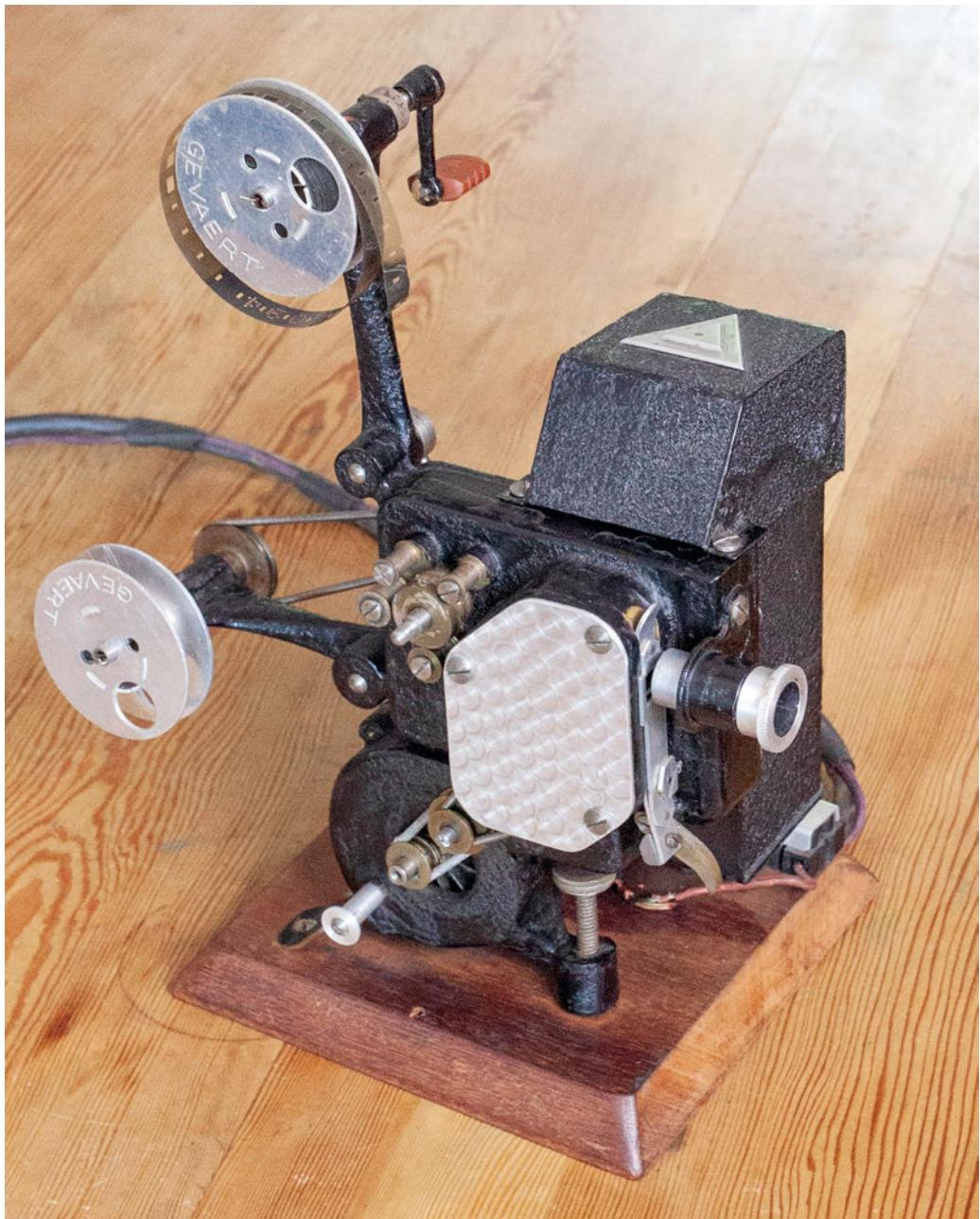


FIGURE 12
The George Pell Projector.

THE GEORGE PELL 9.5MM FILM PROJECTOR

This projector was made in Chesterfield, UK, by George Pell, probably in the 1940s. It | 159 is a scratch-built 9.5mm film projector made of black-painted cast brass, 28 x 24 x 15 cms, featuring a 100-watt incandescent lamp and 230–250-volt electric motor, with 110-volt transformer. Film advance operates by virtue of an eccentrically mounted two-pronged claw. The projector is contained in a handmade mahogany case.

THEORETICAL FRAMING

This chapter presents an object-led enquiry into the practice of self-building film technology. The “text” of a particular example, constructed by a known individual, is read with reference to other examples of homemade projectors collected by the author. This newly assembled corpus is contextualised through research into the printed discourse surrounding DIY culture and amateur film making. The chapter aims to launch the historical practice of artisanal film technology as a topic for further investigation.

AN ALIEN OBJECT

I discovered my first homemade film projector in 2007. It came to me as a disposal from Michael Rogge's outstanding collection of film technology.¹ Rogge specialised in collecting film equipment for rare gauges, objects that tell an alternative film history of ingenious mechanical ideas and failed commercial projects. As early as 1996 he had adopted the internet as a new way of exhibiting his private collection and making global connections.

On one of his webpages, Rogge advised aspiring collectors to find their own particular niche.² I did not know then that my new acquisition would become exactly that. It had appealed to me simply as an attractive, enigmatic and unique object, something rich and strange—and undervalued. Its material presence was particularly notable. Living with it in my small room in Amsterdam initiated a more protracted, philosophical response, one which

160 | provoked many questions: Why would someone go to the trouble of making something as complicated as a film projector when there were many models commercially available? Who was the person who had devoted themselves to such a task, leaving behind a substantial trace of their time spent on earth but no trace of their identity? In short, how did it come about? It seemed to be an alien object, certainly in relation to the rapidly obsolete and disposable technology of the world around me—a remnant of a different type of society.

Through personal contacts with amateur filmmakers, I had already experienced the creativity present in amateur film culture and its frequent coupling with the drive to economise.³ Having studied the work of the UK cine club, the Widescreen Association, I could see that similar factors were at work (and play) in this homemade projector. But whereas the club's members had developed technology that was not otherwise commercially available, this machine could not claim to do anything that a mass-produced model could not do.⁴ Nevertheless, it was ontologically distinct. A flea-market find of a small gauge film projector or camera can usually be identified by reference to its nomenclature. A subsequent internet search of its make and model will often provide photographs of countless identical items and supporting information, such as instruction books and sales literature. A homemade film projector provides no such clues. In most cases, it can only be interpreted inexactly, as an example of a certain practice glimpsed in the literature. Scarcely part of familiar film historical discourse, these sources must be brought into view with the devices themselves, also often outsiders in technology collections. In this chapter, I want to show the value of bolstering the context around these devices as a first step to introducing the topic into film technology scholarship.

DO-IT-YOURSELF CULTURE

The printed discourse around amateur film culture supplies relatively abundant instances of building and adapting cine equipment. Periodicals such as *Amateur Cine World (ACW)* and *Home Movies* and *Home Talkies* featured regular content from both staff writers and subscribers.⁵ ACW had a wide circulation and was very influential on UK film culture. For more remote readers and those not part of a club, it was their only connection with like-minded individuals. Advice from columnists on DIY construction methods was mixed with reports from amateurs on the equipment they had designed and constructed. Its articles and letters pages functioned as a message board with the exchange of comments over time, much as an internet-based forum would in the present day. The difference was that the content was heavily “moderated” and only “refreshed” every month. However, an appearance in the pages of ACW would have amounted to a degree of recognition on a national stage, and may itself have served as a motivation to complete the self-assigned projects of amateur cine engineers. Although there was no direct competition, one perceives the desire for a degree of affirmation from the peer group.

| 161

Contributions to the specialist press tended to concentrate on modifying existing equipment or on the construction of accessories; converting a silent projector into one that could reproduce sound was a common theme, for example.⁶ More general publications would offer complete instructions for building a projector, but in these cases the machine was of a simplified design and likely to produce something comparable to a toy projector once construction was complete. One such weekly magazine was *Hobbies Weekly*, in which an article describing “How the Amateur Can Make a Home Cinema Projector” appeared alongside advice on building a “Wind Indicator” or “Simple Teastand.”⁷ These publications indicate the extent of the thrifty build-your-own/do-it-yourself culture of the time, which of course far exceeded the bounds of film technology. While most of the discourse dates from the 1930s, '40s and '50s, the practice is as old as animated pictures themselves; an early example is found in the pages of the *Boy's Own Paper* of 1899 where “a drawing room showman” encouraged readers to build their own “Boyograph,” a decent pun on the contemporary Biograph.⁸

A single book-length work was produced in 1947.⁹ In its 124 pages, Wilfred Rowell laid out the trickier aspects of building an optical sound film projector (see fig. 13). He assumed a certain level of access to knowledge, skill and technology: “it will of course be necessary [...] to possess a lathe or alternatively know of some source from which machined parts can be obtained.”¹⁰ He admitted that some of the work involved was beyond the skills of most hobbyists. For example, his design for the lens holder involved making a pattern

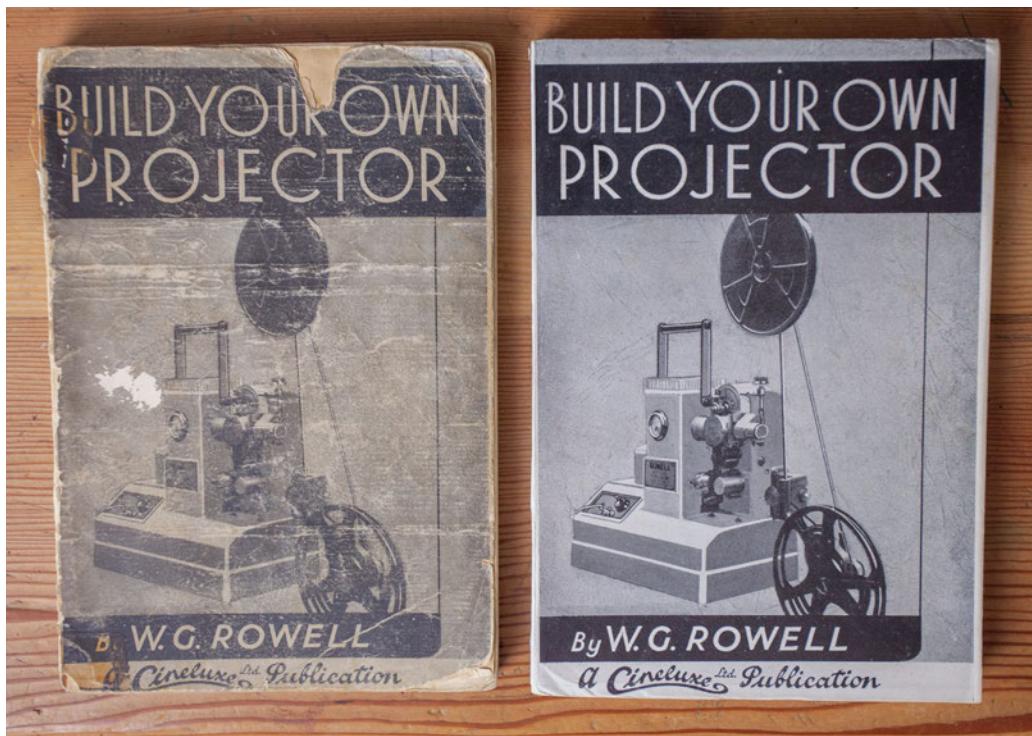


FIGURE 13
“Build your own projector” by W.G. Rowell. ↪

for a casting which “is not easy to make and should be put into the hands of a pattern maker.”¹¹ Rowell also quantifies the likely time commitment required, estimating that, working in evenings and spare time only, it might take up to two years.¹² The volume includes a few photographs of his finished projectors, which are of smart appearance and bear his own name as a finishing touch.

READING THE TEXT OF THE OBJECT

While these kinds of printed sources will be familiar to amateur film historians, they have received little direct attention from scholars. Furthermore, there are apparently few physical examples of the machines they describe to be found in either public or private collections, possibly due to collecting instincts that prioritise items in good, factory-fresh condition. Whether initial experience of the topic is in the form of an object or a printed source, it is ultimately necessary to join together analysis of the two to fully map the practice. In the case of the ex-Rogge projector, while the printed discourse suggested its

general context, I felt an imperative to seek out further examples of self-made cine technology with which it could be compared. Over the last 15 years, I have collected not just cameras and projectors but any item of film technology whose fabrication would appear to be artisanal or amateur. These have generally emerged in online auctions or through contacts with other collectors. Acquiring them for their aesthetic and epistemological value, I have inadvertently developed the collecting niche advocated by Rogge.¹³

Having built up a body of evidence from existing apparatus, it was possible to form a picture of the terrain through rough statistics. Of the ten so far collected, all have UK origin, including the one sourced from Michael Rogge, although the practice and discourse certainly exists in other countries. Frustratingly, despite Rowell's example, none of them are signed by their maker. Most notably, there is a distinct bias towards the use of the 9.5mm gauge.¹⁴ This may be due to its reputation for both quality and economy amongst amateur filmmakers; the purity of its design perhaps also appeals to the engineer's mind. Most of the machines demonstrate a good familiarity if not outright skill with mechanical, electrical and optical engineering, and often carpentry skills as well, the making of a bespoke case providing the finishing touch for four out of ten. In other respects, they are delightfully heterogenous. Methods chosen for advancing the film display a greater variety of design solutions than in mass-produced cine projectors, which were nearly always based on an intermittent claw mechanism. In this sample, both Maltese cross and beater designs are also employed. Some machines make greater use of mass-produced components while others are built from scratch, a finding which encourages their division into categories of home-adapted and homemade. A silent projector self-converted into a sound projector is a notable achievement but not of the same order as an entirely self-designed and built machine.

This degree of intervention by the home-based constructor is critical. It is the major distinguishing quality of these objects and key to their individual narratives. It can be divined through an audit of the components and a close reading of the device that distinguishes subtle irregularities in the finish. Macro photography can help to convey this quality, which does not generally call attention to itself¹⁵ (see fig. 14). The original authors would have likely striven for the most professional—and therefore seamless—finish possible. By contrast, modern day media archaeologists, alert to the seamlessness and clean edges of predominant digital culture, may be more likely to value these subtle traces of the hand of the maker and the enigmatic link that they provide to another human intelligence across time.¹⁶

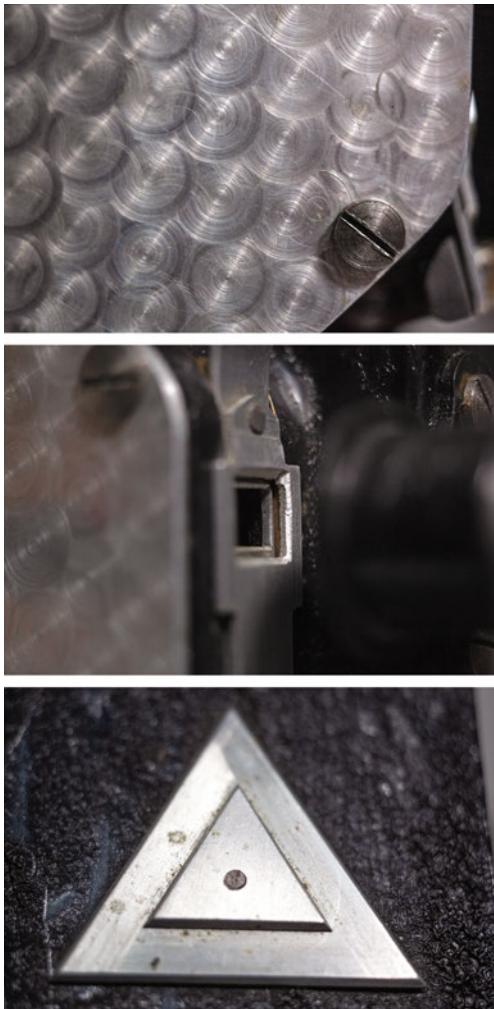


FIGURE 14
Macro images of the projector. ↗

164 |

THE GEORGE PELL PROJECTOR

The projector under consideration here was the eighth that I collected in this ongoing project of mapping the terrain of homemade cine equipment. It was acquired in 2019 and was a unique addition to the collection because it still had the name of its maker attached to it. The authorship of the other examples had been lost as time passed and they changed hands.

In the example I have chosen to write about, the vendor, Jon Ratter, was able to provide this information:

My grandfather lived in Aberdeen but my father moved down to Chesterfield in Derbyshire after the war and worked as a design engineer for Sheepbridge Engineering. He bought the projector from George Pell, who was a draughtsman working for the same company who liked making things in his shed. I think I was told that George had made it and had made more than one, but I presume that it was a pre-war projector that he had refurbished. I was told that the box was made from an old table by my grandfather. As an engineer, my father was in a reserved occupation and couldn't move from Aberdeen until wartime restrictions were lifted, so I presume that he got the projector around 1947, at the same time that he bought his first car and met my mother. George Pell and his wife remained family friends but didn't have any children and are both now dead.¹⁷

In many ways, this narrative matches my expectation of the constructor of a homemade projector as received from the pages of the advice literature. One can easily imagine Pell working away in his shed (for up to two years!) and perhaps taking out a subscription to *ACW*.

| 165

What is perhaps surprising is the contention that Pell made multiple projectors and may even have made money selling them. This points to a more ambitious and on-going practice than would be expected from the literature. From Pell's perspective, lessons learnt from the creation of one machine could be rolled over into the next project and some remuneration could compensate for the expenditure of time and effort. From Ratter's father's point of view, investment in a homemade projector over that of a mass-produced machine, shows a degree of confidence in Pell's work. Although somewhat speculative, this is a reminder that the socio-economic conditions behind the practice require further investigation. For example, in post-war UK, technology was expensive and scarce, but the population was highly trained in mechanical engineering. Manufacturers were encouraged to export rather than sell to the home market, and fiscal policy such as purchase tax was used to mould the commercial environment. In such circumstances, it may have been tempting, even profitable, to avoid the conventional market entirely and purchase a desired domestic commodity from a skilled friend. It is also notable that it was Ratter's grandfather, and not Pell, who made the fine mahogany case for the projector: a useful reminder that even if an object presents as homemade, it may represent the work of more than one person. It is also possible that Pell's colleagues at Sheepbridge Engineering helped him with certain jobs, such as the more involved work of making metal castings, either in their own sheds or using facilities at work.¹⁸

Ratter's assumption that the Pell projector was a re-furbished pre-war machine is understandable but can be refuted on the material evidence that

it presents. The forms and surfaces simply lack the uniformity of mass-produced cine equipment, a fact most keenly sensed through familiarity with other examples, both homemade and factory-made. In fact, the only components not made from scratch in this case would appear to be the motor, the transformer and the lens elements. The 230-volt motor bears the only name present on the machine: "Kluxon Ltd."¹⁹ The projector body and spool arms are made of cast brass and the lamphouse is sheet metal, all coated in thick black crackle paint. Pell has allowed himself a couple of aesthetic flourishes, which lift the appearance of this otherwise modest device with its light-absorbing finish. Using bright aluminium, he has fashioned a panel to cover the intermittent mechanism and finished it with engine-turned decoration, as might be seen on the bulkhead or cambox of a vintage Bugatti. On the top of the lamphouse, he has placed two very neatly made triangles that have no obvious function. They do, however, recall the shape of the Pathéscope logo seen on 9.5mm film cartons, an apparent homage to the corporation which created the gauge (see fig. 14).

166 |

As Rowell said, access to skills and technology was essential for such a project. However, while relatively easy to source in 1940s industrial society through the networks of the engineering class, these assets are less available today. This has implications for the logical next step in the study of these objects: their activation. My examination of the Pell projector in action stalled when the linkage to the eccentric wheel on which the claw is mounted seemed intent on undoing itself and jamming the mechanism. Continuation of the project, including an evaluation of the technical achievement of the projector, would therefore benefit from a suitably electro-mechanically minded co-investigator.

CONCLUSION—THE TOUCH OF THE DEVOTEE

The Pell projector, even with its known authorship, still benefits from being seen in the context of a wider collection where similarities and differences can be assessed and a wider relation of connections established. It is standard in its choice of gauge, common in being contained in a bespoke case, but uncommon in its use of unique castings. It demonstrates individual motives both of economy and creative expression and also embodies a societal motive promoting the acculturation of engineering.

With the increased attention to the study of film technology in volumes such as this, the phenomena of self-built or adapted technology will hopefully receive more attention. A recent publication by FIAF profiled 100 pieces of film technology in archives around the world, and of these at least two could be

said to fall into this category.²⁰ Andre Gaudreault commented in the volume's Preface that "in these artefacts we still see the signs of human presence, and this will have great importance in the years to come."²¹ This statement would seem to apply doubly to these homemade devices. We see this not just in the signs of their use by humans but in the traces of their creation, the handicraft of their manufacture.

More than the impression received from the DIY discourse, objects like the Pell projector express a profound connection to the idea of home cinema, an alternative, perhaps more fundamental form of cinephilia in which the primary engagement is with the mechanics of the illusion of moving images. This fascination with the apparatus, to the potential exclusion of the conventional cinephile's focus on the image, gives these objects their dramatic novelty. They are not just a medium for the experience of cinema, they are in and of themselves an act of devotion to cinema.

| 167

I gratefully acknowledge the friendship and inspiration of Michael Rogge. I would also like to acknowledge the support of other researcher/collector friends who have helped me assemble examples of homemade film technology and references thereto, including Stephen Herbert, Martyn Stevens, Christopher Bird and James Holcombe.

NOTES

1 IJsbrand Rogge, known as Michael to his international friends, died on 26 January 2024, aged 94. The website that he created remains a first port of call for information on obscure apparatus, although it is no substitute for a visit to his stately townhouse, where shelves of curiosities reached up to the high ceiling and continued down the winding stairs to the basement.

2 In his words, “Concentrating on special themes has the advantage of keeping the collection within limits,” IJsbrand Rogge, “Specialties in Collecting,” *Cinematographica*, n.d., <https://wichm.home.xs4all.nl/cinemat.html#divisions>.

3 It is important to acknowledge this living context, one received from contacts in cine clubs and the surviving members of that diminishing scene. For example, at Home Movie Day 2009 in Amsterdam, the Dutch amateur Frans Schuller demonstrated his own self-built 70mm projector; another year his specially adapted Half 16 projector became a working exhibit.

4 Guy Edmonds, “Amateur Widescreen; Or, Some Forgotten Skirmishes in the Battle of the Gauges,” *Film History: An International Journal* 19, no. 4 (2007): 401–413, <https://doi.org/10.1353/fih.2008.0012>.

5 *Amateur Cine World* was published from 1934–1967, and *Home Movies and Home Talkies* from 1932–1940.

6 See, for example, C. Leslie Thomson, “Tracking it Down,” *Amateur Cine World*, Sept–Nov 1942: 274.

7 “How the Amateur Can Make a Home Cinema Projector,” *Hobbies Weekly* 109, no. 2818 (2 November 1949).

8 A Drawing-Room Showman, “The Boyograph; Or, Animated Photography: How to Make and Work It,” *The Boy’s Own Paper* 21, no. 1048 (11 February 1899), 316–318. I am indebted to Stephen Herbert for alerting me to this source.

9 Wilfred G. Rowell, *Build Your Own Projector* (Leigh-on-Sea, UK: Cinèluxe, 1948).

10 Ibid., vii.

11 Ibid., 79.

12 Ibid., 124.

13 Occasionally, I have seen comparable objects in public collections when browsing depot shelves. There is an example in the technology collection of the Netherlands Institute of Sound and Vision and at least two in the Lichtspiel Kinemathek in Berne. Existing databases may not respond fruitfully to queries regarding such novel research topics.

14 8.5 of my ten collected projectors are for 9.5mm; 1.5 are for 16mm (the .5 is due to one machine being dual gauge).

15 Macro photographs effectively communicated this point when discussing the collection at a symposium: “Folk Technology? The Homemade 9.5mm Film Projector,” *9.5mm: And Cinema Is Everywhere*, Lichtspiel /Kinemathek Berne, Switzerland, 17–19 November 2022.

16 A similar dichotomy is seen in the special character of amateur film in which the gap between the desire for a professional effect and the actual effect is characteristic of the whole endeavour.

17 Jon Ratter, email to the author, 29 March 2019.

18 Sheepbridge Engineering was a “Manufacturer of mining equipment, aircraft and car components, machinery and castings” (https://www.gracesguide.co.uk/Sheepbridge_Engineering).

19 Klaxon were a company famous for their motor-driven sirens, but they also produced motors for other uses. I have not yet discovered the original function of this motor.

20 Louis Pelletier and Rachel Stoeltje, eds., *Tales from the Vaults* (Brussels: FIAF/Technès, 2023). Tara Marynowsky profiles a scratch-built copy of a 35mm professional projector in the collections of the NFSA as “a prime example of analogue DIY determination” (“Eddie Vormister’s Homemade Projector and Home Cinema Set-Up,” in *ibid.*, 102), and my own contribution on the Minirama projector features a Eumig projector highly adapted by Stuart Warriner to handle his ingenious self-devised diagonally running film format (“The Minirama Projector,” in *ibid.*, 160). Many of the other featured items are adapted from their original specifications by their professional users and remind us that, far from being an amateur only practice, it is virtually a badge of honour amongst filmmakers to be able to adapt, modify and invent the tools of their trade. And an object such as Georges Méliès’ first camera, which he famously converted from a Robert Paul projector, also serves to demonstrate the special conditions at work in the early cinema period in which the filmmakers themselves were also the toolmakers (Laurent Mannoni, “Georges Méliès’s First Camera,” in *ibid.*, 114).

21 André Gaudreault, “Preface,” in *ibid.*, 28.

| 169

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Amateur Archaeologies and Hybrid Thinkering with the Kodak Reels Film Digitizer

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| 171

ABSTRACT

This chapter contextualises the personal practice of digitizing Super 8 family films, exploring an *amateur* mode of experimental media archaeology that considers amateur dispositifs, devices and users. Homing in on the Kodak Reels Film Digitizer, I outline how today's amateurs (re)engage with small-gauge technologies, both analogue and digital, and how their hybrid practices can enrich experimental media archaeological research and pedagogy. Hands-on work with the scanner raises questions of technological obsolescence, archival formats and choices, and the ways digital technologies may convey the affordances of their analogue precursors. This extends existing work in experimental media archaeology on the creative approaches of amateurs, to consider intersections of analogue and digital technologies that re-shape home archives and practices with small-gauge films.

KEYWORDS

Amateur; small-gauge technology; film digitizer; experimental media archaeology; hybridity

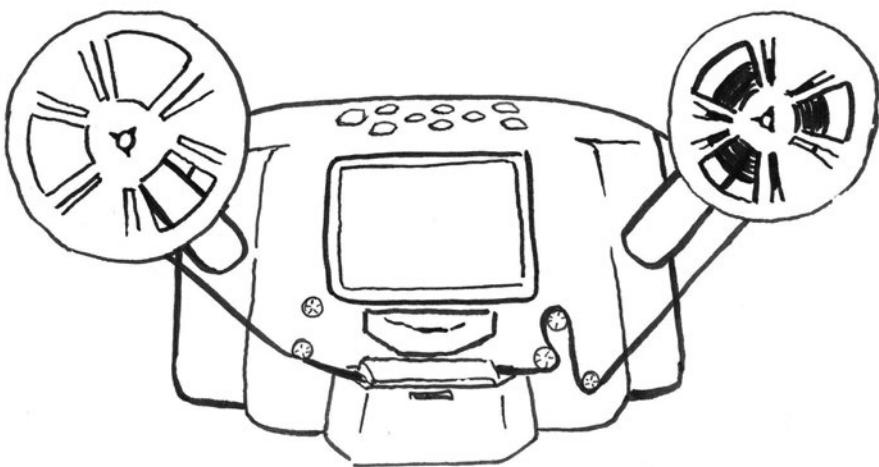


FIGURE 12

The KODAK REELS Film Digitizer (illustrated by Sanna McGregor).

THE KODAK REELS FILM DIGITIZER

The digitisation of film, be it for restoration, distribution, or preservation, is a concern for both media heritage institutions and amateur filmmakers (and their inheritors).¹ The Kodak Reels Film Digitizer, produced under license by C+A Global, is a scanner patented in 2024 for converting 8mm film and Super 8 to MP4, and marketed for home use.² Measuring 31.5 x 15.4 x 21.3 centimetres, it consists of two foldable arms for the reels, between which the film runs around several spools and across a backlit platform where a camera captures each frame. Each image appears on the digital screen and is then stored on an SD card. | 173

THEORETICAL FRAMING

This chapter explores a novel, *amateur* mode of experimental media archaeology, addressing amateur dispositifs, devices, and their users in a mode of “thinkering” that productively engages the interplay of analogue, digital and hybrid technologies. Taking a homely, hands-on approach to a Kodak Reels Film Digitizer as its case study, it frames the intergenerational echoes of small-gauge technology and its hybrid successors in contemporary amateur practice. Accordingly, by its very nature, its approach is personal. By working with the digitizer in a kind of “home mode,”³ it investigates what media archaeology, particularly experimental media archaeology, stands to gain from research utilising amateur apparatuses and practices.

AMATEUR ARCHIVIST MEETS FILM DIGITIZER

The Kodak Reels Film Digitizer is designed to be “reel easy” to use.⁴ Its “configured” users are amateur archivists, often the inheritors of amateur filmmakers’ reels, who want lasting, accessible versions of their (family) films.⁵ Amateur is arguably an ambiguous term, and much has been written on amateur individuals, their practices, and particularly their films.⁶ These facets of the amateur interact and, following Alexandra Schneider, it is also crucial to consider the devices and material histories of the amateur.⁷ Another expert in this field, film historian Tom Slootweg, speaks of disparate but “sometimes slightly overlapping *amateur modes of practice and functioning*” and includes in this the devices bound up in these modes of practice.⁸ Slootweg values this framework for being more permissive of idiosyncrasies in uses, practices and technologies. Moreover, this flexibility can become particularly productive

174 | for studying the practices of contemporary amateurs—both those currently (still) making small-gauge films and those working with the archives of historical amateurs. Contemporary amateurs working with small-gauge devices may vary widely in technical competence, inventiveness and practices. Their practices tend to bridge temporal, generational and technical divides,⁹ as the following experiment will detail. Despite this, although there has been increased interest in amateur archives from media heritage institutions,¹⁰ and amateurs’ affection for, expertise, and interest in actual uses of technologies have been increasingly valued as rich grounds for research,¹¹ there has been relatively little attention for contemporary amateurs’ modes of practice and their small-gauge technologies.¹² The question then is: How are today’s amateurs (re)engaging with small-gauge technologies (both analogue and digital); and how can their hybrid practices enrich experimental media archaeological research and pedagogy?

Turning to such practices through hands-on work with the Kodak scanner aims to address these questions and unpack the affective and educational value of such “thinkering” (thinking through tinkering)¹³ for experimental media archaeology. Harnessing amateurs’ uninhibited, innovative approaches¹⁴ to media technologies, and engaging in homely thinkering has previously inspired creativity and particular kinds of expertise in the hands-on work of experimental media archaeology. How this works may be clarified by looking at the digitizing technologies that re-shape home archives and practices for small-gauge films today. To demonstrate, I turn myself into an amateur, using the converter to digitize the home movies that bridge the generations within my own family.¹⁵ First emulating my late grandfather’s tinkering with his technology and films, I then screen the family films kept safe and unseen by my grandmother for decades.¹⁶ Grounded in the affective, interpersonal dynam-

ics of the “home mode,”¹⁷ this small (research) project opens up a number of questions, connections and forms of participation in hands-on media historiography.

HYBRID HOME THINKERING

This project sprang from a family archive, and the drive to transpose Super 8 footage onto a more readily accessible and re-watchable digital format without risking (further) damage to the film stock through repeated projections. Following Kodak’s instruction manual, I attached the reels and ran the film along the spools to secure it over the platform (notably not using its perforations) for accurate scanning. These movements, and the initial appearance of the converter, are strikingly reminiscent of editor/viewers’ usage, design and affordances. It is no coincidence that the Kodak converter’s design patent references a 1969 patent for a film viewer.¹⁸ More than straightforward “backwards compatibility,”¹⁹ the scanner solicits what Tim van der Heijden calls “hybrid practices,” in that its “users appropriate a new media technology with the older medium as [a] frame of reference.”²⁰ The converter’s hybrid practices engage with digital formats and networks (MP4, scanning, USB transfer) while appropriating analogue Super 8 film technologies. It goes beyond taking small-gauge devices as a frame of reference, and extends the meaning of the notion of hybridity to technological transitions that reach across extended temporal and technological divides between different formats, practices and technologies.²¹ From setting it up and running the film past the light and around its spools to showing the frames on its screen, the scanner tacitly recreates (some of) the affordances of editor/viewers from the 1960s like the one my grandfather used. The Kodak digitizer’s user manual includes a diagram for distinguishing 8mm and Super 8, and explains how to link film to an empty reel.²² So together the scanner and its manual become an indirect guide to some uses and affordances of editor/viewers more contemporaneous with the film stock itself. Admittedly, not all users will recognise this. However, even unwittingly, any user will learn something about historical small-gauge technologies through the implicit “replication” the Kodak scanner facilitates.²³

This kind of genealogical kinship is embedded in the apparatus as well as its user practices. The converter is arguably also a “hybrid technology,” blending two existing media technologies by integrating a scanner and elements of the editor/viewer in one device.²⁴ However, its hybridity also emphasises the converter’s digital differences from analogue editor/viewers. For instance, on the converter the film moves past a lens that captures each frame and shows it on the *digital* screen at the centre of the device. This screen is navigable with

buttons on top of the device that move through the menus, zoom in or out, go back, or approve a choice. Viewing footage through the scanner may prompt an edit, but by stopping and restarting the scanning rather than splicing the film stock itself. It is more likely to involve digitally adjusting the scan's frame, saturation, exposure and level of sharpness. Scanning film reels without having previously seen them projected makes this a guessing game, as adjusting these settings means interrupting the scan. If miscalculated, over-exposure may trigger an automatic stop when the scanner does not recognise images for a prolonged period. I learned this the hard way but, on the upside, it does raise relevant questions about the visibility, or legibility, of the image for the scanner's digital camera as opposed to the human user, and what it means for a film to be seen. In my practice, this generally entailed making only marginal adjustments, based on the first image, and making the digital frame slightly larger than a frame on the film reel to ensure everything would be on screen. It meant making the film's material more visible. This prompted further reflection on the affordances and constraints of small-gauge filmmaking for my grandfather: for example, what exposure and focal lengths were possible with Super 8 cameras; how little or no subsequent adjustment to the footage was feasible; how near-impossible it was to duplicate reversal film.²⁵ In other words, I was coming to understand his tinkering with small-gauge devices in a new light through the scanning process. Visually and procedurally foregrounding these facets of small-gauge amateur filmmaking practices and technologies points to the pedagogical potential of re-envisioning a hybrid media historiography through hands-on, experimental media archaeological engagement with contemporary (hybrid) amateur devices and practices.²⁶

Admittedly, my hands-on engagement with this device focused on its external mechanism and did not thoroughly address its digital innards. As Lori Emerson has outlined, opening up digital devices can present many obstacles of expertise, safety and potentially inhibited function.²⁷ At the same time, its digital system cannot go unacknowledged, and a basic awareness of what lay behind the interface informed my approach. In tinkering with the settings, I was faced with weighing the choice of prioritising fidelity to the film's presumed aesthetics when originally screened, against the options for heightened sharpness, brighter or more desaturated colours, and more uniform exposure. Conscious of the black-boxed system implementing these effects in the scanning process, the choice was in part a matter of how digital the output's aesthetics might appear. Yet, on some reels, it was also a more straightforward matter of attempting to rescue footage that had faded almost entirely. Playing with these settings transformed and reinstated the image, as the obscured digital processor in the scanner made the reel visible again.

Altogether, taking on board the converter's hybrid nature and usage can

facilitate a unique mode of thinkering, one that explores amateur technologies, old and new, through the lens of the scanner's hybrid integration and digital re-configuration of the affordances of small-gauge film technologies. Central to this *hybrid* thinkering is the conceptual interplay of analogue, digital and hybrid frameworks, and the possibility of making historical technologies visible and comprehensible through current digital (or hybrid) devices.

AMATEUR ARCHIVISTS AND EXPERIMENTAL MEDIA ARCHAEOLOGY

Following the digitization of family films, many amateurs are likely to hold what Joseph Wachelder calls "belated screenings." During these screenings, families can talk over the footage to recall the events and people on screen, reflect on those shown who are no longer alive, and laugh at the moments of levity.²⁸ I screened a selection of digitized films for relatives, echoing the home screenings conducted by my grandfather with his nuclear family. Partially an artificial re-enactment of the home-movie dispositif, this digital screening of the Super 8 films nonetheless formed an alternative dispositif. Without the whirr and light of the projector, the flicker, or the prerequisite darkened room, only the image quality and the visibility of frame edges and perforation highlighted the analogue origin of the footage. Instead, using a Chromecast device to stream the footage from a smartphone, with easy remote controls to pause and rewind and a slightly sped-up playback due to the scanning speed, the hybridity of the experience only emphasised genealogical differences, both personally and technologically. My grandfather, who filmed the images we were watching, did not live to see his devices become obsolete, or meet the grandchildren now watching his films; meanwhile, we were re-sensitised to the amateur technologies he used through the contrast with current screening technology.

Such a (re-mediated) re-enactment also points to the potential impact of digitization on amateur archival practices. The Kodak converter is effectively designed for single use: once the 8mm or Super 8 reels are digitized, there will be no need to retain the scanner (or, for some users, the reels themselves).²⁹ The device is built for obsolescence in an ironic capitulation to the anticipated obsolescence of the films it is made to digitize. In this sense, the scanner enacts a stranger transformation than that of storage formats: by converting treasured but inaccessible reels back into valued moving images, the reels become disposable objects, obsolete. The symbolic value of the unwatched or unwatchable reels may fade once their content is available and becomes the locus of affective memories. Possibly some users will keep the reels, given their "aura of being cinema" and the "transgenerational link" they materialize.

alise,³⁰ but others will assume that the digital will outlast the reel and dispose of them. Arguably, its very hybridity enables the scanner's complicity not only in its own obsolescence, but in the physical demise of amateurs' small-gauge film collections. There may actually be opportunities for institutional (national) archives to step in at this juncture: cultivating dialogue with amateur archivists around digitization practices; establishing support for digitization with comparable scanners as programmes for outreach and participation; or even enriching their collections with amateur films and devices that amateurs want to be rid of. When it comes down to it, the scanner's hybrid form, uses and impact indicate the need to re-examine how amateurs and their inheritors engage with, archive and perhaps dispose of small-gauge apparatuses and home movies.

This small, domestic investigation of the Kodak scanner has sketched the ripple effects of digitization on amateur archives and practices, as well as changing relationships with small-gauge technology. Today's amateurs may be (re)learning the affordances of small-gauge editor/viewers through digital or hybrid devices like this converter. In this sense, the Kodak scanner's hybridity (in both technology and practices) brings current amateur users closer to the practices of their predecessors (and family). It facilitates a hybrid mode of homely thinkering that conveys some of the affordances of small-gauge devices, even as it foregrounds the interplay of digital and analogue technologies, affordances and practices. In other words, in the process of digitizing my family archive, I hope to have convincingly outlined a kind of hybrid, amateur experimental media archaeology in the "home mode" that works with amateur devices and users to connect with and explore (personal) media histories hands-on. Moreover, I have elaborated on how this can productively harness digital or hybrid affordances of contemporary audiovisual media (technology). On the one hand, working hands-on with the Kodak scanner cultivates a degree of Super 8 media literacy by appropriating some of the affordances of historical small-gauge technologies: this hybrid approach to small-gauge technology opens up pedagogical pathways for re-sensitising "born-digital" students with analogue film technologies. On the other hand, the scanner invites research and reflection on how amateurs experience, engage with or re-invent the affordances and practices of small-gauge filmmaking through new devices, archival practices and communities. Admittedly, there remains more to explore in terms of how such thinkering is expressed in (online) amateur communities; in the breadth of creative thinkering with the scanning, re-editing and screening of family films; and in users' understandings of obsolescence. While hybrid thinkering engages with the afterlives of small-gauge amateur film(makers) in the digital age, it also undergirds the potential of hands-on amateur work for opening up new questions regarding evolving

amateur archives, dispositifs and (obsolete) technologies—questions that might not have quite such “reel easy” answers.

Many thanks to Annie van den Oever and the anonymous peer reviewer for generous feedback on earlier versions of this chapter.

NOTES

- 1 On digitization in heritage institutions, see Giovanna Fossati, *From Grain to Pixel: The Archival Life of Film in Transition* (Amsterdam: Amsterdam University Press, 2018).
- 2 See Kodak, “KODAK REELS Film Digitizer | Digital Scanner,” *Kodak Photo Plus*, <https://www.kodakphotoplus.com/products/rodreels>; C+A Global, “A History of Innovation and Growth,” *CAGlobal.com*, <https://www.caglobal.com/pages/history>; for the patents, see Sam Kain, *Apparatus, System, and Method for Analog to Digital film Conversion* (United States Patent Office US 11,949,823 B2. Edison, NJ, filed 19 September 2021, and issued 2 April 2024); and Sam Kain, *Film Converter* (United States Patent Office US D1,023,119 S. Edison, NJ, filed 19 September 2021, and issued 16 April 2024).
- 180 | 3 On the “home mode” see Tom Slootweg, “Home Mode, Community Mode, Counter Mode: Three Functional Modalities for Coming to Terms with Amateur Media Practices,” in *Materializing Memories: Dispositifs, Generations, Amateurs*, eds. Susan Aasman, Andreas Fickers, and Joseph Wachelder (New York: Bloomsbury Academic, 2018), 203–216, <https://doi.org/10.5040/9781501333262.ch-012>.
- 4 Kodak, “KODAK REELS Film Digitizer.”
- 5 On the “configured user,” see Andreas Fickers and Annie van den Oever, *Doing Experimental Media Archaeology: Theory* (Berlin: De Gruyter Oldenbourg, 2022), <https://doi.org/10.1515/9783110799774>, 35; the patent describes consumers who have lost access to their analogue films, see Kain, *Apparatus, System, and Method for Analog to Digital Film Conversion*.
- 6 On types and discourses of the amateur, see, for example, Susan Aasman, Tim van der Heijden, and Tom Slootweg, “Amateurism: Exploring Its Multiple Meanings in the Age of Film, Video, and Digital Media,” in *Digital Roots: Historicizing Media and Communication Concepts of the Digital Age*, eds. Gabriele Balbi, Nelson Ribeiro, Valérie Schafer, and Christian Schwarzenegger (Berlin: De Gruyter Oldenbourg, 2021), 245–266, <https://doi.org/10.1515/9783110740202-014>; Slootweg, “Home Mode, Community Mode, Counter Mode”; Roger Odin, “Amateur Technologies of Memory, Dispositifs, and Communication Spaces,” in *Materializing Memories*, 19–34.
- 7 See Alexandra Schneider, “The Tripod or ‘When Professionals Turn Amateur’: A Plea for an Amateur Film Archaeology,” in *Exposing the Film Apparatus: The Film Archive as a Research Laboratory*, eds. Giovanna Fossati and Annie van den Oever (Amsterdam: Amsterdam University Press, 2016), 165–176.
- 8 Slootweg, following James Moran, in “Home Mode, Community Mode, Counter Mode,” 204, emphasis in original.

9 Variations in skillsets and approaches to hybrid(ising) technologies are reflected in contributions to online platforms like the 8mm Forum. The ways such online communities expand on Slootweg's "communities of practice," as well as this community's discourses on digitization processes and technologies, would merit further exploration. See Slootweg, "Home Mode, Community Mode, Counter Mode"; 8mm Forum, "Film to Digital Conversion," *8mm Forum, Film-Tech.com*, <https://8mmforum.film-tech.com/vbb/forum/film-to-digital-conversion/page2>.

10 See chapter 6 in Annamaria Motrescu-Mayes and Susan Aasman, *Amateur Media and Participatory Cultures: Film, Video, and Digital Media* (London: Routledge, 2019), <https://doi.org/10.4324/9781315396149>.

11 See Fickers and Van den Oever, *Doing Experimental Media Archaeology: Theory*, 37.

12 Benoît Turquety does discuss Kodak's 2016 announcement about rebooting its Super 8 cameras in a hybrid digital form; see Turquety, "Understanding (Amateur) Cinema: Epistemology and Technology," in *Global Perspectives on Amateur Film Histories and Cultures*, eds. Masha Salazkina and Enrique Fibla-Gutiérrez (Bloomington, IN: Indiana University Press, 2020), 31–32, <https://doi.org/10.2307/j.ctv1b742mb.5>.

13 Coined by Erkki Huhtamo, "thinkering" is pivotal to experimental media archaeology; see Fickers and Van den Oever, *Doing Experimental Media Archaeology: Theory*.

14 On the technical skills of the "tinkerer," and unbiased exploration of the "naïve practitioner," among other types of amateurs, see Aasman, Van der Heijden, and Slootweg, "Amateurism."

15 This family-focused approach builds upon previous work utilising other amateur devices belonging to my late grandfather that outlined an amateur experimental media archaeology within a framework of care, while now introducing a new device, and a digital or hybrid dimension to that mode of working. See Annie van den Oever and Sanna McGregor, "Experimental Media Archaeology and an Ethics of Care," in *The Routledge Companion to Media Archaeology*, eds. Erkki Huhtamo, Doron Galili and Meredith Bak (London: Routledge, forthcoming).

16 The preservation of family films can be taken as a gesture to the "permanency of family life"; see Odin, "Amateur Technologies of Memory, Dispositifs, and Communication Spaces," 28; and as an expression of care, see Van den Oever and McGregor, "Experimental Media Archaeology and an Ethics of Care."

17 See Slootweg, "Home Mode, Community Mode, Counter Mode."

18 See Kain, *Film Converter*.

19 See Nick Hall and John Ellis, "Introduction: What Is Hands On Media History?," in *Hands On Media History: A New Methodology in the Humanities and Social Sciences*, eds. Nick Hall and John Ellis (London: Routledge, 2020), 6, <https://doi.org/10.4324/9781351247412>.

20 Tim van der Heijden, “Hybrid Histories: Historicizing the Home Movie Dispositif,” in *Materializing Memories*, 41.

21 Van der Heijden’s examples of hybridity are combinations of technologies or practices developed synchronously or in close succession to each other, whereas the heyday of Super 8 devices and the introduction of digital scanners, MP4 formats, etc., are decades apart and interspersed with numerous other technologies and formats.

22 C&A IP Holdings LLC, *User Manual Kodak Reels Digitizer* (Edison, NJ: C&A Marketing Inc, 2023), 11.

23 This is a slight twist on the use of exact replicas described in the experimental mode of “replication” within experimental media archaeology; see Fickers and Van den Oever, *Doing Experimental Media Archaeology: Theory*, chap. 4.2; Tim van der Heijden and Aleksander Kolkowski, *Doing Experimental Media Archaeology: Practice* (Berlin: De Gruyter Oldenbourg, 2023), chap. 1.2.1.

182 | 24 See Van der Heijden, “Hybrid Histories,” 41.

25 On the impossibility of copying reversal films, and Jean Rouché’s commissioned printer to sidestep this, see Benoît Turquety, *Medium, Format, Configuration: The Displacement of Film* (Lüneburg: meson press, 2019), 28–29.

26 See Van der Heijden, “Hybrid Histories.”

27 Lori Emerson, “Towards a Variantology of Hands On Practice,” *Lori Emerson* (blog, 13 July 2020), <https://loriemerson.net/2020/07/13/towards-a-variantology-of-hands-on-practice/>.

28 Joseph Wachelder, “Belated Screenings of Home Movies: Biographical Storytelling and Generational Referencing,” in *Materializing Memories*, 103.

29 In the small but active Dutch second-hand market for 8mm scanners, numerous listings mentioned the sale followed completed digitization of family films. Marktplaats user “Sara” mentions in their listing of a Reflecta scanner that it was “Used for digitizing all the old 8mm films of our family” (“Gebruikt voor digitaliseren van alle oude 8mm films van ons familie” [sic]); Sara, “Reflecta Filmscanner Normal/Super 8mm,” *Fotografica en Filmapparatuur, Marktplaats.nl* (2 March 2025), <https://www.marktplaats.nl/v/verzamelen/fotografica-en-filmapparatuur/m224117073-reflecta-filmscanner-normal-super-8mm>.

30 Odin, “Amateur Technologies of Memory, Dispositifs, and Communication Spaces,” 31.

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184 | Schneider, Alexandra. "The Tripod or 'When Professionals Turn Amateur': A Plea for an Amateur Film Archaeology." In *Exposing the Film Apparatus: The Film Archive as a Research Laboratory*, edited by Giovanna Fossati and Annie van den Oever, 165–176. Amsterdam: Amsterdam University Press, 2016.

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Double Vision

William Kentridge and the Stereoscope

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| 187

ABSTRACT

In this chapter, I consider William Kentridge's sustained engagement with stereoscopic devices, imagery and vision by tracing the ways in which the Johannesburg-based artist utilises "double vision" as both an aesthetic and metaphorical strategy in his oeuvre. This "double vision" highlights not only his interest in doubles, but also the technical workings of stereoscopic devices. By situating Kentridge's practice and his reflections on stereoscopy at the crossroads of media archaeology and art history, I show how image comparisons generate knowledge and have the capacity to initiate political, philosophical and art historical reflections.

KEYWORDS

F-71 magnifying stereoscope; William Kentridge; media archaeology; double vision; object lesson; art historical lecture

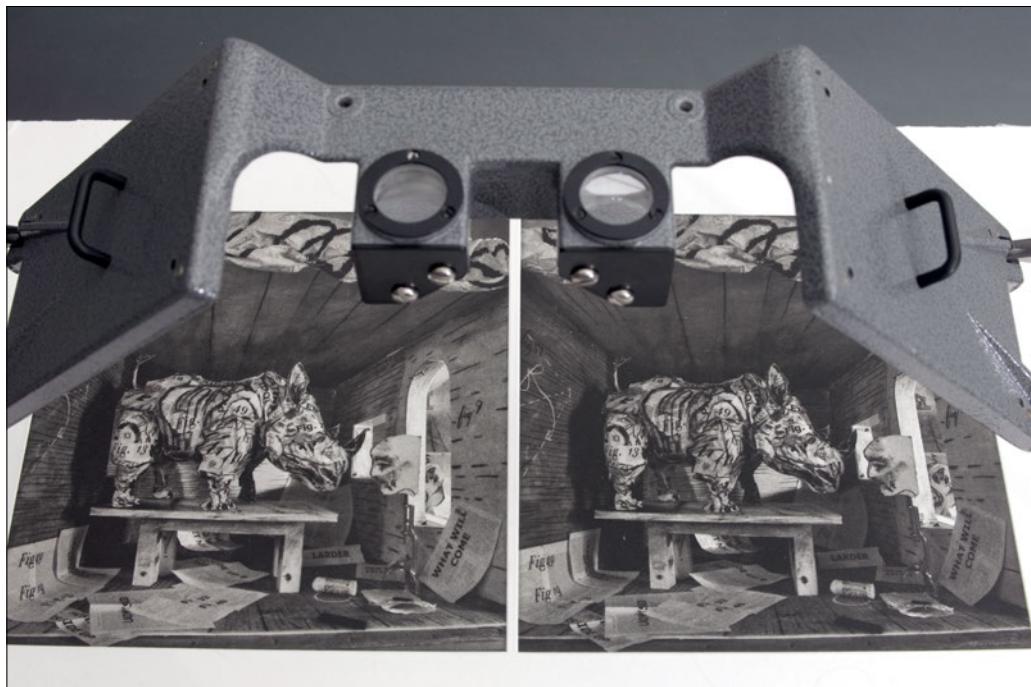


FIGURE 16

William Kentridge, Installation view of a stereoscopic photogravure, in the series *Underweysung der Messung* (2007), with accompanying F-71 magnifying stereoscope. Reproduced with the permission of the William Kentridge Studio.

THE F-71 MAGNIFYING STEREOSCOPE

The F-71 magnifying stereoscope is a sturdy, aluminium stereoscopic viewer that uses mirrors to produce stereoscopic images. It was built in large quantities by companies such as Fairchild Aviation Corporation and Alan Gordon Enterprises for the US military during World War II. It was primarily used to view aerial photographs for the compilation of intelligence reports. Two aerial photographs are placed next to each other and viewed through the inset lenses of the device. The lenses receive the photographs from two angled mirrors in which the photographs are reflected. This creates the illusion of a three-dimensional image at about twice the original size. The magnified stereoscopic image makes it easier to identify hard-to-see details. A clip-on binocular attachment can be utilised to increase the magnification to four times if necessary. The device stands on four fold-out legs (one of which can be adjusted for uneven terrain) and, when not in use, it fits into a carrying case measuring 6.5 x 18.25 x 8 inches (16.5 x 46.4 x 20.3 cm)

| 189

THEORETICAL FRAMING

The South African artist William Kentridge (b. 1955) is known for his extensive experiments and engagements with stereoscopic devices and images. He has a collection of stereoscopes in his studio in Houghton, Johannesburg, revealing his interest in doubles and the technical workings of stereoscopic devices, and repeatedly references them in his artworks. This chapter approaches his studio—and oeuvre—as a rich media archaeological site waiting to be excavated by scholars. Kentridge has been described as a media-archaeological artist whose work references a variety of media-archaeological sources, for example, “shadow puppetry, cylindrical anamorphoses, automata, phenakistiscopes, stereoscopy and the trick films of Georges Méliès.”¹ It is argued that Kentridge’s engagement with stereoscopic devices both informs the technical and formal qualities of his artistic practice and serves as a conceptual tool with which he initiates philosophical enquiries. This investigation of Kentridge’s artistic processes considers his engagement with stereoscopic devices and images—that is, “double visions”—not only as reflections and comments on (experimental) media-archaeological interests, but also to draw attention to the evocative and generative power of comparisons in a discipline such as art history, while simultaneously unlocking reflections on pairings of images as political statements or visions.

AN OBJECT LESSON

William Kentridge is well-known for his imaginative engagements with early cinema and pre-cinematic devices, also described as “philosophical toys.”² As Giuliana Bruno argues, “in some way, artists are becoming historians. They are turning into materialist scholars.”³ Through his “toying” and “thinkering” with these devices in his artworks, Kentridge creates a rich conceptual world in which these devices unlock a series of metaphors—that is, ways of looking at, thinking about, and describing the world.⁴ As Kentridge writes: “I’m interested in machines that make you aware of the process of seeing and aware of what you do when you construct the world by looking. This is interesting in itself, but more so as a broad-based metaphor for how we understand the world.”⁵

190 | Kentridge’s studio is scattered with a number of stereoscopes. Some of these stereoscopic devices travel to accompany Kentridge’s stereoscopic sets of pictures for exhibitions. He mainly uses two types of stereoscopes for his own artworks: older wooden items, such as the Underwood & Underwood stereoscope or F-71 magnifying stereoscopes. The last was a device that was used during World War II to view aerial photographs, typically relying on mirrors, lenses and a binocular head, but Kentridge does not include the binocular head for the viewing of his artworks. Kentridge’s collection also includes a box-like Brewster stereoscope, which was received as a gift and is not used for his own artworks. Older stereoscopic devices were also gifted or bought in antique shops or at auctions. In 2022 the studio bought fifteen F-71 magnifying stereoscopes from the Alan Gordon Film company to supplement the eight devices already in the collection. Whether gifted or purchased, all the devices become tools for viewing, provided that their lenses are in a good condition.

A POLITICAL LESSON

Kentridge’s interest in stereoscopic devices, not only as a subject, but also as philosophical tool, is most clearly reflected in the animated film *Stereoscope* (1999) from the *Drawings for Projection* series (1989–2020), which repeatedly references stereoscopic images. However, stereoscopic pairs are found throughout the artist’s oeuvre. There are series of large-scale drawings such as *Double Canna* (2004), which also reference stereoscopic images.⁶ While working on *Black Box/Chambre Noire* (2005), Kentridge produced a set of eight stereoscopic cards of his studio and of the miniature theatre built for *Black Box*. These stereoscopic cards were accompanied by a handheld stereoscopic device.⁷ Kentridge has also created a stereoscopic set of photographs titled

Double Vision (2007), which is accompanied by a handheld stereoscope. Lastly, Kentridge has made sets of stereoscopic photogravures such as *Tummelplatz* (2017) and *Underweysung der Messung* (2007), which are typically displayed on tables with F-71 magnifying stereoscopes carefully positioned above the sets of photogravures.

In *Stereoscope*, the artist references a variety of “mechanistic analogues of the brain” such as “the tape recorder and telephone,”⁸ as well as the stereoscope of the title. In discussing Kentridge’s work, Lilian Tone explains that “the stereoscope is a device which makes images appear three-dimensional by presenting each eye with a slightly different point of view of the same scene.”⁹ However, in Kentridge’s film, he deconstructs this by “employ[ing] a reversed manoeuvre, where the use of a split screen device can be seen to dismember three-dimensional reality into complementary but unsynchronized realities.”¹⁰ Throughout the film an electric blue line continues to separate the sets of images that appear next to each other; in Leora Maltz-Leca’s words, “the doubled image refuses to coalesce into the promised image of unity,” the “picture plane cracks again and again.”¹¹ Despite the telephones and tape recorders referenced in the film, the stereoscope is presented as the “dominant metaphor of consciousness,” since the film seeks to address the “divided consciousness” prevalent in South Africa during the 1980s and 1990s.¹²

The “divided consciousness” and the two images that “refuse to coalesce” in *Stereoscope* seem to poignantly reflect and comment on the lived experience of South Africans during the period that ushered in the end of Apartheid. The 1980s was a time of decadence and affluence globally. The white minority in South Africa experienced much of this prosperity while being confronted daily with the atrocities committed by the Apartheid regime against the black majority in the country. And many of the inequalities that plagued South Africa during Apartheid still plague the country today.¹³ Despite thirty years of democracy, Post-Apartheid South Africa remains divided—unity is still lacking. This lack of unity becomes especially apparent when looking at aerial photographs of the country, in which scars of division clearly still separate communities in South Africa—revealing the lingering effects of Apartheid policies. These aerial depictions of division evoke something of the input images for a stereoscope: two images that are different, yet similar, separated by a short distance, which could potentially be unified to produce a single image, as was the case with the F71 magnifying stereoscope. However, this unity must be actively constructed.

For Kentridge the stereoscope is a “machine for demonstrating seeing.”¹⁴ It helps the viewer to realise “that he is not seeing three-dimensional space but rather is *constructing* it.”¹⁵ The “stereo effect” utilised by Kentridge reveals the viewer as involved in the “active construction of the world” and discloses

the “binocular viewer” as “a constant maker or ‘projector’ of meaning.”¹⁶ The viewer of stereoscopic photographs or prints becomes a co-constructor of the stereoscopic image, and it requires physical as well as mental effort on the viewer’s part. As Kentridge explains:

A stereoscope is very different from a still photograph. You look across a photograph. You travel through a stereoscopic image. It is never a gaze. It is always an investigation, even if brief. Your eyes have to change their focus to the different depths. Literally it entails work, using the muscles of the eye, to align the two different images of the same object in the two photographs.¹⁷

The terms in which Kentridge describes stereoscopic vision suggest that the unity still lacking in South Africa must be actively and continuously construct-

192 | ed for differences to be overcome, and for the gaping divide between affluence and poverty to finally coalesce. This idea of unity is not some kind of utopian ideal, however, since it is not a permanent type of unity; like the illusionary image produced by the stereoscope, it is a temporary unity in need of constant adjustment and renegotiation by the eyes of the spectator—a distancing, an investigation, an imaginative projection. Kentridge defines the political aspect in his art as reflecting this ambiguity: “I am interested in a political art, that is to say an art of ambiguity, contradiction, uncompleted gestures and uncertain endings. An art (and a politics) in which optimism is kept in check and nihilism at bay.”¹⁸ Whereas “artistic process usually presents itself as the most material and most apolitical of concepts,” Kentridge’s artistic practice “explodes both notions, dematerialising charcoal dust into the cerebral ether of metaphor.”¹⁹ Kentridge continued to explore the almost-identical doubles at work in *Stereoscope* in later projects. As has been argued by Jane Taylor, “the stereoscope provided Kentridge with an instrument through which to bring together aesthetic, scientific, psychological, and philosophic metaphors about doubles” and eventually contributes to him developing “a principle of double vision” in his oeuvre.²⁰

AN ART HISTORY LESSON

Significantly, Kentridge’s “double vision” does not only constitute mere “doublings”:

It becomes evident that pairings can be understood either as doublings, or, as in the logic here, as *philosophic-aesthetic enquiries*, in which *one*

image scrutinizes the other, and meaning arises out of a kind of dialectical mutuality that is more complex, more various and productive, than a literal mirroring.²¹

Here the “double vision” embraces phenomena far beyond politics and the reconciling of divisions between South Africans. As a university-based art historian, I am interested in how this “double vision” relates to the method of comparison associated with the art history lecture. Kentridge’s lecture-performance of Kurt Schwitters’s *Ursonate* (2018) features a moment in which he seems to specifically reference that style of lecture and the comparative techniques art historians rely on.²² During this part of the performance, as in *Stereoscope*, Kentridge presents the viewer with a series of comparisons by placing two drawings next to each other. This immediately recalls the art historical lecture’s use of comparisons and double slide projection, a practice pioneered by Heinrich Wölfflin in his lectures.²³

| 193

In Kentridge’s version thereof, we see, for instance, a drawing of a sculpture of a reclining female nude placed next to a drawing of an espresso cup—perhaps pointing to the similarities between the curvatures of the female nude and the cup. Such a moment of “philosophic-aesthetic enquiry” during the lecture-performance recalls the art historian’s comparative method of staging similarities and differences as a means to generate an argument. That said, the use of comparisons “within the performative practices of art history” has become so common that nowadays audiences are mostly blind to its effects.²⁴ Furthermore, some argue that the use of comparisons and “double slides” employed in PowerPoint presentations “no longer serve to work with systematic comparison” but instead contribute to “split vision or distractive looking.”²⁵

However, the illuminating qualities of the comparative method to which audiences have become desensitised may be rekindled by considering the art historical lecture in light of Kentridge’s stereoscopic experiments. The discipline of art history is ultimately animated by *the same* “double vision.” Of course, comparisons in art history do not produce an illusion of depth and three-dimensionality. However, comparable to the doubles on which Kentridge’s use of the stereoscope relies, the comparisons in art history generate a productive tension that illuminates and makes visible the thoughts and arguments of the art historian. These comparisons produce a “stereoscopic gaze” that is both imaginative and revelatory. The comparisons in art history lectures can be described in terms of “visions” that “work wonders with the imagination. [They are h]overing between absolutely real and purely virtual, material and mental [...].”²⁶

In summary, Kentridge’s “double vision,” his stereoscopic experiments,

which can be read as both political statements/visions and “philosophic-aesthetic enquiries,” produce images that are not meant to be merely looked at, but to instigate in the viewer an investigation through comparative looking—a mode of seeing that is equally desirable in art history comparisons. In this way, the viewer of Kentridge’s work becomes a co-constructor of the meaning of the paired images, through an “investigative looking” that contributes to and augments the arguments posited by the comparisons set out by the artist.

I would like to express my sincere gratitude to Anne McIllemon, Taryn Buccellato and Natalie Dembo, collaborators in the Kentridge studio, for generously answering my questions and providing valuable information on, and images of, the stereoscopic devices in Kentridge’s collection. I also thank Erkki Huhtamo for his valuable expert input. Lastly, I also thank my colleague Martin Rossouw for his insights after reading an early draft of the chapter.

NOTES

- 1 Erkki Huhtamo, “Art in the Rear-View Mirror: The Media-Archaeological Tradition in Art,” in *A Companion to Digital Art*, ed. Christiane Paul (West Sussex: Wiley, 2016), 97.
- 2 Tom Gunning, “Hand and Eye: Excavating a New Technology of the Image in the Victorian Era,” *Victorian Studies* 54, no. 3 (2012): 495, <https://doi.org/10.2979/victorianstudies.54.3.495>.
- 3 Giuliana Bruno, *Surface: Matters of Aesthetics, Materiality, and Media* (Chicago: University of Chicago Press, 2014), 151.
- 4 Cleverly playing with the verb “tinkering,” Erkki Huhtamo offers the concept of “thinkering,” pointing to the connection between thought and hands-on experimentation and play; Huhtamo, “Thinkering with Media: On the Art of Paul DeMarinis,” in *Paul DeMarinis: Buried in Noise*, eds. Ingrid Beirer, Sabine Himmelsbach, and Carsten Seiffarth (Berlin: Kehrer Verlag, 2010), 33–46.
- 5 William Kentridge as quoted in Michael Godby, “Unwritten History: William Kentridge’s Triumphs and Laments, Piazza Tevere, Rome, 2016,” in *What Was History Painting and What Is It Now?* eds. Mark Salber Phillips and Jordan Bear (Quebec: McGill-Queen’s University Press, 2019), 219.
- 6 Throughout his career, Kentridge has continued to make large-scale stereoscopic drawings for which simple mirror stereoscopes are constructed in the studio.
- 7 Anne McIlheron, the manager of Kentridge’s studio, has pointed out that Kentridge was prompted to create this stereoscopic set by a handheld stereoscopic device in the studio, which was accompanied by photographs of First World War scenes. The provenance of this device is unknown.
- 8 Leora Maltz-Leca, *William Kentridge: Process as Metaphor & Other Doubtful Enterprises* (Oakland, CA: University of California Press), 196.
- 9 Lilian Tone, *Projects 68: William Kentridge: The Museum of Modern Art, April 15–June 8, 1999* (New York: Museum of Modern Art 1999), n.p.
- 10 Ibid.
- 11 Maltz-Leca, *William Kentridge*, 196.
- 12 Ibid. This “divided consciousness” is reflected in a significant number of Kentridge’s early drawings that draw parallels between Weimar Germany and Apartheid South Africa. Kentridge highlights the similarities between the two time periods, times of political uncertainty characterised by decadence and turmoil simultaneously.
- 13 South Africa is ranked as the “most unequal country in the world.” Insightful here is the report by Victor Sulla, Precious Zikhali, and P. F. Cuevas, “Inequality in South Africa: An Assessment of the Southern African Customs Union” (World Bank Group, 2022), <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099125303072236903/p1649270co2a1f06boa3ae02e57eadd7a82>.

14 William Kentridge, *Six Drawing Lessons* (Cambridge, MA: Harvard University Press, 2014), 113–114.

15 Nadine Rottau, “Perspektiven Eröffnen/Opening Perspectives,” in *Double Vision: Albrecht Dürer/William Kentridge*, eds. Klaus Krüger, Andreas Schalhorn, and Elke Anna Werner (Munich: Sieviking Verlag, 2016), 38.

16 Maltz-Leca, *William Kentridge*, 291.

17 William Kentridge, *Tummelplatz* (Madrid: Ivory Press, 2017), <https://ivorypress.com/en/?editorial=william-kentridge-tummelplatz>.

18 William Kentridge as quoted in Godby, “Unwritten History,” 225. On the theme of imaginative projection, it is also worth considering Kentridge’s artist’s book *Everyone Their Own Projector* (2008).

19 Maltz-Leca, *William Kentridge*, 1.

20 Jane Taylor, *Being Led by the Nose* (Chicago: University of Chicago Press, 2017), 114–115. This was also the theme of a 2016 exhibition, titled *Double Vision*, which explored the similarities and differences between Kentridge and Albrecht Dürer and required a kind of double vision from the viewer in order to view the works of a German Renaissance artist and a contemporary South African artist together.

196 |

21 Taylor, *Being Led by the Nose*, 119. My emphasis.

22 *Ursoneate* is Kurt Schwitters’ famous Dadaist sound poem, which Kentridge has performed on multiple occasions. The performance can be viewed at <https://lessgoodidea.com/ursonate>.

23 As pointed out by Dan Karlholm, Wölfflin invented a “stereoscopic gaze” for art history with his use of double slide projections during lectures; Karlholm, “Developing the Picture: Wölfflin’s Performance Art,” *Photography and Culture* 3, no. 2 (2010), 211, <https://doi-org.ufs.idm.oclc.org/10.2752/175145110X12700318320512>.

24 Ibid.

25 Ibid. The issue of split/distrautive looking (i.e., split vision) vs. constructive comparison (i.e., double vision) requires further investigation and elaboration: for example, when do viewers experience split vision and when do they experience double vision? What are the conditions which constitute split vision and double vision?

26 Karlholm, “Developing the Picture,” 211.

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edited by M. S. Phillips and Jordan Bear, 215–233. Quebec: McGill-Queen's University Press, 2019.

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<https://ivorypress.com/en/?editorial=william-kentridge-tummelplatz>.

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<https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099125303072236903/p1649270c02a1f06boa3ae02e57eadd7a82>.

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| 197

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PART II MEDIUM AND NOT EASILY PORTABLE

The Mazo *Cinématographe Mixte*

A Hybrid Media Apparatus

FRANK KESSLER AND SABINE LENK

Fossati, Giovanna and Annie van den Oever, eds. *Exposing the Film Apparatus: Global Laboratory Perspectives*. Amsterdam: Amsterdam University Press, 2025.
DOI 10.5117/9789048568260_CH12

| 201

ABSTRACT

This chapter examines a hybrid media apparatus, the Cinématographe Mixte, advertised by the French firm of Mazo in their 1912/13 catalogue, which could project both still and moving images. This apparatus bears witness to a form of still and moving image practice, in particular illustrated lectures, that differed from the dominant form of film exhibition in commercial movie theatres. In this chapter, the Cinématographe mixte is considered from a media archaeological viewpoint, shifting the focus of cinema historiography from theatrical to non-theatrical presentations.

KEYWORDS

Projection technology; nontheatrical exhibition; media archaeology; cinema history; lantern slides

Cinématographe Mixte

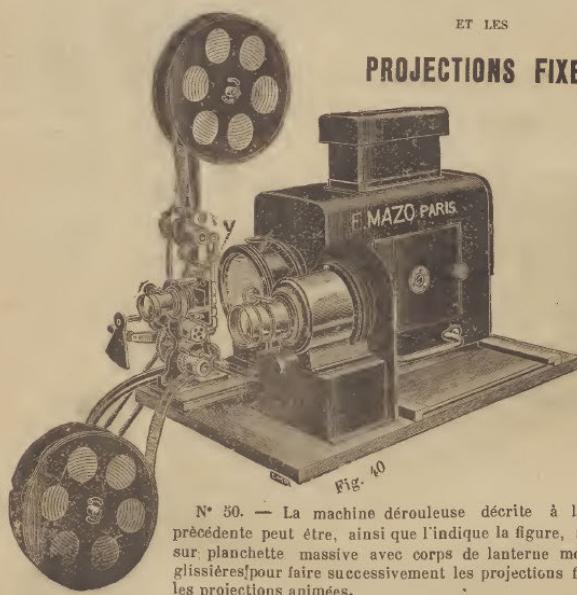
DÉROULEUR-ENROULEUR

Combiné pour les

PROJECTIONS CINÉMATOGRAPHIQUES

ET LES

PROJECTIONS FIXES



N° 50. — La machine dérouleuse décrite à la page précédente peut être, ainsi que l'indique la figure, montée sur planchette massive avec corps de lanterne mobile à glissières pour faire successivement les projections fixes et les projections animées.

Pour cela, la cuve à eau est fixée à demeure derrière la machine dérouleuse également vissée sur la planchette d'embase. Un devant d'appareil de projection Hélios avec son objectif est également disposé à côté pour servir aux projections des vues fixes.

Un corps de lanterne contenant un condenseur spécial et muni de porte et d'aillettes, peut recevoir les différentes sources de lumière, et glisse derrière les deux systèmes projecteurs pour les éclairer successivement. Des poignées métalliques fixées à la lanterne facilitent la manœuvre et une butée placée de chaque côté du système assure un centrage exact et immédiat à chaque changement de projection.

PRIX du système complet comprenant la Machine Dérouleuse-Enrouleuse, les deux grandes bobines, un objectif de cinématographe court foyer, une cuve à eau, un devant d'Hélios avec un objectif de Projection fixe à crémaillère et la lanterne montée sur sa glissière :

1^o Sans éclairage..... 420 fr.

2^o Avec carburateur Oxyéthérique Mazo..... 490 fr.

Avec lampe à Arc, à ajouter à 420 fr. le prix du modèle de lampe à arc qu'on aura choisi.

Ombres et Lumière (Abonnement 1 fr. par an) publie mensuellement des listes de films d'occasion

FIGURE 17

The Mazo Cinématographe Mixte.

THE MAZO CINÉMATOGRAPHE MIXTE

In their 1912/13 catalogue, the French firm of Mazo advertised a *Cinématographe Mixte*, | 203 a combination of their Hélios projection lantern model mounted on a sliding wooden plank with an unwinding/rewinding unit for filmstrips and two lenses. These were fitted in front of the lantern, which made it possible to project films and slides alternatively. The moving-pictures projection unit was fitted with a water-trough between the condenser and the running film strip to protect the inflammable nitrate film against the heat. The *Cinématographe Mixte*, in other words, is a hybrid that affords the combination of two forms of projection practice by means of a single apparatus.

THEORETICAL FRAMING

In this chapter we argue that, by looking at a hybrid media apparatus such as the *Cinématographe Mixte*, one can interrogate established linear histories of media change, according to which new technologies replace obsolete ones. This shifts the focus from dominant media uses, such as the projection of movies in cinemas for entertainment purposes, to (apparently) marginalised practices such as illustrated lectures, which have their own historical temporality. The *Cinématograph Mixte* bears witness to a different branch of still and moving pictures exhibition that was important enough to sustain a company such as Mazo and therefore merits investigation. Our perspective is both a media archaeological one, in that we look at the apparatus as well as the practices it afforded, and one that is concerned with cinema historiography, in that we shift the focus from the dominant form of film exhibition to non-theatrical presentations.

THE CINÉMATOGRAPE MIXTE

When the French firm Mazo advertised a *Cinématographe Mixte* in their 1912/1913 catalogue, they highlighted the flexibility of its components.¹ The apparatus was not only designed to project both still and moving pictures, but the body of the lantern could also accommodate different lighting systems. Handles facilitated its sliding from one position to the other. In this advertisement, the cinematograph part was privileged by Mazo in both the naming and the description of the apparatus. This presentation differed slightly from the preceding pages, where unwinding/rewinding units were advertised as separate devices to be added to an optical lantern, thus expanding the latter's affordances in a way not fundamentally different from other attachments commonly used by lanternists, such as microscopes or polariscopes. By stressing each part of the projection device while also selling the lamp house

204 | and the various accessories as a whole, Mazo pointed to the versatility of the apparatus: the ordinary Hélios lantern had been turned into a hybrid system for every convenience. As the words "film" or "living pictures" were missing in the advertisement, Mazo did not make any hierarchical difference between the carriers. The firm insisted instead on the functionality of the recently added part—to wind/unwind (a celluloid strip)—which distinguished it from the projector for "vues fixes" (lantern slides), which for many years had been their main product.

Around the same time, the French Catholic media enterprise Maison de la Bonne Presse put a similar apparatus on the market, the Solus, which made film historian Pierre Véronneau wonder why the organisation apparently still believed in slide projections. By 1910, Véronneau claims, these were outdated: "The audience no longer followed those commented slide shows—regardless of attempts to increase their appeal by using coloured images—as animated images were available at cinemas, at the fairground, and even in places of worship."² This, however, is a misconception: as media historian Jacques Perriault had already pointed out in the 1980s, far from disappearing because of the new moving pictures technology, the optical lantern continued to flourish in the 1910s and 1920s, and even in the 1930s.³ Yet, the idea of cinema supplanting the optical lantern is not simply an issue of hitherto overlooked historical data. It also results from a view on cinema history that focuses all but exclusively on movies as a popular art form, and on the economic infrastructures that support it, thus marginalising all other forms of moving-picture presentations.⁴ This is precisely why the *Cinématographe Mixte* advertised by Mazo is such an intriguing object: it invites us to open up the field of moving picture historiography to embrace different kinds of cinematic practices and, at the same time, to question commonly accepted periodisations and temporalities.

EARLY COMBINED PROJECTION PRACTICES

The projection of both still and moving pictures in one programme dates back to the late 1890s. Similar combined machines were already offered in Britain by Riley Brothers, Wrench and others from 1897, in the form of biunial lanterns (consisting of two lanterns mounted on top of each other), whose lower part was equipped for film projection.⁵ According to Charles Musser, in the US “the combination motion picture-slide projector [...] appeared in November 1897.”⁶ These combined projectors made it possible for exhibitors and lecturers to alternate between slides and films. Moreover, they could be used to project the films’ titles, which were generally not included on the filmstrip at the time, as well as to communicate all sorts of announcements to the audience.⁷ The combined slide and film projection lantern offered solutions to problems faced by, especially, travelling showmen and lecturers who wanted to present both slides and films. First of all, it was obviously easier to travel with just one, rather than two machines. Second, it was simpler to project with one apparatus in a show instead of two separate ones. Third, and most importantly, lanternists could add moving pictures as a new attraction to their show. In the case of themed programmes such as Lyman H. Howe’s “War-Graph,” which screened films on the 1898 Spanish-American War, lantern slides made it possible to extend and diversify the performance, particularly because war-related footage was limited. “Almost every exhibitor showed slides along with films to increase his choice of subject matter and lower his costs.”⁸ In these programmes, slides might even have been able to show more of the military action than the moving pictures—especially in the form of drawings. Moreover, with still images lecturers could stay in control of the length and the rhythm of their oral presentations.

| 205

Cinema historiography has commonly organised its periodisation along the lines of a master narrative describing a trajectory beginning with travelling exhibitors who introduced the new apparatus to fairground shows, variety theatres, and other venues; followed by the first, still very simple, permanent theatres, such as the Nickelodeons in the US or the *Ladenkinos* in Germany, and later the movie palaces of the 1910s and 1920s; the introduction of sound; the glorious era of the 1940s and early 1950s; until the decline caused by the coming of television; and so on. Itinerant exhibition tends to be seen as a practice that was important in the earliest period of the medium to boost its dissemination, but became marginalised once permanent and purpose-built theatres had developed into the main site for the projection of films.

NON-THEATRICAL PROJECTIONS

Conversely, Mazo, or Maison de la Bonne Presse for that matter, mainly catered to a clientele that was active in this allegedly marginal field, their catalogue offering chiefly equipment and slides for the projection of still images, while cinematography played only a minor role. Looking at Mazo's apparatus therefore invites us to shift the focus away from commercial movie-theatre entertainment to so-called non-theatrical projections. The history of non-theatrical exhibition is a very different one that, contrary to the abovementioned dominant cinema historiography, "cannot be explained in terms of a master narrative concerning origin or institutionalization, progress or decline."⁹ Placing the Mazo apparatus in its historical context helps us to become aware of the different temporality governing the use of moving pictures in the context of illustrated lectures, where they were often combined with lantern slides.

206 | Slides and films complemented each other, the former affording detailed description and a multiplication of perspectives and examples, while the latter made it possible to document people, objects or processes in motion. Such lectures could serve different purposes, from the presentation of travelogues to hygiene and health campaigns, from missionary work to political propaganda, from practical instruction to science communication. Locations where these events took place were generally multi-purpose venues—community halls, hotels, cafés, restaurants, schools, association buildings, and others—which, more often than not, could not provide projection facilities and expected lecturers to bring their own. This kind of lecture continued for many decades after the emergence of permanent movie theatres. Obviously, projection equipment for travelling exhibition continued to evolve as well: among other changes, the separation between lamp house and film projection unit disappeared, for example. But by the early 1910s Mazo's projector would still have been considered state of the art for this kind of practice—thus anything but an outdated technology.

THEATRICAL PROJECTION PRACTICES

With the emergence of permanent, purpose-built movie theatres and the institutionalisation of the medium with its economic infrastructure, the advantages of combined slide and film projection might be considered less relevant for theatrical exhibitors whose projection equipment needed to meet other demands. The possibility of running a machine all day long, for instance, became more important than versatility, while at the same time films became the main product to be shown. Nevertheless, that does not mean that com-

oined projectors had become completely obsolete in theatrical exhibition by the 1910s. In fact, some contemporary sources still mention it as a common practice in movie theatres.¹⁰

In a 1913 manual addressing “cinema owners, projectionists and others interested in motion pictures,” Charles Le Fraper, editor-in-chief of the trade journal *Courrier Cinématographique*, after discussing various types of film projectors, affirms that every type of projection lantern can serve as a lighting unit for film projection, provided one takes off the lens for showing still images and puts a heat-absorbing water-trough between the condenser and the filmstrip. He continues: “In practice, the lantern [...] slides laterally on two rails so that it can be used at will to project still or animated pictures.”¹¹ Le Fraper also details what is generally communicated by means of slides: the title of the film (which seems indeed a bit surprising as late as 1913, unless he refers to the announcement of the following item of a programme), the start of the programme and advertisements.¹² In a 1913 British handbook, Colin N. Bennett remarks: “Although the bulk of projection in the modern cinema theatre consists in showing moving pictures, yet there is a certain amount of still projection which gives relief to the eyes and variety to the program.”¹³ He mentions announcement slides, but also illustrated song slides, as well as “topical slides illustrating local events.”¹⁴ In this context, Bennett refers to “the usual shift-over lantern slide showing attachment of the projector.”¹⁵ So even for movie theatres, in France and Britain at least and quite probably elsewhere as well, combined slide and film projectors were by no means considered outdated when Mazo advertised their apparatus, as they fulfilled a variety of functions.

Bennett’s observation that the projection of slides gives “relief to the eyes and variety to the program” was a common *topos* around that time. In 1911, Franz Paul Liesegang recommended using “*Effektbilder*” (effect slides) for this purpose, preferably related thematically to a film—a maritime sunset after a film showing an ocean liner leaving a port, for instance. Interestingly, Liesegang illustrates this section with a picture of a triunial lantern, similar to the biunial lanterns used for the combination of still and moving pictures projections in the 1890s. For this, the film projection unit is placed in front of the lowest of the three lanterns, while the other two can serve to project lantern slides.¹⁶ The argument that it was necessary to alternate between films and slides to give some rest to the audience’s eyes was also used by the German *Kinoreformbewegung* (cinema reform movement), but in their case as a distinctive feature of their own programmes, as opposed to those shown in commercial cinemas.¹⁷

Ultimately, in many countries the projection of still images in movie theatres continues to this day, generally to advertise local businesses before the

advertisement films, trailers and the feature. Slides announcing “coming attractions” also still existed in the 1980s.¹⁸ Song slides and singalongs were part of film programmes in the United States in various forms into the 1920s and sometimes beyond.¹⁹ Hybrid projectors may have disappeared, but projected still images have not.

CONCLUSION

Mazo’s *Cinématographe Mixte* reminds us that the projection lantern and the film projector not only existed in parallel for many decades but also, and more importantly, co-existed productively in a variety of ways. Rather than a rapidly replaced “forerunner” of moving pictures, the lantern was an integral part of cinema history. Looking at a hybrid apparatus such as Mazo’s *Cinématographe*

208 | *Mixte* from a media archaeological perspective invites us to reflect on the practices that it afforded and thereby helps eschew linear conceptions of media history, because it literally embodies, as a specific combination of material elements, that which is generally regarded as two different, and even successive media forms. Moreover, shifting the focus from film or cinema history in a narrow sense—that is from the history of fiction filmmaking and theatrical exhibition—to the multiple other, sometimes intermedial practices afforded by this technology leads to a richer appreciation of its cultural significance. Engaging with the *Cinématographe Mixte* as a material object opens up a perspective that leads beyond essentialist conceptions of what is “cinema.”

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NOTES

- 1 E. Mazo, *Catalogue no. 50. Années 1912 & 1913* [Paris: Mazo, 1913], 46.
- 2 Pierre Véronneau, “*Le Fascinateur* and Maison de la Bonne Presse: Catholic Media for Francophone Audiences,” in *Faith in a Beam of Light: Magic Lantern and Belief in Western Europe, 1860–1940*, eds. Sabine Lenk and Natalija Majsova (Turnhout: Brepols, 2022), 44. It is by no means our intention to deprecate Véronneau’s work as a film historian. We quote him here because he so explicitly articulates the widely shared idea that new media replace older media, rather than looking at the way in which emerging media lead to a reconfiguration of a historical media landscape, referring, moreover, to an apparatus that is similar to the one we are discussing.
- 3 See Jacques Perriault, *Mémoires de l’ombre et du son: Une archéologie de l’audio-visuel* (Paris: Flammarion, 1981). What Perriault could show for France has been corroborated for Belgium and the Netherlands in two research projects: “B-magic: The Magic Lantern and Its Cultural Impact as Visual Mass Medium in Belgium (1830–1940)” (2018–2023) and “Projecting Knowledge—The Magic Lantern as a Tool for Mediated Science Communication in the Netherlands, 1880–1940” (2018–2024), in which the authors were involved. See in particular Margo Buelens-Terryn, “From ‘Magic’ to ‘the Masses’: Mapping the Lantern Lecture Circuit in Antwerp and Brussels c. 1900–c. 1920” (PhD dissertation, University of Antwerp, 2023). See also Dulce da Rocha Gonçalves, “Public Lantern Lectures in the Netherlands 1880–1940: A Dataset Based on Historical Newspaper Advertisements,” *NECSUS. European Journal of Media Studies* 12, no. 2 (2023): 368–385, <https://necsus-ejms.org/public-lantern-lectures-in-the-netherlands-1880-1940-a-dataset-based-on-historical-newspaper-advertisements/>.
The dataset is available here: <http://dx.doi.org/10.25969/mediarep/20855>.
According to Bart Moens, “New Light on Maison de la Bonne Presse and Its *Service des Projections*,” in *Faith in a Beam of Light*, 65 (5.129094), Maison de la Bonne Presse still sold 520 optical lanterns in 1935 and rented out more than 400,000 slides.
- 4 For a different viewpoint, see Gregory A. Waller, *Beyond the Movie Theater: Sites, Sponsors, Uses, Audiences*. (Oakland, CA: University of California Press, 2023).
- 5 See Riley Brothers advertisement in *Optical Magic Lantern Journal* 8, no. 94 (March 1897): xxv. This and other models are presented in Nicholas Hiley, “Lantern Showmen and Early Film,” *The Magic Lantern*, no. 15 (2018): 5–7.
- 6 Charles Musser in collaboration with Carol Nelson, *High Class Moving Pictures: Lyman H. Howe and the Forgotten Era of Traveling Exhibition 1880–1920* (Princeton, NJ: Princeton University Press, 1991), 87.
- 7 See Claire Dupré la Tour, “The Lantern Slide, a Fabulous Tool for Early Film Titling,” in *A Million Pictures: Magic Lantern Slides in the History of Learning*, eds. Sarah Dellmann and Frank Kessler (New Barnet: John Libbey, 2020), 77–86.

8 Musser and Nelson, *High-Class Moving Pictures*, 87.

9 Waller, *Beyond the Movie Theater*, 5. The term “non-theatrical” does not exclude the possibility that a special screening of, for instance, slides and films about an expedition took place in a movie theatre that was rented out to the lecturer for that event. In other words, the term does not refer to the location but to the overall character of the screening, i.e., its motivation, its method and its objectives.

10 Another field where combined projection apparatuses continued to be used in France, well into the 1920s, was schools. The Pathé N.A.F. projector, built from 1920 onwards, could be combined with a slide projection unit. See <https://www.cinematheque.fr/fr/catalogues/appareils/collection/projecteur-de-film-35-mm-95-1397.html>.
An article in a journal for educators mentions as late as 1927 that film projectors for teaching could be fitted with such a unit. See G. Eisenmenger, “Appareils de projection pour l’enseignement,” *Le Travail manuel, les sciences expérimentales et le cinéma à l’école* 5, no. 8 (1 May 1927): 279.

210 |

11 Charles Le Fraper, *Manuel pratique à l’usage des Directeurs de Cinéma, des Opérateurs et de toutes les personnes qui s’intéressent à la Cinématographie* (Paris: Édition du Courrier Cinématographique, s.d. [1913]): 111.

12 Ibid.

13 Colin N. Bennett, *The Handbook of Kinematography: The History, Theory and Practice of Motion Photography and Projection* (London: The Kinematograph Weekly, 1913), 311.

14 Ibid.

15 Ibid., 315.

16 Franz Paul Liesegang, *Handbuch der praktischen Kinematographie* (Leipzig: Ed. Liesegang’s Verlag, M. Eger, 1911), 250.

17 See Frank Kessler and Sabine Lenk, “Kinoreformbewegung Revisited: Performing the Cinematograph as a Pedagogical Tool,” in *Performing New Media, 1890–1915*, eds. Kaveh Askari et al. (New Barnet: John Libbey, 2015), 163–173.

18 A large collection of “coming attractions” slides can be found on Rob Byrne’s website <https://www.startsthursday.com>.

19 See Rick Altman, *Silent Film Sound* (New York: Columbia University Press, 2004), 182–193; 342–343.

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Bending Efforts and Beams

The Use of the CRT Projector in Video Art Installations

EVELYNE SNIJDERS AND ELLEN JANSEN

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| 213

ABSTRACT

Nam June Paik's *Sistine Chapel* (1993) was an award-winning installation based on CRT projection that immersed spectators in an all-encompassing audiovisual experience. Its reactivation decades later with LCD projectors calls for analysis of this technological migration. After all, the physical properties and unique visual qualities of CRT projectors shaped both the artwork and the user-creator experience, aspects that cannot be easily replicated with contemporary display systems. The application of James J. Gibson's affordance theory helped in analysing the interactive role of the CRT projector and provided insight in hands-on media sessions. The research argues for the inclusion of these embodied affordances in conservation practices and emphasises that time-based media artworks are inherently dynamic and dependent on evolving technologies and human interpretation.

KEYWORDS

CRT projectors; Nam June Paik; hands-on media; affordance; time-based art conservation



FIGURE 18

The CRT Projector.

CATHODE RAY TUBE PROJECTOR

Cathode Ray Tube (CRT) projectors utilise three CRTs, each corresponding to one of the primary colours—red, green or blue. CRTs operate through an electron beam fired within a vacuum towards a phosphor layer, causing it to illuminate. The image is constructed line by line from this singular light point, achieved by rapidly moving the electron beam and scanning the phosphor layer. The number of scan lines a projected image contains depends mainly on the picture tubes present. The 4:3 aspect ratio tube face of the CRTs can range from 7 to 9 inches and the lifespan of the tubes is approximately 10,000 to 20,000 hours (depending on the colour). The light output for a CRT projector is relatively low, ranging from 650–1,300 lumens at peak level, but this technology allows for high-contrast images with excellent colour accuracy. Typical dimensions of a CRT colour projector are about 60 x 45 x 30 cm for a small projector, but a larger unit can be as much as 100 x 80 x 40 cm. The weight varies between 22 and 113 kilograms. Once a cornerstone of video projection in the 1990s, this analogue technique experienced a decline with the rise of digital projection technologies in the early 2000s. As a result, these once-prevalent systems became obsolete, now only available through a few specialised rental companies.

| 215

THEORETICAL FRAMING

This chapter illuminates the unique qualities of CRT projection technology as an artistic medium from a (re)productive perspective, and aims to contribute to established conservation strategies for screen-based artworks. Using a hands-on media history approach and exploring the affordances of CRT projectors, we seek to expose how interaction with this now obsolete display technology can be seen as a form of both immediate engagement and historical reflection. Our aim is to explore whether certain specific features inherent to CRT projection artworks have been affected or lost in the transition through the migration to contemporary projection technologies, using the majestic *Sistine Chapel* (1993) by Korean artist Nam June Paik as a case study.

INTRODUCTION

When Nam June Paik (1932–2006) was invited to represent Germany at the 45th Venice Biennale in 1993, his *Sistine Chapel*, an installation with several dozen CRT projectors, represented the ultimate and inescapable tribute to projection as an independent art media. After this apotheosis, however, the downward spiral for CRT technology as the leading display technology of the twentieth century began with the rise of improved Liquid Crystal Display (LCD) devices, until complete production ceased some two decades later. Almost 30 years after Venice, in a major retrospective of the same artist, his monumental installation was presented using solely LCD projectors, in line with generally accepted conservation guidelines related to obsolete equipment of migration, emulation and reintegration.¹ As enthralling as the artwork was in this contemporary configuration, it also raised questions about its state before

216 | the transition and what elements were enhanced or lost in the migration to new technology. This requires careful analysis and, in our opinion, should be incorporated into the artwork's documentation to ensure its effective preservation.

The analysis of the use of CRT projectors in time-based media artworks can be enriched by James J. Gibson's concept of affordances—what the environment could offer or provide, positively or negatively, to invite (inter)action.² We intend to do this from a user-creator's perspective, rather than a spectator's perspective. With Paik's *Sistine Chapel* as a starting point, we will engage in conversation with a number of people directly involved in the creation of this work, both the original and the remake. In addition, we will explore the operation of, or rather interaction with, the CRT projector, together with a number of specialists with extensive practical experience in time-based media art installations during a hands-on media experimental session.³

PAIK'S SISTINE CHAPEL

Whoever ventured from the sunny Venetian daylight into the darkened, high-ceilinged side wing of the German Pavilion at the Venice Biennale of 1993, must have felt as though transported into a different dimension. From the moment the public stepped inside, they were immersed in Nam June Paik's video artwork *Sistine Chapel*—a kaleidoscopic audiovisual collage of partially overlapping projections depicting pop culture references, and references to Paik's own work and that of his circle of friends, all accompanied by a thunderous soundtrack. The name for the work, which according to collaborating assistant Jochen Saueracker came later during the installation process, clearly

refers to Michelangelo's work of the same name in its scale and its interaction with the surrounding architecture.⁴ It might also be a cheeky reference to the controversial restoration of the Vatican chapel in the 1980s and '90s that was generously sponsored by Nippon Television Network Corporation of Japan in exchange for exclusive reproduction rights.⁵ Another interesting parallel can be drawn between the scaffolding Michelangelo used to paint his Sistine Chapel, and the scaffolding built by the Paik team for the equipment needed to create his all-encompassing installation.⁶ The Zenith PRO851 CRT projectors that Paik employed were collected and bought second-hand for this artwork.⁷ This particular type of Zenith was designed as a low-end projector, with low-cost acrylic lenses and only one master focus control. They were relatively inexpensive, but still considered to be very reliable, although they were not equipped with internal error or diagnostic indicators, as other higher-end projectors were.⁸ The projectors were connected to custom video switchers that randomly switched between four video channels to generate the bombardment of images on the walls and ceiling of the room.⁹ Despite the large quantity of projection equipment, the installation was not blinding due to the relatively low light output of the CRT projectors. However, the many projectors will have added extra heat to the already hot summer climate in Venice, making the ventilation system run overtime.

| 217

Although there had been one trial installation with fewer projectors at the Holly Solomon Gallery before its definitive iteration at the Biennale, most of the decisions for the installation had to be made on the spot.¹⁰ There were no drawings or a specific preconceived plan, and the projectors were intuitively placed as huge sculptural elements in the composition of the installation by Paik's assistants, who moved the 60-kilo devices onto and around the metres-high scaffolding. The improvised arrangement was adjusted until Paik completed his "media practice" and was satisfied with the final result.¹¹ The machines were supported with pieces of wood and bricks to direct the projections at the desired angles on the walls and ceiling, guided by the affordances that both the exhibition space and the projectors had to offer.¹² The orientation of the images in the room was more important than the sharpness of the image, and the rhythm and "flow" of the projected images were manually manipulated by the artist himself using the speed dial on the video switches. Finally, in order to keep the projectors running in those unusual positions and in that heat, so that they could continuously perform during the period of the exhibition, it proved necessary to station an assistant on the pavilion's roof who could remedy any equipment failure immediately.¹³

TRIPLE TUBE PROJECTIONIST

Projection is first and foremost a play of light. To display illuminated images in colour, every display technology uses additive colour mixing according the trichromatic theory of mixing red (R), green (G) and blue (B) light in different light intensities.¹⁴ Different from any other projection technology is the fact that a standard CRT colour projector has three separate picture tubes, one for each primary colour, and you have to align these R-G-B projections, almost as a “projectionist,” to form one colour image.¹⁵ To investigate this, we consulted highly skilled experts, Ramon Coelho and Paul Jansen Klomp,¹⁶ and invited the founder of VideoArtlab, Ivo van Stiphout,¹⁷ for a hands-on session with the Sony VPH-1251QM CRT projector, in order to observe the interaction with the device during tube alignment.¹⁸ The projector is an impressive machine, but once positioned in front of the blank wall, its three round, eye-like lenses evoke

218 | curiosity and give it an unexpectedly friendly look. The control panel, unlike the on-and-off button on the front of the unit, is hidden under an integrated panel at the top. Once the projector is switched on, it changes the room, creating a new virtual environment, in which the task of aligning the tubes must be fulfilled. Unlike other projection techniques, crossing the light beams does not feel like interference; rather, the CRT projector invites it, as no shadow is cast, but a rainbow of complementary colours is created.

The machine has built-in physical affordances that allow you to interact with it, such as buttons to press and screws to adjust, guided only by the projector's hefty user manual, because the interface, or “perceived affordance,” is not intuitive on any level.¹⁹ The meticulous aligning process demands expertise and patience, starting with the fact that the machine has to warm up before use. There will be some differences by brand and projector type, but in general the steps are broadly similar. When setting up, the lenses must first be mechanically aligned before any electronic centring adjustments can be made. This requires partial removal of the device housing. Electronic image adjustments are then made with aid of various test patterns from the projector set-up menu operated by the control panel.²⁰ Achieving a well-aligned image necessitates precise manipulation of the beams in a specific sequence, starting with the green middle beam, then the red and lastly the blue. Following the correct sequence of actions within the projector's set-up menu is important to avoid getting stranded in the process and having to start anew.²¹

It took the authors days to arrive at a somewhat satisfactory result with a Sony VPH-1251QM CRT projector, but even an experienced person will still need several hours to completely fine-tune the image.²² And even then, the end result will never be perfect and minor deviations in colour alignment will persist, also because the focusing system in pre-1993 equipment slowly degrades

over time with intensive use.²³ Depending on factors such as video content, installation constraints and context, tube projectionists may opt for a less stringent alignment to simplify the process.²⁴ This provides an unparalleled, pleasantly soft picture quality with great contrast, as black is really black with a CRT without ambient light.²⁵

THE CURRENT CHAPEL

Despite winning a Golden Lion for the best national representation at the Venice Biennale in 1993, Paik's *Sistine Chapel* was not re-exhibited, and it disappeared from public view, its CRT-based playback equipment repurposed by the artist.²⁶ The videos and two interconnected bespoke analogue video switchers were the sole remainders of the grand installation, safeguarded by the artist and by his estate after his death.²⁷ When the artwork was exhibited for the first time in 36 years during the Nam June Paik solo exhibition at Tate Modern in London (October 2019 to February 2020), it had undergone a significant transformation. The installation was scaled down to fit into the museum's white-walled, rectangular exhibition space, and displayed with various types of digital projection equipment attached to an open scaffolding structure. To prepare for the re-activation of the artwork in other European and Asian venues that the exhibition would travel to, the estate contacted the German company for technological services EIDOTECH in Berlin to explore the possibilities for playback, sound, synchronisation and projector mounting, based on a visual concept by the former Paik assistant and curator of the Paik Estate, Jon Huffman.²⁸

| 219

From the outset, the use of CRT projectors was deemed an unfeasible option. Finding such a large amount of functioning CRT projectors would be difficult, and the technological failure that was anticipated would mean continuous intensive technical support and intervention during exhibition. The migration strategy to a new system was also in keeping with Paik's receptiveness to new technologies.²⁹ What was deemed the most important element to keep from the old technology, when converting it into the digital realm, was the 4:3 Standard Definition (SD) aspect ratio. At the time of re-activation, it was still possible to find suitable digital projectors, but it has become increasingly difficult because of the popularity of the 16:9 Full High Definition (FHD) image format. Ultimately, Panasonic 3-chip LCD projectors from the XGA³⁰ series were chosen for the re-activated *Sistine Chapel* because of their durability and reliability. Compared to the equipment in the original exhibition the projectors are smaller and lighter, allowing them to be easily attached to the scaffolding with half couplers, in varying orientations and angles to fit the

conceived visual concept. Finding the site-specific installation requirements to build the scaffolding and calculate the correct projector lay-out turned out to be the biggest challenge for the iteration of the artwork.³¹ In any future repetitions, finding digital projectors with the right aspect ratio compatible with the original video switches will become an additional technical complication and, besides, one wonders who will act as the artist's voice when making future decisions that could permanently affect the installation.³²

TAKING STOCK OF CRT PROJECTION

Ultimately, key elements such as the original videos and video switches were preserved, as were the image orientation and the aspect ratio. It is interesting to note that the written sources about the Sistine Chapel installation make

220 | little mention of the presence of the equipment, referring only to the bombardment of images. Nonetheless, it is undeniable that the sheer number of CRT projectors—with their physical presence, along with the heat, sound, and even smell generated by both machines and people—would have significantly shaped the overall experience of the artwork. Furthermore, CRT projectors also influenced the aesthetic quality of the images. Although their light output is relatively low, they offer high contrast, and the scan lines create a fundamentally different visual texture compared to the high-resolution pixel-defined frames of contemporary projections. In short, it is difficult to migrate the intimate and soft image quality of CRT projection.

During our research, Paik's *Sistine Chapel* was often referred to as performance piece. This referred not only to the images projected in the room, but also to how devices were intuitively arranged and supported, and how cables were seemingly carelessly draped. The resulting installation thus became an interplay between the space, the videos, the projectors and the enormous scaffolding that supported them, shaped by both the technological medium and the embodied experience of the projectionist. In that sense, the CRT projectors did not merely function as a passive medium, but actively structured the experiential possibilities of the environment, and invited a reciprocal relationship between user-creator and medium. This is closely in line with Gibson's assertion that affordances are relational, perceptible and based on the interaction between organism and environment.

Experiencing CRT projection through the lens of Affordance Theory allowed us to analyse the artwork's technological transition, suggesting that this perspective could serve as a valuable addition to the conservator's toolkit when approaching time-based media artworks. The hands-on media practical session with the CRT projector proved to be a great asset in the conversations

with those directly involved in this case study to better understand not only the artwork, but also the decisions made. And although there is necessarily a great deal of time and effort invested in the re-activation of the artwork in terms of resourcing display material and layout calculations beforehand, there is a noticeable shift away from the physical aspect—the physical effort of actually hauling up the equipment onto the construction; the effort of adjusting the projectors piece by piece; the effort of orienting the video images step by step in the space using physical objects for support; and also the physical effort of keeping the installation running for the duration of the exhibition. Even though change should be considered inherent in the reality of time-based media artworks, given the impermanence and continuous development of technology, the presentation and preservation of time-based media artworks remains a complex endeavour strongly influenced by human interaction and interpretation to achieve the physical manifestation of technology.

| 221

NOTES

1 See Jon Ippolito and Alain Depocas, "Strategies," *Variable Media Network*, <https://variablemedia.net/e/index.html>; Johanna Phillips, "Shifting Equipment Significance in Time," *The Electronic Media Review* 1 (2012): 139–154; Pip Laurenson, "Authenticity, Change and Loss in the Conservation of Time-Based Media Installations," *Tate Papers*, no. 6 (2006), <https://www.tate.org.uk/research/tate-papers/06/authenticity-change-and-loss-conservation-of-time-based-media-installations>; Laurenson, "The Management of Display Equipment in Time-Based Media Installations," *Tate Papers*, no. 3 (2005), <https://www.tate.org.uk/research/tate-papers/03/the-management-of-display-equipment-in-time-based-media-installations>.

2 James J. Gibson, *The Ecological Approach to Visual Perception* (Boston, MA: Houghton Mifflin Company, 1979), 127.

222 |

3 John Ellis, "Why Hands on History Matters," in *Hands on Media History: A New Methodology in the Humanities and Social Sciences*, ed. Nick Hall and John Ellis (Abingdon, Oxon: Routledge, 2019), 15, <https://doi.org/10.4324/9781351247412>.

4 Jochen Saueracker, interview with authors, Zoom session, 9 November 2023.

5 "Nippon TV and Vatican," *The New York Times* (29 March 1990).

6 Different sources cite different numbers of projectors, ranging from 34 to 48.

7 Saueracker, interview; Curt Palme, email message to authors, 9 March 2023.

8 Palme, "Zenith Pro 841X/851X," *CurtPalme.com Home Theatre: FAQs, Tips, Manuals*, <http://www.curtpalme.com/Zenith841.shtml>.

9 Joachim Arbell, Piotr Komarnicki (EIDOTECH), interview with authors, Zoom session, 17 November 2023; Emily Sharpe, "The Sistine Chapel's System Upgrade: Nam June Paik's Immersive Video to Be Recreated for Tate," *The Art Newspaper* (4 October 2019), <https://www.theartnewspaper.com/2019/10/04/the-sistine-chapels-system-upgrade-nam-june-paiks-immersive-video-to-be-recreated-for-tate>.

10 Saueracker, interview; Sharpe, "The Sistine Chapel's System Upgrade."

11 Saueracker, interview; Ellis, "Why Hands on History Matters," 12.

12 James J. Gibson, "The Theory of Affordances," in *Perceiving, Acting, and Knowing*, eds. Robert Shaw and John Bransford (Hillsdale, NJ: Lawrence Erlbaum Associates, 1977), 74.

13 Saueracker, interview.

14 Holger Luczak and Olaf Oehme, "Visual Displays—Developments of the Past, the Present and the Future" (paper presented at the 6th international scientific conference WWDU 2002—World Wide Work, Berchtesgaden, 22–25 May 2002), 2.

15 There have been artists, including Paik with his installation *One Candle* (1989), who capitalised on this feature of the device and used the aesthetics of decon-

structed colour projection in their work. And because the red, green and blue light comes from different source positions, a shadow of an object or person moving in front of the lens of the projector will create a rainbow effect caused by the appearance of the secondary additive colours in the light projection.

16 Coelho (Video Projects, Amsterdam) and Klomp (Artez, Arnhem; Leiden University) share a deep-rooted history in the Dutch media art scene through their involvement with MonteVideo—later known as Time Based Arts media lab—and the Netherlands Media Art Institute (NIMk). Both have extensive experience working with media apparatuses in art installations, including the alignment of CRT projectors.

17 Ivo van Stiphout worked for nearly fifteen years at the Netherlands Institute for Media Art (formerly MonteVideo/Time Based Arts) before founding the Amsterdam-based VideoArtlab in 1989. Since then, he has specialised in audiovisual exhibition design and installation, supporting artists and institutions in the production and presentation of media artworks. Through this work, he has developed deep practical expertise with media apparatuses in exhibition contexts. | 223

18 Hands-on media history experimental session with Van Stiphout, organised at the University of Amsterdam Humanities Labs (Contemporary Art and Time-Based Media Art Conservation Lab) with a Sony VPH-1251QM CRT projector, 27 June 2023.

19 Donald Norman, “Affordance, Conventions, and Design,” *Interactions* 6, no. 3 (1999): 39, <https://doi.org/10.1145/301153.301168>.

20 The CRT projector also has a remote control that has largely the same control buttons as the control panel on top of the device and makes alignment easier as it affords you more freedom of movement during this process.

21 Van Stiphout, interview and hands-on media experimental session, 27 June 2023.

22 Coelho, email message to authors, 15 January 2024; Van Stiphout, interview and hands-on media experimental session.

23 Coelho, email message; Palme, “Electrostatic (ES) vs Electromagnetic (EM) Focus,” *CurtPalme.com Home Theatre: CRT Primer*, http://www.curtpalme.com/CRTPrimer_12.shtm.

24 Klomp, personal conversation with authors, 12 April 2024.

25 Coelho, email message to authors, 15 January 2024.

26 Saueracker, interview.

27 Sharpe, “The Sistine Chapel’s System Upgrade.”

28 EIDOTECH, interview.

29 Hanna B. Hölling, “Re: Paik: On Time, Changeability and Identity in the Conservation of Nam June Paik’s Multimedia Installations” (PhD diss., University of Amsterdam, 2013), 146; Sharpe, “The Sistine Chapel’s System Upgrade.”

30 XGA or Extended Graphics Array is a display mode standard and has a resolution of 1024 x 768 pixels in the 4:3 aspect ratio.

31 EIDOTECH, interview.

32 For the re-activation of this artwork, this role has at present been filled by John Huffman, the curator of the artist's estate and one of Paik's long-term studio assistants.

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EVELYNE SNIJDERS AND ELLEN JANSEN are contemporary art conservators who have played a key role in shaping the contemporary art conservation programme at the University of Amsterdam. In addition to their work in private practice, they have been affiliated with both the Master's programme and the Advanced Professional Programme (APP) in Conservation and Restoration of Cultural Heritage since 2011 and 2012, respectively. They have been instrumental in developing the curriculum and coordinating the APP track, helping to establish it as a leading programme in the field.

| 225

CHAPTER 14

A Projectionist and His Percepto

Personal Archives and Embodied Film Education

KEITH BENNIE

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| 227

ABSTRACT

In this chapter, I examine the distinctiveness of Percepto! in the context of film apparatus research, both as a film gimmick and as a device that invited cinema managers and projectionists to participate in modes of storytelling. I contextualise the Percepto! device recently donated to the Toronto International Film Festival (TIFF) Film Reference Library, explore its history of use by local film projectionist David W. Snider, and consider what this demonstrates about the essential role of projectionists in preserving film apparatus history, as well as the opportunities this affords for media history in education.

KEYWORDS

Percepto!; projectionists; William Castle; personal archives; participatory cinema



FIGURE 19
The Percepto! Device Timer Box.

PERCEPTO!

The Percepto! Device consisted of 100 electric motors, a timing mechanism, and installation materials released to cinema exhibitors presenting *The Tingler*, directed by William Castle, in 1959. Exhibitors installed the motors underneath cinema seats. Following specific cues, projectionists would activate the device and audience members would feel a vibration under their seats timed to align with the action on screen. Percepto! played a prominent role within the marketing campaign for the film, encouraging audiences to see the film and experience the film apparatus in action.

| 229

THEORETICAL FRAMING

In this chapter, I examine the distinctiveness of Percepto! in the context of film apparatus research, both as a film gimmick and as a device that invited cinema managers and projectionists to participate in modes of storytelling. I contextualise the Percepto! device recently donated to the Toronto International Film Festival (TIFF) Film Reference Library, and explore its history of use by local film projectionist David W. Snider, considering what this demonstrates about the essential role of projectionists in preserving film apparatus history, as well as the opportunities this affords for media history in education.

In the 1959 film *The Tingler*, directed by William Castle and starring Vincent Price and Judith Evelyn, scientist Dr. Warren Chapin (Price) discovers that a parasite within the human body, dubbed the Tingler, is responsible for the spine-tingling feeling associated with fear. After a shocking death brought about by the Tingler, the parasite breaks free from the autopsy room and travels into a movie theatre. It eventually moves into the projection booth, causing a blackout. It is at this moment that Castle orchestrates a diegetic collapse between the fictional world and the world of the audience watching *The Tingler*. Through a voiceover delivered by Price, the audience watching the film is warned that the parasite is in fact loose in *their* cinema. Spectators would then feel vibrations under their seats, simulating the feeling of the parasite moving throughout the cinema. This theatrical moment was brought to life by a device called Percepto!, a system of motors, wiring, and electrical components connected to the cinema seats.

230 | In ads for the film, Percepto! was described as the “newest and most startling gimmick on the screen.”¹ Movie gimmicks were Castle’s signature, designed to enhance the cinematic experience and to serve as bold marketing tactics to lure audiences into theatres. While Percepto! was a key marketing technique for *The Tingler*, reducing the device to a mere gimmick overlooks its role in the history of film historiography. Percepto! presents a unique case study of an apparatus that brought spectatorship to life in an innovative way for audiences and engaged projectionists and cinema managers in modes of storytelling. In this chapter, I provide an overview of the Percepto! technical components and how it was operated in the cinema. I will then discuss one specific history of use by a local Toronto film projectionist David W. Snider, and consider what this tells us about the essential role of projectionists in preserving film apparatus history. Finally, I will explore opportunities for media history in education and how the Percepto! device can be demonstrated to audiences.

INSTALLING AND OPERATING THE PERCEPTO! DEVICE

Cinema exhibitors would receive two wooden shipping cases containing all the essential elements of the Percepto! kit. Case A contained 100 vibrator motors wired in pairs, each with a central terminal snap. The motors were either 12 volts (dark grey) or 27 $\frac{1}{2}$ volts (black). The motors were surplus from WWII, originally used to de-ice airplane wings.² Case B contained a timer which activated the 100 motors, cross lines with terminal snaps used to connect the motors, two Burgess “B” batteries, wire spools, plugs, rolls of tape, and 200–300 screws.

A manual accompanying the cases provided instructions for how to install the device to ensure the maximum effect for audience members. The manual recommends that “the seats to which the motors are to be attached should be those in rows most frequently occupied.”³ Further, knowing that each cinema and each seat configuration would yield a different result, those installing the motors were instructed to test a loose motor on various locations on the bottom of the seating to determine “where it will give the best ‘Tingling’ sensation.”⁴ Once the specific motor placement had been determined, and the seats identified, the 100 motors would be affixed beneath the cinema seats by drilling pilot holes and then fastening the motors with sheet metal screws.

Through an elaborate series of wiring—ten seats connected to a cross line, two cross lines connected to an aisle line, five aisle lines connected to the timer box, a timer box connected to a remote control—the Percepto! device would be ready for a projectionist to operate from the booth. All this wiring was to be taped to the floor to ensure audience members did not trip over the cables. Projectionists would activate the motors at two distinct moments during the film, indicated under “Motors” in the cue sheet. The first cue comes at 477 and a half feet when a large image of the Tingler crawls across a white backdrop and Price’s character belts out “The Tingler is loose! Scream for your life!”⁵ At this moment, projectionists were instructed to “Push the timer button (recycling control box) twice, waiting nine seconds between the first and second push.”⁶ The second cue comes at 539 feet at the moment “when the wife raises up from under the bed sheet.”⁷ At this point, projectionists were instructed to “Keep pushing the timer control button constantly until the end of the picture, waiting nine seconds between each push.”⁸ These cues occur during the climax and concluding scene of *The Tingler* to connect viewers with the action on screen in a visceral way.

To heighten the film’s sense of aliveness, and no doubt contribute to word-of-mouth, the cue sheet outlined an innovative piece of participatory theatre: a cue that simply reads “Girl in audience screams.”⁹ This moment is explained in more detail in the manual under the heading “Auditorium Stunt.” The sequence was highly choreographed—a woman, planted in the third or fourth row on the aisle, would scream on cue and pretend to faint, prompting two ushers to rush in with a stretcher and carry her out of the cinema.¹⁰ The importance of this moment to the overall experience is made explicit: “This should be played legitimately; there should be no giggling and smiling and should look real [...]. It is part of the show and is imperative.”¹¹ The activation of the Percepto! device and the auditorium stunt occur at the climax of the film during reel 5A. Cinema managers were encouraged to rehearse these cues with all the staff involved, in advance of the screenings.

The Percepto! device is notable for the significant labour and coordina-

tion it required of cinema managers and projectionists to achieve the desired effect. According to a 1959 *Variety* article, installing the device in a cinema was estimated to require four hours.¹² Cinema owners were asked to drill holes in 100 of their seats and fully wire their auditorium for one film—and all for a handful of screenings! Columbia Pictures seemingly anticipated how much work this will entail and included in the manual a persuasive letter to convince exhibitors to undertake the effort:

Everywhere it has played, the box office results of THE TINGLER have been sensational. The prime reason for the success of this film is the full utilization by you, the theatre manager, of all the various promotional elements and devices that have been specifically designed to make THE TINGLER the most talked about picture of the year.¹³

232 | The economic benefits of installing Percepto! are made clear. This is a device that promised to bring audiences in droves.

Beyond the box office incentive, the Percepto! device also presented an invitation to cinema managers and projectionists to participate in the modes of storytelling as essential players in extending the action on screen into their movie houses. More than merely rolling the picture, they were asked to install 100 motors, recruit and train actors for the auditorium stunt, and activate the Percepto! at key moments in the cue sheet. It is clear that the Percepto! is a unique device within the field of film apparatus research. Its success depended on the precise coordination and buy-in of projectionists and cinema managers, whose often unseen labour was essential to the operation, maintenance and preservation of a wide range of film apparatus.

PERCEPTO! IN THE DAVID W. SNIDER PROJECTIONIST COLLECTION

Components of a Percepto! device were donated to the Toronto International Film Festival (TIFF) Film Reference Library in 2023 by the family of David W. Snider (1912–1973) as part of an exciting and varied collection of materials. Snider was a film projectionist in Toronto from the early 1930s to the time of his passing in 1973. He owned and operated the Adelphi Theatre, where he lived above the cinema with his family, and he worked as a freelance projectionist at many of the city's theatres, most of which no longer operate as movie houses.¹⁴ Screenings of *The Tingler* appear in Snider's journal of film screenings on 3 and 4 March 1960 at The Glendale Theatre in Toronto.¹⁵ The Percepto! components now in the TIFF collection are items Snider installed and operated during these two screenings. His son Harold recalls the Percep-

to! device being delivered to their home and that Snider individually wired the vibrating motors in the basement of the building before installing them in the cinema for the two screenings.¹⁶ Despite only two known screenings, Snider preserved the device until his death, when it passed into the family's keeping.

Snider's commitment to safeguarding the Percepto! device underscores the role of projectionists as essential keepers and conservators of film apparatus and ephemera. Sadly, the labour of projectionists as vital stewards of film history is too often left out of the narrative of film preservation, and is very limited in the existing literature. An exception is Lucie Česálková's theorisation of projectionists' "cinema memory," which offers valuable insight into their intimate relationship with film apparatus. Using the concept of professional memory, and drawing on interviews with practitioners in the Czech Republic, Česálková maps the embodied knowledge a film projectionist holds—projectors of different brands, film formats, electrical wiring, proper practice—and how this type of memory formation captures a unique perspective on cinema history that is distinct from those of cinemagoers, cinema managers and those controlling the modes of production.¹⁷ She posits that, in an era of standardisation and due to the invisible nature of their role, projectionists must defend their profession as a creative activity and "for this reason, the relationship to equipment and technology is essential for the projectionists' sense of being a professional."¹⁸ This relationship to equipment, devices, and apparatus becomes one of the defining features of the profession, reflected in the embodied "cinema memory" Česálková articulates—and in the collection of these items by practitioners like Snider.

Projectionists' unique position allows them to function as both operators and conservators. Who better to collect and preserve these devices than those who work intimately with them and understand them best, who listen intently as the film rolls through the projector, and who fix them when they break? We should advocate, champion, and support film projectionists and technicians as keepers of our collective film history. In addition, it is the responsibility of public institutions like TIFF to work closely with private individuals to ensure the long-term stability and preservation of these collections for research, display and public education.

REANIMATING PERCEPTO! FOR CONTEMPORARY AUDIENCES

At TIFF, we are in the early phase of considering how to demonstrate the Percepto! device at TIFF Lightbox as part of a broader initiative to connect audiences with participatory cinematic experiences. Starting in 2022 post-pandemic, as a way to invite audiences back into cinemas as part of "eventised"

screenings, in Public Programming we began to curate audience participation events to encourage connection and community. This included hosted, sing-along screenings of *The Sound of Music*, *The Greatest Showman* and *Encanto*, as well as quote-along screenings of *Mean Girls* and *Josie and the Pussycats*. To deepen this series, it is planned to present screenings from film history that experimented with audience interactivity. One highlight would be a special screening of *The Tingler*, connecting Castle's efforts with later innovations like Odorama, Sensurround, and IMAX.

While the Percepto! device in our collection is incomplete and we are unable to test and reactivate the original components, we plan to bring the screening and apparatus to life in a number of ways. As audiences enter the cinema, they will be handed a printed copy of the Percepto! Manual, and we will display the original Percepto! components—electrical box, manual, and press clippings—in a vitrine for the audience to encounter before the screening. Alongside the vitrine, we would place a vintage cinema seat demonstrating how the motors were installed. Before the screening, we would invite a cinema scholar or film projectionist to present a talk on Castle and the Percepto! device and introduce the objective of the screening—to present the film as it was intended, with all the novel film gimmicks. And then as the main event, we would screen the film and follow the cue sheet contained in the Percepto! manual, complete with the “auditorium stunt” and motors under the seats. To simulate the Percepto! device, we would consult with our technical team to recreate the experience, utilising a contemporary device under cinema seats like the ButtKicker Gamer Plus, commonly used in gaming setups, or haptic actuators, employed in virtual reality systems. Both technologies share a legacy with the Percepto! device in expanding the modes of immersive entertainment.

Our approach to bringing Percepto! to modern audiences takes inspiration from the Eye Filmmuseum, an international leader in reanimating historical film and film ephemera. As Grazia Ingravalle explains in *Archival Film Curatorship: Early and Silent Cinema from Analog to Digital*, the “Eye has devised new modes of accessing and interacting with archival moving images inspired by new media and participatory practices.”¹⁹ By recreating the Percepto! device in a participatory screening context, we embrace the need for film museums to actively engage audiences in the histories and technologies of cinema through immersive, fun and memorable experiences. Much like the Eye Filmmuseum’s programmes, our initiative seeks to create encounters that foster a deeper understanding of film history and the technological innovations that shaped the cinema-going experience.

CONCLUSION

Percepto! was a unique film apparatus designed to deepen the cinematic experience and generate word-of-mouth publicity. While it may not be essential to movie making or film projection, it bridged the world on screen and the experience in the cinema. The Percepto! device in the David W. Snider Projectionist Collection at TIFF stands as a testament to the enduring dedication of projectionists to preserving film apparatus for future audiences. This device, and the broader Snider collection, highlights the importance of preserving novel film apparatus and ephemera, and the potential this unlocks for dynamic and inventive film education, furthering our understanding of the art form.

NOTES

1 “The Tingler Publicity Material,” *Zombo’s Closet of Horror* (20 December 2010), https://www.zomboscloset.com/zombos_closet_of_horror_b/2010/12/the-tingler-1959promotional-material.html.

2 “The Tingler: Film Review,” *Variety* (5 August 1959): 6.

3 *The Percepto Manual for The Tingler*, Columbia Pictures Corp. (1959), 3.

4 *Ibid.*, 7.

5 *Ibid.*, 11.

6 *Ibid.*

7 *Ibid.*

8 *Ibid.*

9 *Ibid.*

10 “The Tingler: Film Review,” 6.

236 | 11 *Percepto Manual*, 12.

12 “Goosepimple Saga With Seats to Suit,” *Variety* (5 August 5, 1959): 19.

13 *Percepto Manual*, 2.

14 John Sebert, *The Nubes: Toronto’s Wonderful Neighbourhood Movie Houses* (Oakville, CA: Mosaic Press, 2001), 3.

15 David W. Snider, “Inventory of Films Screened by David W. Snider” (unpublished manuscript, 1932).

16 Harold Snider, email communication, 5 March 2024.

17 Lucie Česálková, “‘Feel the Film’: Film Projectionists and Professional Memory,” *Memory Studies* 10, no. 1 (2017): 52.

18 *Ibid.*, 59.

19 Grazia Ingravalle, *Archival Film Curatorship: Early and Silent Cinema from Analog to Digital* (Amsterdam: Amsterdam University Press, 2023), 198.

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| 237

The LAPA Scanner and the Possibilities for Sovereign Film Preservation

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| 239

ABSTRACT

The LAPA scanner is a digitization system developed by the Laboratorio de Preservación Audiovisual (Audiovisual Preservation Laboratory; LAPA) at the Universidad de la República de Uruguay (University of the Republic of Uruguay). Its main feature is the reconfiguration of an obsolete telecine apparatus into a frame-by-frame scanner based on open-source software and free of proprietary licences. The scanner is the result of research into film heritage technologies and aims to create an independent system for Uruguay's cinematographic digitization. This reflects the symbolic disputes surrounding cultural sovereignty that are directly linked to the politics of memory.

KEYWORDS

Film heritage; film preservation; DIY technology; politics of memory; Uruguay; Latin America

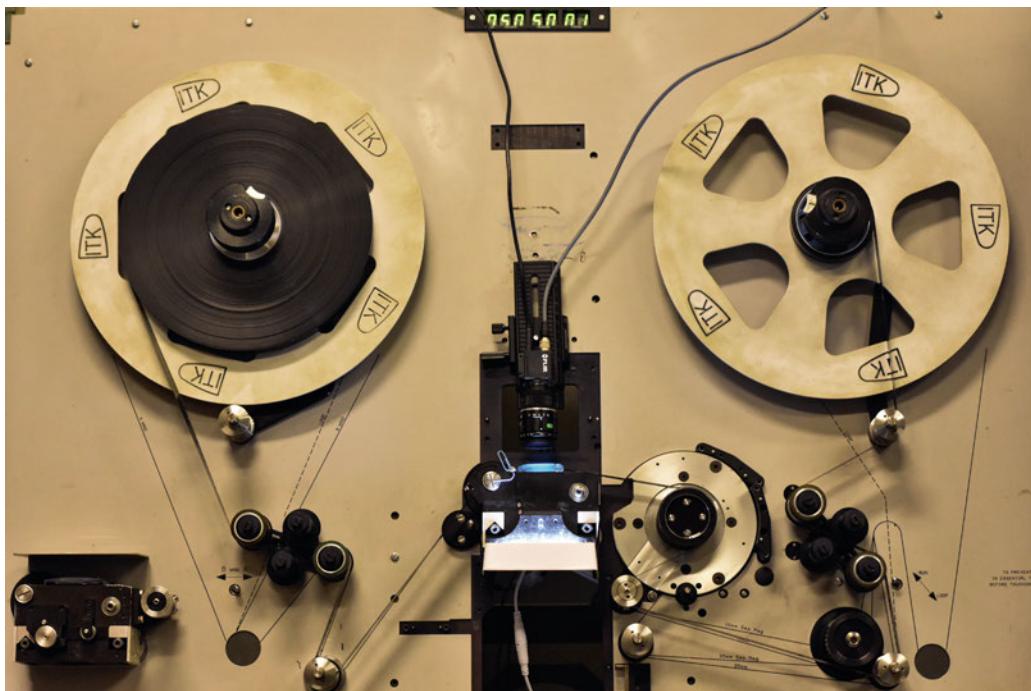


FIGURE 20

The LAPA Scanner.

THE LAPA SCANNER

The LAPA scanner is a digitization system developed by the Laboratorio de Preservación Audiovisual (Audiovisual Preservation Laboratory; LAPA) of the Universidad de la República de Uruguay (University of the Republic of Uruguay). Its main feature is the reconfiguration of an obsolete telecine apparatus, the Rank-Cintel model, into a frame-by-frame scanner for the digitization of 35mm, 16mm and 8mm heritage films. Based on the use of open-source software and free of proprietary licences, the LAPA scanner aims to create an independent system for the digitization of Uruguay's cinematographic heritage, preserved in both the collection of the university's archive and other cultural institutions in the country. | 241

THEORETICAL FRAMING

The LAPA scanner is the result of research in the field of film heritage technologies, which has recently led to some new methodological and deontological approaches to the standard modes of preservation and restoration in historical archives. Born in a context of economic and infrastructural difficulties that limit the development of film preservation policies, this research has sought to create tools that could be developed independently of industrial systems, so that their use, repair or upgrading can be adapted to the local situation. In this chapter, we revisit this case and invite reflection on the symbolic disputes in the field of cultural sovereignty that are directly linked to the politics of memory and film heritage preservation. In the context of the technological divide, the LAPA scanner appears as a way for Latin American archives to overcome a lack of resources by adopting a DIY approach.

INTRODUCTION

Over the last decade, a variety of initiatives in the field of film heritage preservation across Latin America have joined together to foster coordinated enterprises. In a scenario shaped by constant economic difficulties, labour precariousness and political disruptions, new spaces for experimentation in historical film preservation have emerged, introducing adaptations suited to local realities. A conflict emerged between local film archives, which must act fast to safeguard a large number of endangered documents with limited resources, and the dominant mandates of the film heritage market, mostly dictated by the commercial exploitation of film and based on ongoing technological dependence.

As in the rest of the world, Latin America has promoted the recognition of images and sounds as part of the tangible cultural heritage of a community. In

242 | the case of Uruguay, the main institutions existing since the mid-1950s, such as the Cinemateca Uruguaya (Uruguayan Cinemateque) or the Archivo Nacional de la Imagen y la Palabra (National Archive of the Image and the Word; SODRE), have been joined by new archives from the Universidad de la República and the Universidad Católica del Uruguay (Catholic University of Uruguay), as well as organisations such as the Agencia de Cine y Audiovisual (Film and Audiovisual Bureau). This melting pot of organisations sensitive to the field of film heritage made it possible to enrich the identification of local collections and expand the notion of film as a manifestation that is not restricted only to canonical cinematographic masterpieces but includes a great variety of traces from the past.

In 2016, these organisations established a joint agreement for the development of a work plan aimed at the preservation of film archives in Uruguay.¹ The unprecedented initiative gained momentum after the discovery of the equipment of the Cinergia company, a former professional film laboratory, which had been unable to continue its activities and had had to hand over its equipment to the Banco de la República (Bank of the Republic). The confiscated equipment had been stored in a warehouse on the outskirts of Montevideo and had not been used for years. The Cinergia company, which had been dedicated to the digital transfer of photochemical film specifically, had opened its doors during the first decade of the 2000s, just when the local film industry was beginning to adapt film production and distribution to the digital system. At that time, statistics had predicted that the transition period from analogue to digital would be ten years. However, filmmakers and production companies had already put away their old film cameras and were recording in digital format in less than five years, rendering Cinergia's function obsolete.

In the context of technological and institutional orphanhood, the Labo-

ratorio de Preservación Audiovisual (Audiovisual Preservation Laboratory; LAPA) at the University of the Republic took over the abandoned equipment and embarked on the evaluation of its possibilities for use in the present. The project—of an academic nature and linked to a university initiative for the production of knowledge in the field of film preservation—focused on the technological adaptation of an old Ursa Gold Rank-Cintel telecine, whose application could be put to the service of the organisations involved in the agreement. From the very beginning, a common symptom of the discard can be glimpsed in the prehistory of the apparatus, which was marked by the tensions between industry, its development and its requirements for competition in the market, and the need for the long-term sustainability of film preservation, especially critical in countries with limited resources.

REVAMPING DIGITIZATION

| 243

Working with the digitization equipment was a research scenario in itself. From 2010, the LAPA had set up a series of digitization tools, including a telecine that gives access to a large number of the films stored at the university's archive. This experience was an important precedent for the laboratory, as it helped to develop an understanding of the diversity of the collection and the limitations of the technology used. It clarified the importance of incorporating into the research the need for systems that can work with different formats and badly deteriorated films.² But also, and above all, the research had to include the possibility of creating independent solutions for the sustainability and autonomy of the digitization equipment.

The conversion and refurbishing work on the Ursa Gold Rank-Cintel began in 2016 with an assessment of the operational status of its various components.³ It was soon discovered that the digital specifications of the device had become obsolete, given that it generated files in standard rate and resolution (digital SD PAL/NTSC). However, the transport and voltage regulation mechanisms were in excellent working order and could still be used. At this point, the possibility of reconfiguring the device was evaluated, based on similar projects that had previously been designed, such as Matthew Epler's Kinograph.⁴ In brief, Epler developed a low-speed film drive system integrated with a diffused-light window and a camera equipped with a macro lens, which would be triggered by a synchronization mechanism each time a frame was positioned in the window.

In LAPA's case, the Rank-Cintel drive system worked well and could be adapted for the new purpose. In fact, it was particularly advantageous for working with heritage films, as its system allowed the films to be moved without

the use of perforations. The next step was to prepare a new lighting, capture and synchronization system. To do this, the CRT (cathode ray tube) and optical focusing system were dismantled and replaced with a commercial 10-watt LED light (which costs USD 20 in Uruguay). During the first experimental phase, a series of black-and-white nitrate base films were used as an example, so the requirements for colour reproduction were not studied in depth at that stage. The original components of the colour separation and capture system were dismantled and replaced with a Nikon D7200 camera, which allowed the system to capture an image of 24 megapixels (6000 x 4000px), a much higher resolution than the 4K commonly used in digitization processes. However, the dimensions of the camera body meant that it could not be installed vertically in front of the window through which the film passes. The system that controlled the movement of the film and its synchronization with the camera was implemented using a Raspberry Pi to process the frame-drive signal. The software, developed in Python code, emitted the pulses for the photographic shots and switched on the light source. In the first stage, the camera was connected via USB to a computer, where the various parameters were set using the free digiCamControl software. The captured images were saved in RAW format as uncompressed TIFF files. The post-production workflow was initially carried out using free versions of Davinci Resolve and Fusion, which were gradually replaced by other software specifically designed by LAPA.

The final result was a highly versatile and flexible system. From the very beginning, the new system was designed in such a way that components could easily be replaced, according to the needs, budget or availability in the local market. Over the years, the life of the LAPA scanner confirmed this adaptability through constant modifications and improvements. Thus, the camera initially used was replaced at the end of its useful life (400,000 shots) with a Flir Blackfly S USB3 20-megapixel Sony IMX183 CMOS camera. This camera has the advantage of having a small body that can be placed with the focus directly on the film, but also the disadvantage that it is not possible to run the film in front of it slowly. A step-by-step feed system had to be implemented by replacing the Raspberry Pi controller with an Arduino Due board. The lighting system was also modified; it was found that the most effective solution was to use the light diffusion system of a traditional photographic enlarger, and an LED bulb of the type used in cars as a light source, easily replaceable in case of breakage. Finally, in recent years, the team has been able to integrate new functionalities for the digitization of optical soundtracks, which was not previously contemplated.⁵

INDEPENDENT CINEMA

The first film digitized at LAPA was *Eclipse Solar de 1938* (Solar Eclipse of 1938). This film was produced by the Ministry of Public Instruction and preserved in the collection of nitrate base films belonging to the Archivo Nacional de la Imagen y la Palabra and stored at the Cinemateca Uruguaya. The film is one of the first recordings of solar eclipses in Uruguay, made at the Astronomical Observatory of the Liceo IAVA. The history of astronomical photography and film in Uruguay is a field of particular interest, due to the early development of observatories to study the constellations of the southern hemisphere. Initially, various foreign companies set up stations in the southern regions of Latin America, though, in the case of Uruguay, this observatory was a public initiative with a scientific and educational aim, through which important local records of the southern sky were made.

From that time to the present, 216 works have been digitized, including films in 35mm, 16mm and 8mm formats, made from 1904 to the beginning of the 1970s. This number only includes the photochemical films digitized with the LAPA scanner, and excludes the many of other documents in magnetic and photographic formats. Their number is constantly increasing and exceeds thousands of digitized items, which have also been preserved with other tools developed in the laboratory. All the preserved audiovisual elements belong to collections that are unlikely to be processed in any other institutional framework, as they include documents related to militant cinema, testimonies of social and human rights organisations, and other documents associated with the contemporary history of the country.

The experience described above from a technical point of view also implies a working ethic in the preservation and restoration of films. From the technical side, we assume that the processes can hardly be fully automated, and that manual and customised adjustments should be made while working with films that have usually been damaged or have deteriorated. The development of the LAPA scanner within the framework of the university, closely connected with Grupo de Estudios Audiovisuales (GESTA), a research team devoted to film and audiovisual studies in Uruguay, led to a theoretical understanding of the use of the device related to the specific knowledge of the country's film history, allowing for a deeper interpretation of the material, cultural and symbolic life of the films beyond the technical aspects of the preservation. These theories invited researchers to challenge notions that had previously thought of digitization as a neutral and mechanical automated process that had no relation to the film content or history.

While this research favours methods of film preservation and digitization of historical archives that are otherwise inaccessible, the research methodol-

ogy also integrates the need for contextualisation, appraisal and curatorial thinking in a way that provides an analytical setting for the films that have been preserved, contributing to the preservation of the cultural memory of our recent past from a critical perspective. It is no coincidence that many of the films preserved by this laboratory are those produced by political and militant film collectives in the past. Among them are the productions made by the Cinemateca del Tercer Mundo (C3M), which operated from 1969 until its activities were interrupted by the coup d'état of June 1973. The C3M films were censored, their members were persecuted, and the archive was expunged. LAPA also preserved the short films by filmmaker Ferruccio Musitelli, which he made together with the Sindicato Único de la Construcción in Uruguay (Uruguayan Single Construction Union) to denounce the situation of workers at the time. While the films were technically processed with the LAPA scanner, they were also integrated into a diversity of historical research,⁶ which made it possible to revisit a still traumatic scenario in Uruguayan social memory. Far from being simply technical work with damaged images, restoration implies research, restitution and recirculation of the films, so as not to erase the complexity of their history, sometimes linked to processes of censorship, repression, exile or even death of their authors.⁷

If the films of the C3M or Musitelli were produced with the few resources available and were part of an active circuit of alternative distribution, the film preservation practice in LAPA continues on the same path of reusing resources, altering the dominant technology, and rejecting the capitalist mandate of constant technological update. In this encounter, a shared theory arises, as expressed by one of the founders of C3M, Mario Handler: "We have become aware of many things, of the extent to which we have been sold not only a language, but a whole material; that is to say, the industry of the developed countries. They are selling us a material that is inappropriate or not suitable to our needs or possibilities."⁸

The characteristics of the LAPA scanner also established a position with regard to the norms and standards of international film restoration, conceived and written in a context of access to technology that has little to do with the poorest countries. Although these international standards are formulated as universal, they seem to be designed to solve the problems of developed industries only, with no real value or use in countries with fewer resources and a higher level of dependence for their technological development. These concepts of film restoration and preservation, defined mainly by the codes of the International Federation of Film Archives (FIAF), and also promoted by the practices of film distribution structures, such as festivals and streaming platforms, reinforce technological-commercial dependency, ultimately promoting the invisibility of counter-hegemonic cinemas, small cinemas and cinemas produced in poor countries.⁹

From the LAPA scanner it is possible to glimpse the possibility of technology sovereignty. It also demonstrates that it is possible to build open and shared knowledge and that, in the end, it is possible to uphold the same idea of cinema while subjecting this technological and material interpretation to cultural analysis. The technological and symbolic issues raised by these independent projects also expose a scenario of cultural debate. At the time of writing this article, the activities of the Audiovisual Preservation Laboratory have been interrupted by a restructuring inside the university. The specialised teams and skills needed to support a project like this do not exactly match the types of work carried out by academics within a traditional university structure; as a result, its development relies heavily on external funding. With these challenges in mind, we have presented our ideas to raise awareness and valorise these experiences, in the hope that they may someday be integrated and consolidated in the thriving field of audiovisual preservation.

| 247

NOTES

- 1 After a series of debates organised by the Film and Audiovisual Institute and various organisations linked to the sector, in 2014 the Audiovisual Commitment was established, in which the institutions linked to audiovisual heritage agreed to create an inter-institutional Audiovisual Heritage Roundtable.
- 2 While this first system was functional for obtaining access copies, its limitations included capturing images at an insufficient resolution, the requirement to reproduce all films at 24 fps, and the limitation to digitizing 16mm items only. This system was designed and adjusted by LAPA members Lucía Secco and Mariel Balás.
- 3 The study, conversion and start-up of the equipment was carried out by Engineer Ignacio Seimanas and IT specialist Jaime Vázquez; audiovisual preservation specialist Julio Cabrio collaborated in the development and testing of the process; project coordination was carried out by Isabel Wschebor.
- 4 *Kinograph: Open-Source Film Digitization*, <https://www.kinograph.cc/>.
- 5 For more technical details see Isabel Wschebor, “Nuevas tecnologías para la digitalización del patrimonio audiovisual: prácticas y métodos del Laboratorio de Preservación Audiovisual del Archivo General de la Universidad de la República (Uruguay)” (New technologies for the digitalization of audiovisual heritage: practices and methods of the Audiovisual Preservation Laboratory of the General Archive of the University of the Republic [Uruguay]), *Journal of Film Preservation*, no. 110 (2024): 27–33.
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| 249

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CHAPTER 16

Nostalgia

Emulation as a Service

SEÁN CUBITT

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| 251

ABSTRACT

This chapter engages technical, legal and cultural issues involved in preparing games, encyclopaedias, commercial interactives and interactive or networked art for contemporary use, including emulations of physical devices such as input/output systems, connectors and displays. It outlines the significance of recalling the proliferation of media and platforms in the first decades of popular computational culture prior to their consolidation in the twenty-first century.

KEYWORDS

Nostalgia; emulation; archive

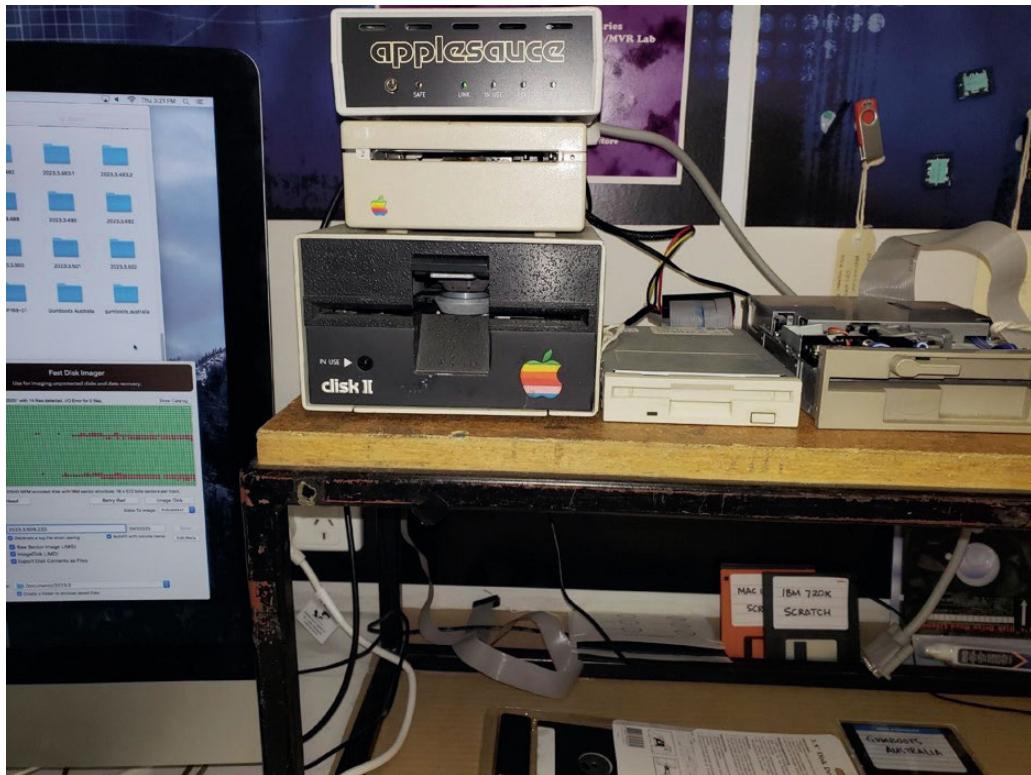


FIGURE 21

Hardware from the Emulation as a Service Infrastructure platform (EaaSI). Photo: Cynde Moya, AusEaaSI.

EMULATION AS A SERVICE

Emulation is an archival response to the ephemerality of even very recent software and operating systems. Recorded media can, as a rule of thumb, be migrated from one format to another. Even though some loss of and change in quality is a probable consequence, some record of video and audio can be retained across successive migrations. Interactive media must be emulated in order to function at all. Obsolete software, often dependent on obsolete operating systems, can be emulated on contemporary equipment. Emulation as a Service is a network for sharing the code required to give contemporary users the opportunity to experience digital heritage.

| 253

THEORETICAL FRAMING

Archiving and accessing past media artworks is a double process, involving care for their physical preservation on a variety of storage media and creating environments where they can be experienced in the present. In the 1980s and 1990s, a variety of hardware, software and storage media flourished before the effective standardisation of consumer and creative practice around the MS Dos and Mac operating systems. Even those have undergone such radical evolution that materials generated on or for them in the 1990s and even later have become difficult if not impossible to run. The situation is as bad or worse in game platforms. The Australian Emulation Network project, a partner in the Emulation as a Service Infrastructure platform (EaaSI) has begun work to emulate obsolete operating systems and software environments to allow artists' CD-ROMs, games, soundworks and other creations to run in browser windows for remote access. Accessing old drives and software and ensuring they can function adequately to play often demanding artworks involves a great deal of labour. It also engages everyone who works with these systems in a great deal of nostalgia. Much of the debate on emulation concerns the ethics of translating, and a significant amount of discussion is about issues in cataloguing and intellectual property rights. Here, however, I want to address the labour of emulation through the lens of nostalgia, from the Greek words for pain and home: homesickness. What kind of home have we lost in obsolete technologies? What makes their recall so painfully sweet in the present?

EMULATION

Emulation is a relatively recent mode of archival practice and follows two earlier phases that first tried to preserve or reconstruct the original state of an artefact, and later to make a faithful record of its state of decay. Archival practice has long been confronted by a choice of whether to concentrate on preserving artefacts or to transfer their contents to new formats capable of delivering an experience, however attenuated, of the original for contemporary audiences. In many instances, the two paths are not mutually exclusive: libraries lucky enough to hold a First Folio of Shakespeare's plays do not hinder their mass reproduction in print media. Walter Benjamin's observations on the "aura" of an original artwork and its loss in the process of reproduction hold good for unique visual art objects such as paintings, but less so of poetry or religious texts.¹ In the case of film archives, the choice has been made more confronting by the expense and risk of preserving early film. Because much of the labour of preserving digital heritage has fallen to film archives, debates among film archivists are also significant for digital archives.

254 |

In the first of two influential and symptomatic books, leading film archivist Paolo Cherchi Usai noted that "The 'original' version of a film is a multiple object fragmented into a number of different entities."² He referred to different copies, of different statuses, and various accounts (shooting scripts, budgets, contemporary descriptions ...) of an original that archivists consult. Confronting old operating systems, software and digital works, there may be multiple variants of files, various iterations of content, different implementations for different operating systems and heterogenous supporting materials (manuals, user-generated guides), and descriptions from reviewers and other end-users. Archives are haunted by the lack of a single, unified origin, which thus never returns to the present of the archive as a confirmable presence of that missing original.

Considering this problem, the philosopher Jacques Derrida notes that an archive devoted exclusively to preservation can only accumulate,³ a term implying that the preserved original, rather like accumulated profit in Marx, tends to disappear. The public records are revenants hovering around the unviewable and therefore invisible original. The implications for archiving are not only that there is no original to preserve, but that the floppy disc, SCSI cable or hard drive we have in front of us is only a material ghost of what it was. Derrida goes on to say that these hauntings demonstrate that there "is" no solid thing to archive, rather a promise: it is a "performative to come whose archive no longer has any relation to the record of what is,"⁴ where a *performative* is a type of statement that makes a change in a later state of affairs, like a judge saying, "I find you guilty." Derrida's deconstructive prognosis points beyond

the second phase (preserving a state of decay) towards the work of emulation: to build, for an unforeseeable future, a working model of lost artefacts.

DECAY

In an increasing number of instances, originals can no longer be played or interacted with. The machines they ran on, their operating systems, the often idiosyncratic codes underpinning them, and the protocols governing how they displayed become more remote with each passing year. The accelerating vicissitudes of bitrot and versioning mean that digital archives may no longer be able to access even material objects. There are, for recorded media, the options of restoring to remove damage, reconstructing by retrieving missing elements, and recreation. Restoration and reconstruction interpolate, replace or reassemble a work from multiple copies in an effort to approximate a curator's desired "authoritative" copy. Usai's third category is recreation: "presenting an imaginary account of what the film would have been if some or all of its missing parts had survived,"⁵ a practice, as historian and philosopher Michel Foucault wrote, "that enables statements to both survive and to undergo regular modification."⁶ Without abandoning his overarching belief that the archive is "*the general system of the formation and transformation of statements*,"⁷ Foucault also understood that archiving determines the rules about how artefacts can be handled and modified. In this way, whenever it aspires to restore, reconstruct or recreate an impossible authenticity, archiving reveals its own rules of operation.

Emulation instead addresses "the archival life" of media—how artefacts continue to evolve or decay chemically and physically long after they were first stored.⁸ In emulation, there are only evolving digital files preserving snapshots of states of decay. CD-ROM and Laserdiscs were, for some years, the favoured medium for distributing games and interactive artworks. The writable discs typically used in short-run artist projects are especially vulnerable to decay, but so too are even high-quality, industrially produced optical discs.⁹ "CD bronzing," often ascribed to poor quality control during manufacture, occurs when the plastic lacquer protecting the aluminium layer of recorded data reacts with its packaging, allowing the aluminium to oxidise and become unplayable.¹⁰ Oxygen can permeate the dye layer used to reflect the laser and corrupt the data layer, and adhesive bonds between base, dye, metal and protective layers can crack or warp.¹¹ Where the original is not, say, a video recording on a hard drive but code designed to be printed and played on optical disc, the original is completely unavailable. Either the material is abandoned to oblivion or there is work to do to keep faith with its cultural memory. Emulation then concerns

first the conditions and validations required to generate fundamentally new files, each endowed with its own unique potential to embark on trajectories of decay and reduplication.

SOFTWARE AS A SERVICE

Originally developed among games fans and music producers hoping to retrieve lost ways of synthesising sounds, emulation is economically opposed to “Software as a Service” (SaaS), the subscriber model adopted by many major software houses that impose standardisation, capture user data and separate use from ownership. Emulation as a Service distributes open-source hacks that allow obsolete platforms to operate as virtual machines inside contemporary computers, machines that can then run emulations of old software and

256 | the works made to run on them—Macromedia Director, Flash and many others. Neither centralised nor data-harvesting but a networked commons, Emulation as a Service encourages re-animation: “reuse, recycling, appropriation and borrowing of archive material.”¹² Needless to say, it runs into legal challenges. Ironically, the US 2018 Digital Millennium Copyright Act allowed institutions to provide software access “on-premises,” curtailing the practice of breaking copy protection in the interests of preservation.¹³ Other jurisdictions do not have the same limitations, and knowledge, once activated, is very hard to control, especially when corporations have erased earlier platforms, often deliberately. It is not only the software but the idealism of early computer cultures that is reanimated in Emulation as a Service. As archivist Melanie Swalwell and her colleagues note, cooperative collecting and preservation, sharing collections data and expertise, has produced a far stronger sense of the history of the media arts, in their case in Australia, than either artists’ efforts at self-archiving or scattered local historical surveys or artist monographs can do.¹⁴

When, as Foucault believed, archives reveal the rules of their practice, those rules include the set of reciprocal obligations that archiving assumes and passes on—including the archivists who laboured over the tradition. The past haunts the archive, but the archive is also haunted by ghosts of the future, who or may not recall or care for our precious things or those whose labour is embodied in them, just as our ancestors may or may not be grateful for our attempts to grant them immortality.

Preparing emulations requires sourcing machines, parts and peripherals as well as functioning versions of obsolete systems and software. Hearing modem chimes, handling obsolete external storage media and their connectors, reviving once-familiar application interfaces and coding with now half-forgotten protocols, accessing old drives and software—and ensuring

they can function adequately to play often demanding artworks—Involves a good deal of nostalgia for what we have lost in obsolete technologies. But it also produces terrains where new creations become possible. The artist Simon Biggs, working on 2023 emulations of his CD-ROM interactives from the 1990s, found that returning to the old software has allowed him to make new works on the old platform. As photographic archivist Jane Birkin reflects, “one should not try to anticipate the specific future use of an object but should instead allow for all possible uses.”¹⁵ When AI feeds on its own products, like derivatives in finance capital, it loops back on itself, freezing everything into a permanent present. Reanimating old software creates other possibilities for other futures, multiple futures where there had been only one.

NOSTALGIA

| 257

Nostalgia is personal, recreating the past in the image of the present for the present, but evolving in its interplay with the one who remembers. To that extent it is a creative process. On the other hand, the archive that Foucault presents is committed to an eternal present that it can preserve, restore and duplicate, but therefore also to what it can delete,¹⁶ and condemn to disappearance.¹⁷ As a creative process, nostalgia does not just revel in abandoned cables and forgotten boot-up chimes: it reanimates multiple pasts, presents and futures, evolving new directions, new dimensions of and new structures in time. Archives deal with entropy and economics as well as the voices of the dead. Ethics oblige us to work with the posthumous media of our forebears in order to create posthumous archives that will outlive us. Mortality is a political concern because we only survive beyond death together, where “we” extends to ancestors, and the ancestors that we are becoming. As archiving refocuses from preserving past objects to enabling their future evolutions, by reanimating multiple pasts and creating multiple futures, it may be the model of a new politics, born to open roads to multiple immortalities.

NOTES

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4 Ibid., 72.

5 Paolo Cherchi Usai, *Silent Cinema: An Introduction* (London: BFI, 2000), 66–67.

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Caring for Obsolete Technology “in the Wild”

Former Users as Caregivers in the Maintenance and Repair of the U-Matic Video System

SERGIO MINNITI

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| 261

ABSTRACT

The chapter adopts the conceptual framework of “care” to examine maintenance and repair practices related to the U-Matic video system, a technology that has been largely neglected in both media history and the preservation of technoscientific heritage. It explores how former users assume the role of caregivers within informal and distributed networks that support obsolete media beyond institutional contexts. Drawing on an ethnographic case study of Gabriele Coassini, a former professional who maintains U-Matic equipment and contributes to preservation initiatives, the chapter illustrates how actors operating outside formal institutions can develop care practices, networks and ecosystems that are vital to the ongoing survival of obsolete technologies.

KEYWORDS

U-Matic; maintenance and repair; care; technological obsolescence; media heritage



FIGURE 22

Part of Gabriele Coassini's laboratory where he repairs, maintains and uses U-Matic and other videotape technologies. Photo: G. Coassini.

THE U-MATIC VIDEO SYSTEM

Introduced by Sony in 1969 and released in 1971, U-Matic was the first video format to employ a magnetic tape enclosed in a cassette, replacing open-reel systems and inaugurating the era of videotape. It became a professional standard in broadcast, educational and corporate contexts, and laid the groundwork for later consumer systems like Betamax and VHS. | 263

THEORETICAL FRAMING

Recent scholarship has highlighted maintenance and repair (M&R) as forms of “invisible work” essential to the persistence of technology. Framing M&R as “care” emphasises not only technical activities but also the affective and epistemic dimensions of sustaining obsolete media. Within cultural heritage institutions, these practices are often formalised; however, care also occurs outside these settings. This chapter extends the concept to non-institutional settings, offering a case study that highlights the role of former users within heterogeneous care ecologies, where different forms of knowledge and expertise coalesce around obsolete media.

Recent scholarship has framed maintenance and repair (M&R) as forms of “invisible work” vital to the persistence of technology.¹ M&R is conceptualised as “care” to emphasise the attentive relationships between maintainers and technologies, which are articulated not only through technical work, but also by interconnecting “material care” with broader societal and cultural issues.²

M&R practices counteract technology decline and obsolescence, a concern particularly relevant to cultural heritage institutions. Museums preserving time-based media art, for instance, care for obsolete technologies along three dimensions: through technical repairs, the establishment and maintenance of care networks, and the cultivation of broader ecosystems of expertise and resources.³

This chapter examines how care for obsolete technology occurs outside institutional settings, where ordinary individuals sustain aging technologies through grassroots M&R. By mobilising experiential knowledge and improvising with limited resources, these practitioners, often former users, become repairers, distributors and producers, working to maintain and rejuvenate these technologies.⁴ I refer to these practices as M&R “in the wild” to emphasise how they entangle heterogeneous expertise and labour, blurring distinctions between institutionalised and informal care.⁵

Former users—particularly those with professional backgrounds—often act as intermediaries between consumers, amateurs and institutions, preserving and rearticulating technical knowledge. They bridge gaps in discourse and practice, warning of risks to technical heritage. This chapter examines the case of Gabriele Coassini, a former professional user of U-Matic turned “caregiver,” who maintains video equipment and supports broader preservation initiatives. Drawing on a short-term ethnography conducted in 2023 in his laboratory,⁶ it outlines key M&R activities related to the U-Matic and the role of former users in “in the wild” M&R. The ethnography involved the collection of qualitative data, including recorded conversations, fieldnotes and photographs, and focused on practices of acquisition, use, repair, collaborations and the challenges encountered. The data were coded and analysed according to the three dimensions of care proposed by Van de Leemput and Van Lente: objects, networks and ecosystems.⁷ The conversations, which constitute the primary basis for the analysis presented in the chapter, were conducted in Italian and subsequently translated into English.

THE RISE AND FALL OF U-MATIC

Video technology was pivotal in advancing broadcast recording. In the 1950s, reel-to-reel magnetic tape recorders like the Ampex revolutionised the industry with instant colour recording and playback. However, their high tape consumption prompted manufacturers to develop more compact, efficient solutions.⁸ In their response, Sony introduced the U-Matic in 1969, a ground-breaking system with enclosed $\frac{3}{4}$ -inch videotape cassettes. Commercially released in 1971, it featured a video cassette recorder (VCR) capable of playing up to one hour of video. Initially designed for playback only, later models added recording capabilities, enabling widespread adoption in home entertainment, industry and broadcasting.

The U-Matic featured a novel U-wrap tape lacing system and was named after the U-shaped path the tape followed around the helical-scan video head drum. Unlike later formats like Betamax and VHS, its spools rotated in the same direction, with transport, heads and guides positioned externally.⁹

| 265

The format underwent two revisions to improve image quality, resulting in three variants: Low-Band, High-Band, and Superior Performance.¹⁰ These enhancements helped to establish U-Matic as an industry standard by the early 1970s. It became dominant in business, education and broadcast sectors, and revolutionised news gathering with its portability, low costs and fast delivery.¹¹

Sony initially intended U-Matic as a consumer VCR,¹² but its high costs and limited playtime restricted its reach to a few enthusiasts, who fostered the hobbyist video culture that would later thrive in the “home video revolution.”¹³ Nevertheless, U-Matic’s professional success paved the way for future innovations. In the early 1970s, video companies rushed to develop home-use formats, creating demand for standardisation. This was achieved only in the late 1970s, with the emergence of Sony’s Betamax and JVC’s VHS.¹⁴

Launched in 1975, Betamax built on U-Matic principles,¹⁵ using smaller $\frac{1}{2}$ -inch tape to reduce costs and cassette size. Initially, these cassettes recorded one hour of video, as Sony assumed the technology would primarily be used for time-shifting TV shows, which typically lasted an hour.¹⁶ As Betamax and VHS gained popularity, U-Matic gradually became obsolete, overtaken by more affordable and user-friendly formats. The Betamax vs. VHS “format war” became a textbook case of *de facto* standardisation.¹⁷ In business and media analyses, U-Matic was reduced to a mere precursor,¹⁸ yet it remained widely used throughout the 1980s in TV stations and was embraced by marginalised communities¹⁹ and media artists.²⁰

These uses highlight the importance of preserving U-Matic. While heritage institutions are often seen as the primary actors in this effort, much of

the necessary expertise frequently lies outside them. Video enthusiasts, former users and retired professionals actively contribute to its preservation by forming networks, sharing knowledge and collaborating with institutions. The next section explores such grassroots M&R practices, focusing on former users and their expertise in caring for the U-Matic.

CARING FOR THE U-MATIC

Gabriele Coassini began as a photographer and reporter in high school. In the 1970s, he worked with Venice's first cable TV station and later as a cameraman for RAI, the Italian public broadcaster. By the late 1970s, he specialised in electronic video production, producing commercials, experimental films and documentaries. Today, he runs a laboratory offering digitisation services, workshops and equipment maintenance. Over the decades, he has amassed a large collection of audiovisual equipment, which he plans to turn into a museum.

266 | Coassini specialises in U-Matic and other video formats, drawing on his experience as a professional user and producer to support video enthusiasts and institutions with maintenance, repair and digitisation. He describes his motivation for preserving video technologies as a mission to counteract the loss caused by rapid obsolescence:

These formats document our recent history and allow us to rediscover it, which is why they are so important. [...] The more recent we go, the less durable [the materials] are. So there is an absolute urgency to start recovering [them].²¹

Caring for obsolete technologies like the U-Matic spans three levels: maintaining and repairing the physical objects themselves; maintaining the care network that supports these objects; and cultivating a broader environment that ensures their continued functionality.²²

At the object level, caring for U-Matic involves preserving tapes and devices. Tape restoration addresses three main issues, which are mould, sticky-shed syndrome and tape breakage. Each of these problems requires specific techniques, with knowledge coming partly from online enthusiast communities and partly from practical experience.

Mould contamination, caused by prolonged exposure to moisture, is particularly harmful as it spreads to VCRs and tapes: "Mould is a disaster because it goes everywhere. [...] If I put it inside a VCR [...] The next tape gets mould." Cleaning begins with the removal of surface mould using isopropyl alcohol and gloves. Coassini has developed his own methods, employing both ordi-

nary and homemade tools. For instance, he uses a toothbrush and a custom cleaning box equipped with a compressor and a handheld vacuum cleaner to remove mould. After cleaning, tapes undergo a heat treatment in an oven to remove residual moisture—a process video enthusiasts refer to as “baking.”

“Sticky-shed syndrome” is a common issue triggered by humidity or temperature fluctuations, which causes the tape binder to release, slowing down VCRs, clogging video heads and jamming tapes. Diagnosis is done through playback testing: if tapes produce noise, slow down, or stop, they are identified as sticky. Slight stickiness can be resolved by spooling and rewinding. For this, Coasssin uses a VCR with three motors—one for fast forward—as it is more effective than cheaper models at making sticky tapes playable. In severe cases, tapes are baked to temporarily stabilise them for digitisation.

Tape breakage is another common issue, often caused by mechanical stress during playback. It requires physical repair, after which the tape may also be baked to prepare it for digitisation. Baking is therefore essential for restoring tapes and making them suitable for transfer. The procedure, widely shared online through detailed “recipes,”²³ is described by Coasssin:

| 267

On average, tapes take 8 hours. You start at room temperature and slowly increase to 50–52°C within an hour. Maintain a constant temperature [...] then cool gradually. The tape must be digitised within 24 hours in winter or 48 hours in summer. [...] It alter[s] the signal, so it's best to digitise as soon as possible.

The ovens used for baking are not standard kitchen or microwave ovens. According to the International Association of Sound and Audiovisual Archives (IASA), tapes should be baked in a scientific oven at a constant temperature of 50 °C.²⁴ However, video enthusiasts often use more affordable tools, like dehydrators. Coasssin uses a non-professional oven that he has modified with a thermostat to control the temperature precisely.

VCRs require regular maintenance, as mould and detached oxide layers can dirty the heads and cause playback artifacts (“dropouts”). Coasssin keeps his heavy U-Matic units (up to 30kg) open for easier access. Cleaning starts with unplugging the machine, removing the external cover, and lifting the electronic boards above the mechanical components. He cleans the audio heads with isopropyl alcohol and a paper towel, checks for residue with a magnifying glass, and uses printer paper soaked in alcohol for the drum and heads, as it does not leave fibres. Once dry, he vacuums the drum to remove any remaining debris.

Repairing VCRs is a complex task that Coasssin undertakes with two retired technicians, who also repair radios and TVs for the wider community. They

are crucial for diagnosing faults and handling electronic repairs. As Coasssin explains:

I can identify issues, but solving them is another matter [...] He puts the unit on the table, opens it up and uses diagnostic tools like the oscilloscope, vectorscope, etc. With one he checks audio frequencies, with another he checks video frequencies, and so on.

This collaboration illustrates how care involves both material interaction and specialised knowledge, developed collaboratively within care networks.²⁵ Here, users and technicians act as a “connector generation” that keeps past technologies alive.

Another key strategy is salvaging parts. Coasssin collects broken equipment to dismantle for reusable components. According to him, it is often “easier to find a recorder board that has always worked, but whose mechanics are ruined, and replace the whole board” than to source individual parts. He keeps at least two units of each machine:

A TV station asked me for this one. I have two of them but refused to sell one, because I keep at least two machines per type, so if one breaks, I have parts for the other. I told them, “Once you had at least ten,” and they replied, “Yes, but ... we threw them away.” Well done.

VCR heads are the hardest parts to find. No longer manufactured, they must be sourced from remaining stock: “I bought the last U-Matic heads in Greece, from a laboratory that was closing down. And that’s it, I ran out of them.” The closure of professional labs is a double-edged sword: it can free up components, but also makes serious repairs difficult or prohibitively expensive. Coasssin recalls two Sony machines that needed both heads and electronics:

I described the problems with my technician friend’s help and contacted Sony in Milan. They said all maintenance had moved to London. London told me to try Hamburg, where they might still have parts. Hamburg [...] asked me for €12,500. Amen.

Donations are another important source of parts, often from TV stations discarding old equipment. Coasssin reports that equipment is frequently given to him for free, as broadcasters are eager to get rid of it and often contact him directly. However, acquiring such donations can be challenging or unsuccessful:

When a broadcaster switched from analogue to digital, the director invited me to collect the old gear. It was a mountain of beautiful, well-maintained equipment. But I lacked the space, a truck, and manpower. I asked for more time [...] but when I called back, they'd already thrown everything away.

Another strategy is the manufacture of custom parts, in which the network plays an important role. Coasssin explains that his collaborator helps him create hard-to-find cables, which he describes as “rustic” cables that do not meet standards:

There's a cable we can't find, so it has to be custom made. [...] We found the diagram online, dismantled another cable, and used it to make the needed connections. Another example: to synchronise two machines, I made a “rustic” cable, and it works.

| 269

These practices and networks replace former institutional supply chains and services, highlighting the work involved in maintaining declining technologies outside formal frameworks. This M&R “in the wild” relies on informal support and knowledge exchange among actors with heterogeneous expertise, complementing institutional preservation efforts.

The case of Gabriele Coasssin, a former media professional turned maintainer, shows how ex-users can become central actors in distributed ecologies of care, actively sustaining obsolete technologies. His work articulates a layered epistemology that encompasses multiple forms of knowledge. At its core is legacy knowledge, developed through years of professional use and shaped by “learning by using.”²⁶ This becomes particularly evident in his handling of overlapping standards (PAL, SECAM, NTSC) and formats (Low-Band, High-Band, Superior Performance), which he describes as “quite a mess.” Even tapes in the same format may be unreadable across different machines. Without documentation, he relies on experiential knowledge: “When a tape arrives, the problem is figuring out how it was recorded. After years, I rely on my instinct.” His expertise evolves through M&R, a form of “learning by caring” rooted in continuous material engagement and creative adaptation, exemplified by DIY solutions. Care is also embedded in informal, networked knowledge regimes—linking ex-professionals, hobbyists, institutions, and online communities—that enable the circulation of repair techniques and spare parts. Coasssin's collaboration with retired technicians and use of shared resources exemplify this distributed knowledge production.

Former users like Coasssin not only preserve past media but also meet contemporary demands, from individuals digitising personal archives to insti-

tutions seeking technical support. Yet his work highlights challenges at the ecosystemic level of care, where sustaining technological persistence requires supportive environments. At this scale, Coassini's efforts starkly contrast with the relative institutional neglect surrounding technoscientific heritage. He has frequently described his repeated efforts to obtain institutional support to transform his archive into a public museum. Yet, despite initial interest from public institutions, shifting political priorities have stalled the project, and his collection remains in a private storage space provided by volunteers. His workshop continues to serve a range of publics—individuals, enthusiast communities, and institutions such as the Cineteca di Bologna, which engaged him to repair equipment. Other collaborations remain unrealised, including a request from a film festival to move his entire lab to digitise 8,000 U-Matic tapes, which he declined as it required “disassembling, transporting, and reassembling 25 quintals of equipment.” His case underscores both the value and fragility of grassroots preservation.

270 |

By examining the case of Coassini, this chapter has pursued a dual aim: to foreground the U-Matic system, largely neglected within both media history and preservation, and to broaden understanding of care for obsolete technologies beyond institutional settings. It emphasised the role of former users and the layered nature of M&R practices beyond institutional contexts, shaped by diverse actors and forms of expertise, which can be conceptualised as M&R “in the wild,” a crucial dimension for the persistence of technology.

NOTES

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2 Christopher R. Henke, “The Mechanics of Workplace Order: Toward a Sociology of Repair,” *Berkeley Journal of Sociology* 44 (2000): 55–81.

3 Dirk van de Leemput and Harro van Lente, “Caring for Decline: The Case of 16mm Film Artworks of Tacita Dean,” in *Technologies in Decline: Socio-Technical Approaches to Discontinuation and Destabilisation*, eds. Zahar Koretsky, Peter Stegmaier, Bruno Turnheim, and Harro van Lente (London: Routledge, 2022), 185–199.

4 Christina Lindsay, “From the Shadows: Users as Designers, Producers, Marketers, Distributors, and Technical Support,” in *How Users Matter: The Co-Construction of Users and Technologies*, eds. Nelly Oudshoorn and Trevor J. Pinch (Cambridge, MA: MIT Press, 2003), 29–50; Sergio Minniti, “Polaroid 2.0: Photo-Objects and Analogue Instant Photography in the Digital Age,” *Tecnoscienza: Italian Journal of Science & Technology Studies* 7, no. 1 (2016): 17–44.

5 I base this definition on the concept of “research in the wild,” which refers to techno-science-society interactions arising from collaborations between experts and non-experts in informal settings. See Michel Callon and Vololona Rabehari-soa, “Research ‘in the Wild’ and the Shaping of New Social Identities,” *Technology in Society* 25, no. 2 (2003): 193–204.

6 Sarah Pink and Jennie Morgan, “Short-Term Ethnography: Intense Routes to Knowing,” *Symbolic Interaction* 36, no. 3 (2013): 351–361.

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8 Joshua M. Greenberg, *From Betamax to Blockbuster: Video Stores and the Invention of Movies on Video* (Cambridge, MA: MIT Press, 2008).

9 Aaron F. Nzungwun, *Video Recording Technology: Its Impact on Media and Home Entertainment* (Hillsdale: Lawrence Erlbaum Associates, 1989), 148.

10 Detailed information about U-Matic formats and features is available at: <https://umatic.palsite.com/>.

11 Nick Lyons, *The Sony Vision* (New York: Crown Publishers, 1976), 205–207.

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13 Greenberg, *From Betamax to Blockbuster*, 18–29.

14 Nzungwun, *Video Recording Technology*, 150–153.

15 Morita et al., *Made in Japan*, 112.

16 Greenberg, *From Betamax to Blockbuster*, 43–44.

17 Michael A. Cusumano, Yiorgos Mylonadis, and Richard S. Rosenbloom, “Strategic Maneuvering and Mass-Market Dynamics: The Triumph of VHS over Beta,” *Business History Review* 66, no. 1 (1992): 51–94.

272 |

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20 Lisa Conte, Christine Frohnert, Lisa Nelson, and Julia Sybalsky, “Overcoming Obsolescence: The Examination, Documentation, and Preservation of Nam June Paik’s TV Cello,” *The Electronic Media Review* 2 (2013): 1–9.

21 Unless otherwise specified, all quotes are drawn from the author’s conversations with Coassin, recorded during ethnographic fieldwork.

22 Van de Leemput and Van Lente, “Caring for Decline.”

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25 Christophe Lejeune, “Interruptions, Lunch Talks, and Support Circles: An Ethnography of Collective Repair in Steam Locomotive Restoration,” in *Repair Work Ethnographies: Revisiting Breakdown, Relocating Materiality*, eds. Ignaz Strebel, Alain Bovet, and Philippe Sormani (Singapore: Palgrave Macmillan, 2019), 221–251.

26 Nathan Rosenberg, *Inside the Black Box: Technology and Economics* (Cambridge: Cambridge University Press, 1982).

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The Anabasis of Super 8

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| 275

ABSTRACT

This chapter explores the role of Super 8 in Eric Baudelaire's film installation, *The Anabasis of May and Fusako Shigenobu, Masao Adachi, and 27 Years Without Images* (2011), examining how obsolete media make visible archival absences shaped by colonial violence and political exile. Through the lens of *anabasis*—a cyclical journey marked by transformation—the chapter traces the protagonists' paths between Tokyo and Beirut, shaped by Japan-Palestine solidarity. Baudelaire mobilises Super 8's dual legacy—as domestic memory and artistic device—to confront visual erasure. The chapter is informed by *fukeiron* (landscape theory), and proposes anabasis as a media-archaeological concept to understand how Super 8 is reactivated in the exhibition space, transforming obsolescence into a generative form of historical engagement.

KEYWORDS

Super 8; landscape; anabasis; obsolete media; archival absence; Japan-Palestine solidarity



FIGURE 23

Exhibition view of *The Music of Ramón Raquello and his Orchestra* (2017) at Kunstinstituut Melly, Rotterdam. Photo: Kristien Daem, Kunstinstituut Melly.

SUPER 8

For *The Anabasis of May and Fusako Shigenobu, Masao Adachi, and 27 Years Without Images* | 277 (2011), Eric Baudelaire used a Canon Auto Zoom 814 camera for the Tokyo sequences and a Canon 1014XL-S for the Beirut footage.¹ The Canon 814 (1967) was known for its optical precision,² while the Canon 1014 (1979) introduced automated features through early electronic circuitry,³ each marking a distinct moment in the layered technological history of Super 8. First introduced in 1965 as a user-friendly, small-gauge film format,⁴ Super 8 was widely used throughout the 1970s for home movies. It became deeply associated with personal memory and domestic life, even as it was later taken up by artists and experimental filmmakers.⁵ It is precisely this dual legacy between private memory and artistic intervention that Baudelaire activates with Super 8 in the film and in the exhibition space, where the home-movie aesthetic is used to confront histories of displacement and visual absence.

THEORETICAL FRAMING

This chapter examines the use of Super 8 in artist and filmmaker Eric Baudelaire's film installation *The Anabasis of May and Fusako Shigenobu, Masao Adachi, and 27 Years Without Images* (2011), exploring how archival absences produced by colonial violence are rendered through obsolete media. The protagonists' cyclical journey between Tokyo and Beirut—shaped by Japan's solidarity with the Palestinian liberation struggle—is framed through the concept of “anabasis”: a departure from home followed by an unforeseen return marked by transformation. In Baudelaire's work, anabasis unfolds on multiple registers: geographical, temporal and technological. This chapter proposes anabasis as a media-archaeological concept that helps articulate how Super 8 is remediated and reactivated within the exhibition space.

THE “ANABASIS” AND 27 YEARS WITHOUT IMAGES

The Anabasis of May and Fusako Shigenobu, Masao Adachi, and 27 Years Without Images (dir. Eric Baudelaire, 2011, hereafter *The Anabasis*) oscillates between film essay and documentary, recounting the intertwined trajectories of Fusako Shigenobu, co-founder of the Japanese Red Army (JRA), her daughter, May Shigenobu, and filmmaker Masao Adachi. In 1971, at a time of growing Japanese solidarity with the Palestinian cause, Fusako Shigenobu left Tokyo for Beirut in Lebanon, where she co-founded the JRA. In 2000, she returned to a home that had vastly changed under different political circumstances, where she was arrested. May Shigenobu was born in Beirut and lived there in secrecy for 27 years. After her mother’s arrest, May Shigenobu publicly revealed her identity, and set foot in Japan, a homeland she had never known, for the first time. Adachi, after premiering *Sex Jack* (1970) in Cannes, travelled to Lebanon in 1972, where he co-directed *Red Army/PFLP: Declaration of World War* (1971). By 1974, Adachi had joined the JRA and remained in Lebanon until his extradition to Japan in 2000, where he too was imprisoned, but returned to filmmaking after his release; his forced return barred him from returning to the place he had lived for 27 years.

The shared trajectories of Adachi and the Shigenobus between Tokyo and Beirut are shaped by exile, displacement and unexpected return. This is where the concept of anabasis applies. In Greek, the verb *αναβαίνειν*, from which “anabasis” is derived, means simultaneously to embark and to return. In his military memoir *Anabasis* (circa 370 BCE), Xenophon uses the term to describe the cyclical journey of Greek mercenaries who became lost in foreign lands following the death of their commander and, after being out of place, unexpectedly find their way back home.⁶ This journey is marked by transformation: neither the ones who return nor the place they return to remains the same. For his film, *The Anabasis*, Eric Baudelaire draws on Xenophon to frame the protagonists’ intertwined trajectories—returns to a home that is either unknown or irrevocably changed—as an anabasis.

Their anabasis is devoid of images, enforced by their being out of place, both in terms of their personal exile and the broader Palestinian condition. Fusako and May Shigenobu, forced to live underground, were unable to retain personal photographs, while Adachi’s 200 hours of filmed material was destroyed during the Israeli invasion of Beirut in 1982. Within this audiovisual gap, rather than reconstructing a missing archive, Baudelaire materialises the visual absences by recording landscapes of Tokyo and Beirut from the present with Super 8. The recollections of May Shigenobu and Adachi are overlaid on the landscape images. They are edited with excerpts from Adachi’s early films, 1970s news broadcasts on the Palestine Liberation Organisation (PLO), news-

reels documenting Fusako Shigenobu's arrest, and various on-screen appearances of May Shigenobu.

Baudelaire's work raises fundamental questions about the potential of obsolete media to reimagine and reclaim absent audiovisual archives. *The Anabasis* mobilises Super 8 not to reconstruct lost images or restore the medium itself, but to recontextualise both, activating their residual presence. Media archaeology, as Jussi Parikka reminds us, acknowledges that the remnants of past media are "always, implicitly or explicitly, about the present."⁷ The field interrogates how past media forms recur in new contexts, tracing the dynamic interplay of what Wanda Strauven describes as "the old in the new" and "the new in the old."⁸ Drawing on a media archaeological sensibility, Baudelaire treats Super 8 as a "sedimented and layered" medium, reactivating it not as a nostalgic gesture but as a critical apparatus with renewed function and meaning in the present.⁹ As the past materialises in the present through Super 8, both are transformed: the present reframes the past, while the obsolete medium undergoes its own migration, mirroring the transformative movement at the heart of "anabasis." Within this critical framework, this chapter proposes anabasis as a possible media archaeological concept to explore how obsolete media like Super 8 are reactivated in contemporary artworks through their migration across temporal, spatial and technological terrains.

| 279

THE ABSENCE OF HOME, THE PRESENCE OF SUPER 8

Baudelaire's work confronts the archival voids that reflect both private erasures and the broader visual disappearance of Palestinian resistance. As Edward Said writes, "at the core of Palestinian historical presence lies an absence," a condition that extends into the visual realm.¹⁰ The absence of the protagonists' archive is thus not incidental but symptomatic of the mechanism of erasure rooted in the 1948 conflict that led to the establishment of the State of Israel, the resulting expulsion and displacement of around 700,000 Palestinians, and the people's ongoing dispossession.¹¹ In this context, *The Anabasis* uses the Super 8, an apparatus associated with home movies, to raise the question of home in relation to exile, displacement and return. The ongoing colonial violence in Palestine fractures the idea of home, politically, materially and emotionally.

The Anabasis connects two intertwined forms of erasure: the disappearance of home movies, and the broader erasure of the Palestinian visual archive. Home movies have often been regarded as "irrelevant pastime or nostalgic mementos of the past" and therefore dismissed as insignificant, falling outside the scope of institutional archival practices.¹² However, recent schol-

arship has reframed them as vital counter-archives and alternative memory, especially for marginalised and underrepresented communities, contending that they would otherwise remain invisible.¹³ In *The Anabasis*, this kind of alternative archive is notably absent. By invoking Super 8's associations with domestic memory, the work searches for a counter-memory within this double absence, where the loss of archives parallels the loss of home. In doing so, this absence is foregrounded and made visible.

IMPERFECT ARCHIVES

The Anabasis resonates with other contemporary works that engage with the visual memory of the Palestinian struggle, particularly those linked to the historical solidarity between Japan and Palestine. A notable example is *Tokyo*

280 | *Reels*, a collection of twenty 16mm films given to Palestinian artist, researcher and filmmaker Mohanad Yaqubi in Tokyo in 2015 by Aoe Tanami, a specialist in Middle Eastern Studies, who had been safeguarding them in her home.¹⁴ Later presented by Subversive Film as a ten-hour looped installation at documenta fifteen, and edited by Yaqubi into the documentary *R21 aka Restoring Solidarity* (2022), these films offer rare glimpses into transnational resistance. As Julian Ross notes, they are "solidarity images" that visualise international alliances.¹⁵ Like *The Anabasis*, *Tokyo Reels* does not present a complete archive; instead, it emphasises fragmentation, preserving scratches and sprocket holes to highlight the material vulnerability of memory.¹⁶ Similarly, *The Anabasis* uses the grainy texture of Super 8 to evoke instability and archival absence. Both works reject archival totality, foregrounding visual loss and imperfection as conditions through which memory, especially of resistance, endures.

EXCAVATING ABSENT IMAGES: MEMORY, LANDSCAPE AND SUPER 8

How are the archival absences reimagined through the imperfect Super 8? The voice-overs of Adachi and May Shigenobu overlay the flickering Super 8 footage of deserted interiors and landscapes of present-day Tokyo and Beirut. Landscapes become sites for excavating memory and absence. *The Anabasis'* engagement with landscape is rooted in *fûkeiron* (landscape theory), which was proposed by film critic Matsuda Masao and developed by Adachi and other cinema workers during the making of *A.K.A. Serial Killer* (1969).¹⁷ While filming this documentary about the 19-year-old serial killer Norio Nagayama, the filmmakers recorded the landscapes Nagayama traversed, positing that landscapes are not passive backgrounds but actors of sociopolitical structures

that shape individual behaviour, which makes them key sites for cinematic investigation.¹⁸

Baudelaire extends this approach in *The Anabasis* by using landscapes to retrieve lost histories. Rather than seeking traces in conventional archival sources, *The Anabasis* turns toward the material world—to the landscape—as a site of inscription, and unearths the memories embedded in these sites with Super 8. This approach to space as a mnemonic surface echoes Maurice Halbwachs' argument. For Halbwachs, memory is anchored in the places we have passed through or inhabited, which become vessels for recollection to retrieve the past in the present.¹⁹ Similarly, Adachi says in the film, “All these impressions are within the landscape.” Turning landscapes into palimpsests, Super 8 becomes a “media archaeological tool” to excavate these mnemonic traces, revealing the hidden histories of exile and resistance in the landscapes.

| 281

TEMPORAL, SPATIAL AND TECHNOLOGICAL ANABASIS

The transitions between footage of different landscapes creates a spatial disjunction: the scenes do not explicitly reveal geographical locations, only subtle markers like licence plates, architectural details, and street signs hint at their whereabouts. The images render it challenging to say whether it is Tokyo or Beirut, homeland or exile, “here” or “elsewhere.” This strategy echoes Jean-Luc Godard and Anne-Marie Miéville’s 1976 documentary film *Ici et ailleurs* (Here and Elsewhere), in which the displacement of images of resistance from Palestine to a television in a home in France radically alters their meaning. Such spatial displacement is central to the transformative logic of anabasis.

This dislocation operates not only spatially but also temporally. While the grainy texture and flickering quality of Super 8 footage evoke a sense of the past, background details such as someone speaking on a mobile phone, anchor the viewer in the present. These contradictions produce a temporal confusion that destabilises any fixed boundary between past and present, thereby, “challenging linear conceptions of time.”²⁰ Just as images change meaning when displaced across geographies, *The Anabasis* reveals how the present, too, is transformed when mediated through obsolete technology—and how that obsolete technology is itself altered when it records the present. Alongside its spatial dimension, the film thus enacts a temporal anabasis: not a return to a coherent past, but a reconfiguration of time shaped by fragmentation, recurrence and transformation in the present.

In this sense, *The Anabasis* enters into dialogue with central concerns in media archaeology around the reactivation of past media forms. For instance, Erkki Huhtamo offers the concept of *topos* to study commonplaces, the phe-

nomena that (re)appear and disappear in media history: it is a cyclical approach that argues that certain cultural motifs, media technologies and aesthetic styles recur across different historical periods.²¹ While Huhtamo's concept of *topos* effectively addresses cyclical, the cyclical of anabasis differs by harbouring a change when the media returns. Thomas Elsaesser's definition of a *loop* created by obsolescence is closer to anabasis as it emphasises ruptures, discontinuities and transformation, indicating how past media forms are reactivated within contemporary contexts, reshaping both the media and the understanding of historical temporality.²² In dialogue with this discussion, I propose that anabasis can be a productive media archaeological concept that articulates the temporal, spatial and technological dimensions of the reactivation of an obsolete apparatus marked by transformation.

282 | ANABASIS OF SUPER 8 IN THE EXHIBITION SPACE

This transformation is further intensified in the exhibition space, as Super 8, once associated with the domestic context, travels to the gallery. *The Anabasis* has been exhibited across institutions such as Centre Pompidou (Paris), Gasworks (London), Delme Contemporary Art Centre (Lorraine), each time as part of a broader installation. In each exhibition space, the display changes according to the venue. However, in all venues, the Super 8 footage is digitally projected; a format shift was also necessitated during the editing process, where it was combined with archival materials and sound. Here, I address a specific exhibition, *The Music of Ramón Raquello and his Orchestra* (2017) at Kunstinstituut Melly (Rotterdam), curated by Defne Ayas and Natasha Hoare, which included a number of works by Eric Baudelaire, such as *Also Known As Jihadi* (2017), and his film installation *The Anabasis*, the focus of this chapter. In the exhibition, the film expands with various works: *Fusako Shigenobu Family Album* (2012), *Pictures of Documents*, an excerpt of *A.K.A. Serial Killer* (1969) and a slide presentation of drawings made by Adachi during his imprisonment in Beirut, and a 16-page printed libretto.

The film is projected onto a screen mounted on two metal poles in the exhibition space. Positioned in front of it, seating anchors the viewing setup; its angular geometric form echoes the exposed materiality of the screen's support structure. Both elements are unpolished, intentionally visible and devoid of concealment. The setup emphasises the cinematic while retaining an installation sensibility, blending film viewing with spatial immersion. This composed spatial arrangement structures how the viewer engages with the work and shapes how the medium is experienced, particularly through its translation from analogue to digital.

While this digital remediation enables editing and undoubtedly facilitates the film's circulation in contemporary exhibitions, it also strips the medium of its original sensory qualities—the flicker and whirring of the projector, and the intimacy of its scale and display. In this way, the format transfer becomes a site of media displacement, where material obsolescence is not erased but made perceptible, as does the installation setting. The remediation becomes a conceptual extension of *anabasis*: a return marked by transformation. Super 8 thus undergoes a triple displacement: first, through its migration from the domestic sphere to urban landscapes; second, into the gallery space; and, third, through its conversion to digital.

The exhibition foregrounds this spatial dynamic, and its recontextualisation of Super 8 activates the medium's productive instability within contemporary art. In his analysis of the preservation and evolving display conditions of artists' films that engage with Super 8, Enrico Camporesi argues that the format was "born obsolete," a condition that necessitated translation, hybridisation and adaptation,²³ rendering it a "migratory medium."²⁴ Baudelaire embraces this migratory quality as a deliberate display strategy, extending it into the spatial logic of the exhibition itself. This gesture mirrors the film's narrative of displacement and reframes obsolescence, not as a state of loss, but as a generative condition that alters and transforms both the medium and the work.

| 283

This entanglement of obsolescence, remediation and exhibition is where *anabasis* becomes a useful media archaeological lens. Rooted in its classical meaning as a journey marked by departure and altered return, *anabasis* allows us to think beyond binary distinctions of old and new. It captures how obsolete media re-enter the present in altered, contextually charged ways through ruptures, format shifts and spatial dislocations. *The Anabasis* reframes obsolescence as a generative condition that renders the historical void tangible. Furthermore, the display in the exhibition space enables what Huhtamo calls a "spatialized, conversational historical writing,"²⁵ wherein obsolete formats speak to the present. Thus, *anabasis* emerges as a media archaeological model that connects non-linear temporality, spatial displacement and technological migration as conditions of ongoing transformation.

NOTES

1 Regarding the two Super 8 cameras Baudelaire used for *The Anabasis*, the Canon 814 was borrowed from his then assistant Eleonore Mahmoudian for the Tokyo sequences, while the Canon 1014 was purchased and used for the Beirut footage. The Tokyo footage was processed at Retro Enterprises in Japan, while the Beirut material was developed at the Super 8 Reversal Lab in the Netherlands (email correspondence with the artist, April 2025).

2 <https://global.canon/en/c-museum/product/cine268.html>.

3 <https://global.canon/en/c-museum/product/cine300.html>.

4 <https://www.kodak.com/en/motion/page/super-8-history/>.

5 Danny Plotnick, *Super 8: An Illustrated History* (Los Angeles: Rare Bird Books, 2020).

6 Eric Baudelaire and Anna Colin, eds., *Anabases* (Berlin: Archive Books, 2014).

284 | 7 Jussi Parikka, *What Is Media Archaeology?* (Cambridge: Polity Press, 2012), 10.

8 Wanda Strauven, “Media Archaeology: Where Film History, Media Art, and New Media (Can) Meet,” in *Preserving and Exhibiting Media Art*, eds. Vinzenz Hediger, Julia Noordegraaf, Barbara Le Maître, and Cosetta G. Saba (Amsterdam University Press, 2013), 68.

9 Parikka, *What Is Media Archaeology?*, 3.

10 Edward Said, “Preface,” in *Dreams of a Nation: On Palestinian Cinema*, ed. Hamid Dabashi (London: Verso, 2006), 3.

11 Gil Z. Hochberg, *Visual Occupations: Violence and Visibility in a Conflict Zone* (Durham, NC: Duke University Press, 2015).

12 Karen L. Ishizuka and Patricia Rodden Zimmermann, eds., *Mining the Home Movie: Excavations in Histories and Memories* (Berkeley, CA: University of California Press, 2008), 1.

13 Ibid., 22.

14 Julian Ross, “Tokyo Reels: The Solidarity Image,” *Afterall* 57 (2024): 108.

15 Ibid., 104–121.

16 Ibid., 113.

17 Go Hirasawa, “Landscape Theory: Post-68 Revolutionary Cinema in Japan” (PhD diss. Leiden University, 2021), <https://hdl.handle.net/1887/3243318>.

18 Yuriko Furuhata, *Cinema of Actuality: Japanese Avant-Garde Filmmaking in the Season of Image Politics* (Durham, NC: Duke University Press, 2013), 115–148.

19 Maurice Halbwachs, *The Collective Memory* (New York: Harper and Row, 1980), 157.

20 Parikka, *What Is Media Archaeology?*, 5.

21 Erkki Huhtamo, “Dismantling the Fairy Engine: Media Archaeology as Topos Study,” in *Media Archaeology: Approaches, Applications, and Implications*, eds. Erkki Huhtamo and Jussi Parikka (Berkeley, CA: University of California Press, 2011), 27–47.

- 22 Thomas Elsaesser, *Film History as Media Archaeology: Tracking Digital Cinema* (Amsterdam: Amsterdam University Press, 2016), 348.
- 23 Enrico Camporesi, *Futurs de l'obsolescence: essai sur la restauration du film d'artiste* (Milan: Éditions Mimésis, 2018), 253 (my translation).
- 24 Enrico Camporesi, “Super 8 ausstellen: Notizen zur Obsoleszenz eines Formats,” *Zeitschrift für Medienwissenschaft* 12, no. 1 (2020): 87–94 (my translation).
- 25 Huhtamo, Erkki, “Resurrecting the Technological Past: An Introduction to the Archeology of Media Art,” in *Art and Electronic Media*, ed. Edward Shanken (London: Phaidon, 2009), 199–201.

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ABOUT THE AUTHOR

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PART III

LARGE

Film Inspection Tables as Historical, Operational and Learning Devices

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Fossati, Giovanna and Annie van den Oever, eds. *Exposing the Film Apparatus: Global Laboratory Perspectives*. Amsterdam: Amsterdam University Press, 2025.
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| 289

ABSTRACT

This chapter aims to investigate the historical, epistemic, and media-archaeological status of inspection tables in operational contexts such as archiving, research and training. The literature has given scant consideration to inspection devices, one of the most basic and long-established devices for the analysis of film material artefacts. Nevertheless, the use of hand-cranked, motorised, electronic and, more recently, digital-hybrid tables has been widespread in inspecting (and viewing) practices throughout the film industry chain, as well as continuing to perform more specific functions in the archival field.

KEYWORDS

Film inspection; material film culture; archival knowledge; data analysis; operational devices

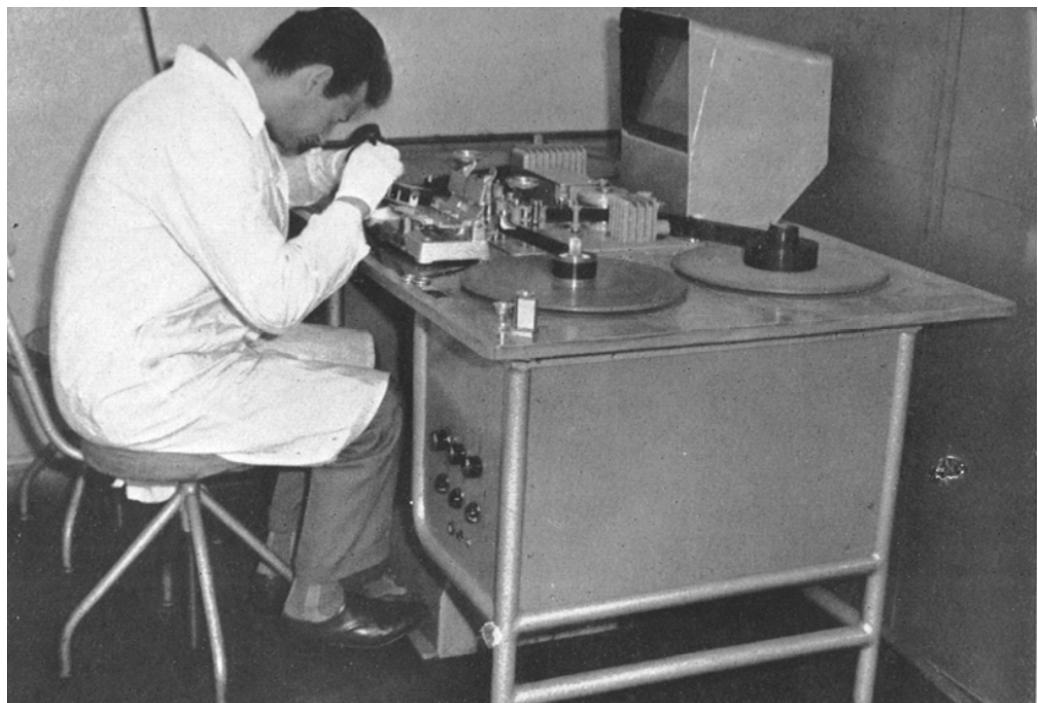


FIGURE 24
Film examination, Volkmann, 1965.

FILM INSPECTION TABLES

“On the left and the right sides of the table are horizontal winding plates for 300 metre or 600 metre reels, which are manually driven by means of a handle. The feed and take-up spindles of the plates should be able to accommodate different gauges, projection spools and cores. The film is wound through by hand to allow a technical inspection to be made. At the same time dirt can be removed and any damage to the perforations determined. In the printing laboratory a similar table may be used for grading.”¹ | 291

THEORETICAL FRAMING

This chapter aims to explore one of the most basic, long-established and widespread devices for the analysis of film material artefacts: inspection tables. It investigates their historical, epistemic and media-archaeological status in operational contexts such as archiving, research and training. With few exceptions, the literature (in technological, historical and operational terms) has given scant consideration to inspection devices.² Nevertheless, the use of vertical, flatbed, hand-cranked, motorized, electronic-automatic and, more recently, digital-hybrid tables was and is widespread in inspecting (and viewing) practices throughout the film industry chain, as well as performing more specific functions in the archival field.

FILM INSPECTION TABLES AS HISTORICAL AND TECHNICAL DEVICES

Inspection tables, with their essential operationalities (handling, winding, measuring, etc.), have been considered the primary equipment to “ascertain film condition,” especially since the preservation turn of the International Federation of Film Archives (FIAF) in the early 1960s.³ Employed along the entire film industry supply chain (in post-production laboratories, film distribution, screening rooms, etc.), some inspection tables were “not suitable for archive work,” hence a selection was made of those fulfilling the archival concern of handling damaged and fragile films in the safest way.⁴ The 1986 FIAF preservation manual presents the “two-plate horizontal hand-winding table” as “the most important device used for the initial examination of the film and its condition,” while viewing tables were used for a more effective “control of picture and sound quality” and comparison, re-editing and restoration purposes.⁵ Alongside such devices, a few pages later the handbook introduces “complex machines” able to carry out “several processes simultaneously” and thus “save a great deal of time.” One was a certain “inspecting table”:

a combined film examining machine [...] which can examine and clean the film at the same time. While the film is cleaned, its length and the number of splices are measured and the physical condition of the splices and perforations are indicated. Any deficiencies [...] are recorded on a concurrent paper band.⁶

The reference is probably to multiple-purpose machines marketed in the 1970s and 1980s for the technical inspection and cleaning of circulation copies (e.g., RTI Retectron, Omega, Cinescan I and II, Pulsar). They could inspect a large amount of film prints and their stop-on-splice or similar functions automatically detected damage. Hence, the operator could check, repair and produce an early kind of metadata recording. Archival discursive knowledge recognised some significant changes in the operationality of inspection tables at the beginning of the electronic transition in the 1980s. Thereafter classified as “complex machines,” they were of epistemic and historical interest because their cybernetic and electronic viewing, control and annotation systems bridged the gap between material and visual culture, and photochemical and mechanical media.

Over the last fifteen years there has been a further shift, in a certain way echoing some properties and aims of the first “complex machines,” thanks to a new generation of basic and multipurpose hybrid analogue-digital devices. Most of the current basic film winding and verification tables, such as Debrie’s TR3, CIR’s D-Observer Cine3, MWA’s Steenbeck R, KEM’s KEMroll and KEM-

wind, have been progressively supplemented and integrated with electronic and digital measuring, viewing, monitoring and feedback annotation systems (motion encoders, multi-unit footage and time counters, cameras, sensors for shrinkage, etc.) to collect metadata, and inspect film stock in the most efficient and gentle way. In such state-of-the-art devices, the film transport is controlled by sensors and a CPU to keep the tension balanced and movement smooth. They are built to manage fragile stock and avoid capstans, sprockets or rollers touching the film. Film handling is increasingly protected, separating film from its mechanical and manual a priori. The state of preservation plus primary and secondary information are detected and annotated by means of specific observational and documentation instruments, integrating the functions and aims originally assigned to film winding and technical inspection tables, as well as those peculiar to viewing tables in a single device. So, to guarantee the film's protection and provide video assistance in the process of material and visual description and analysis:

| 293

the D-Observer table was initially developed as a simple tension-controlled winder having as first rule the protection of the film integrity [...] the following natural evolution was the implementation of a video subsystem for helping the operator during the inspection process.⁷

The currently most advanced inspection tables merge traditional film handling and inspecting with other environments and frameworks, progressively blurring the boundaries between diagnostics, viewing, scanning and annotation. Such hybridisation and convergence is found in multipurpose equipment such as Kem's KEMview; MWA's Spinner V multiformat viewing table; Debrrie's Scantable Perfecta, advertised as an "all-in-one" device;⁸ CIR's D-Observer and D-Archiver, presented as an "all-in-one solution for film archiving";⁹ "the bridge connecting analogue and digital"; and more recently Cube-Tec's INSPECTIONscan, introduced as "the most relevant invention for inspecting archival film since the rewinder," reframing inspection in itself as "the enabler for preservation."¹⁰

Their discursive marketing (commercial brochures, technical descriptions, etc.) reveals a few underlying principles: *protection of film integrity* through electronic and digital transport systems; *hybridization* and *convergence* of several archival and media environments and routine workflow tasks (inspection, repair, scanning, post-production, access); *automation* and *datafication* of film inspection by adding smart tools as well as metadata archiving, analysis and sharing; and *superimposition* of an operational culture and paradigm over a haptic and multisensorial approach to the film artefact.

FILM INSPECTION TABLES AS ARCHAEOLOGICAL AND OPERATIONAL DEVICES

Continuous, encoded and touchless film transport and handling management systems, digital cameras and film scanning technologies facilitated the availability of high-quality digital access copies, marginalising the use of traditional viewing tables that had a high mechanical impact on the film. There are essentially three reasons why it is necessary to produce digital proxies or facsimiles: to safeguard the originals, allow widespread access, and enable machine-assisted visual analysis.¹¹ The viewing functions were therefore absorbed by film scanners and most of the above-mentioned inspection tables, which replaced the original with its digital remediation and metadata during the analytical phase. Despite being designed for the “evaluation, visual and haptic study” of film materials, the tactile and sensorial relationship with the film stock is mediated by several interfaces.

294 | But it would be wrong to say that there is no longer any haptic mediation or direct observation during the inspection process. The use of manual inspection benches still plays a central role in the most up-to-date film archives and labs. In other words, the deepest layer of cultural film handling and inspection practices and techniques is still present. The tacit gestural knowledge,¹² “operational hand,”¹³ and “invisible labour”¹⁴ activated by touching and handling apparatus, artefacts and pictures is a crucial aspect of inspection and technical restoration work. Nonetheless, little attention is paid to the various basic accessories used to support film handling, repairing, magnifying, measuring, etc. As non-discursive traces of archival knowledge, they are as much standardised tools as they are the result of craft and DIY labour practices and technical workers’ behaviours and values. Hence, they can share inclusive, sustainable and smart handling and inspection solutions, and kit for global, grassroots film care.

It is useful to note, however, that the hands-on archival labour, performative learning of film material culture, and embodied knowledge of inspection benches is being redefined by the tendency towards large-scale automatization, datafication and standardisation, pushing film inspection into a new operational environment. Several years ago, in *Schnittstelle* (1995), Harun Farocki demonstrated “the operational differences between film editing and video editing in terms of fingertip activity, showing in close-up [...] fingers touching the filmstrip to feel the cut and the glue and [...] pushing the buttons of the video editing console without physical contact with the video tape.”¹⁵ Starting from its chirocentrism and performative a priori, the inspection table is both a labour and knowledge-building environment and an interface whose performative and operational conditions of film handling, inspection and documentation have altered over time. The film material artefact, framed

by advertising strategies and the concrete operationalities of state-of-the-art devices, is being handled and touched less and less. Preliminary activities to prepare the original are pared back. As in linear video post-production and viewing tables, the “performative hands” are connected to jog/shuttle wheels. At the same time, touchscreens allow the operator’s hands to govern multiple machines and instruments for semi-automatic film inspection and annotation, real-time image measuring, scanning and production of access copies to avoid handling of the original. Over-scan and edge-to-edge proxies become valuable elements for the archive, as well as providing an annotated guide and image-model and reference for subsequent post-production tasks.

These multipurpose tables create an entangled epistemic framework of material, visual and invisual data culture. Following the recent debate about operational images, Parikka highlighted Thomas Elsaesser’s speculations about Farocki’s interest in simulations, not as a replacement of reality, but as a chain of synthesis.¹⁶ Similarly, the *operational turn* of the current advanced diagnostic and inspection devices is not to digitally remediate or mimic the film material artefact, but to superimpose data, tools and interfaces over the film source, in a sort of multilayered “media archaeography” of the film itself—in other words, in “modes of writing that are not human products but rather expressions of the machines themselves.”¹⁷ Inspection practices and discourses have become part of a wider operational and experimental system, a network comprising several different components marked by multiple reconfigurations and readjustment patterns, in which “phenomenon and instrument, object and experience, concept and method are all engaged in a running process of mutual instruction.”¹⁸ The concrete components of these operational inspection devices include annotated digital proxies, analytical and diagnostic software, diagrammatic and statistical inspection reports, calibration images and tools, and integrated databases and AI tools for film material culture identification and learning.

| 295

FILM INSPECTION TABLES AS LEARNING AND TRAINING DEVICES

Film inspection, rooted in the first half of the twentieth century, can be understood as a genealogical method for producing historical knowledge from the observation and classification of specific material traces and clues. Analysis of the physical characteristics of film,¹⁹ as an aid in the identification and hence application of the circumstantial and evidentiary paradigm to the study of the film’s material culture,²⁰ still plays a leading role in both the academic and archival worlds. At the end of the twentieth century, the survey of physical film conditions and the examination of the secondary information preserved on

film as a historical and cultural artefact started to become deeply intertwined in many publications dedicated to film preservation and early cinema history.²¹ A few years later, in the Bologna School and Gamma Group publications,²² or in widely known handbooks,²³ inspection was explicitly conceived as a *learning* methodology and techno-cultural milieu for understanding film.

Inspection tables inhabit a specific dialectic within this framework, since they are both technical and epistemic objects.²⁴ They embody tacit knowledge and perform the role of media interface for framing the cinema history inscribed in the film material artefact. More to the point, they can be recognised as a relevant agent and founding apparatus of archival and historical knowledge. Consequently, with the new hybrid devices mentioned above, how does the paradigm of film inspection change in terms of heuristics, learning and training approaches?

296 | The manual work carried out on inspection tables creates a learning model in which sensory examination and direct observation (or that mediated by basic interfaces, such as the canonical loupe) are driven by the above-described semiotic and forensic paradigm (*learning from film*). With the introduction of encoded transport and the recognition of specific defects, a film's condition is learnt through a cybernetic paradigm, namely, through feedback given to the operator by the control system (*learning from signals*). Ever since the 1970s, specific anomalies such as "thickness splices" have been "touched" and "recognised" by the machine and, through a specific light-graphic signal, the operator is invited to act and the process is thus inserted into a longer operational chain.

Since the 2000s, digital mimicry and film scanning technology have enabled archivists and scholars²⁵ to make (edge-to-edge) digital witnesses of film materials for documentary purposes.²⁶ In this case, the inspection and learning process is based on the digital modelling and display of the film, which is used for diagnostic and scholarly purposes according to precepts and logics typical of the digital humanities (*learning from digital*).²⁷

More recently, multipurpose tables such as the D-Archiver and INSPECTIONscan have added a further layer, embracing a process of data- and operational-culture-based inspection (*learning from data*).²⁸ These devices offer integrated software both for quality control and for annotating historical-material characteristics. In the words of its developers, Quadriga INSPECTIONscan puts into practice "a lot of archival expertise already built into the machine." In semi-automatic mode, it can document frame by frame, integrating operator annotations, displaying results in charts and diagrams, and estimating "an overall quality rating on the photographic and mechanical condition."²⁹ The inspection report and digital access copy loaded onto a viewing interface creates an advanced inspection environment (metadata,

matte overlays and tools, timeline of detected defects and faults). The convergence of annotation software, inspection devices and meta-data has obvious implications in the analysis of single events or the evaluation of statistical accumulations for archival, creative and scientific purposes. Their impact on the training processes of archival practitioners is less self-evident. On this last aspect, INSPECTIONSCAN presents two interfaces that mark a pioneering step toward forms of inspection learning practices based on machine-driven cognitive processes.

The first (Wizard) is an identification tool. The touch screen peripheral and its flowchart convey the know-how traditionally transmitted by hands-on and oral means to laboratories, archives and universities.³⁰ It is now interaction with the operational interfaces that educates the decision-making models, and thus the operator, concerning which inferential processes to follow and choices to make to understand film materials. A second application, the Edge Printing Inspection/Decrypter, explicitly takes up Brown's paradigm in the device. By combining AI algorithms, recognition systems and databases, it unveils the "alchemy" involved in the "deciphering of the information on the film edges," unknown to most and in the hands of a few experts of a "highly complex science [so as] to make the wealth of useful information hidden outside the image area accessible to users in simple forms."³¹

In this latter direction, inspection tables go from being apparatuses of a hands-on relationship with the film artefact and alchemical foundation of an esoteric archival and historical-philological science to operational environments that redefine the role of archival workers and researchers, the agents at play, and the tacit knowledge inscribed in visual and material film culture.

NOTES

298 |

- 1 FIAF, *Preservation and Restoration of Moving Images and Sound* (Brussels: FIAF, 1986), 197.
- 2 Among others, see Eberhard Nuffer, *Filmschnitt und Schneidetisch: Eine Zeitreise durch die klassische Montagetechnologie* (Potsdam: Polzer, 2003); Benoît Turquety, “On Viewfinders, Video Assist Systems, and Tape Splicers: Questioning the History of Techniques and Technology in Cinema,” in *Technology and Film Scholarship: Experience, Study, Theory*, ed. Santiago Hidalgo (Amsterdam: Amsterdam University Press, 2017), 239–259; Turquety, *Inventing Cinema: Machines, Gestures, and Media History* (Amsterdam: Amsterdam University Press, 2019); David Colangelo, “Hitchcock, Film Studies, and New Media: The Impact of Technology on the Analysis of Film,” in *Technology and Film Scholarship*, ed. Hidalgo, 127–148.
- 3 Herbert Volkmann, *Film Preservation: A Report of the Preservation Committee of International Federation of Film Archives* (London: British Film Institute / National Film Archive, 1965), 37.
- 4 FIAF, *A Handbook for Film Archives*, eds. Eileen Bowser and John Kuiper (Brussels: FIAF, 1980), 116.
- 5 FIAF, *Preservation and Restoration*, 200–201.
- 6 Ibid., 200.
- 7 CIR, “D-Observer Family Inspection Tables,” n.d., <https://www.cir-srl.com/products/inspection-equipment/d-observer-family-inspection-tables/>.
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- 14 Wanda Strauven, *Touchscreen Archaeology: Tracing Histories of Hands-On Media Practices* (Lüneburg: meson press, 2021).
- 15 Ibid., 125.

16 Jussi Parikka, *Operational Images: From the Visual to the Invisual* (Minneapolis, MN: University of Minnesota Press, 2023).

17 Wolfgang Ernst, *Digital Memory and the Archive* (Minneapolis, MN: Minnesota University Press, 2013), 58.

18 Hans-Jörg Rheinberger, *An Epistemology of the Concrete: Twentieth-Century Histories of Life* (Durham, NC: Duke University Press, 2010), 31.

19 Harold Brown, *Physical Characteristics of Early Films as Aids to Identification* (1st edition: 1967) (Brussels: FIAF, 1990); Brown, *Physical Characteristics of Early Films as Aids to Identification*, new expanded edition, ed. Camille Blot-Wellens (Brussels: FIAF, 2020).

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26 Serena Bellotti and Andrea Mariani, “The Digital Witness: Film Reconstruction and the Forensic Imagination in New Media Environments,” *Cinergie* 20 (2021): 27–43.

27 Willard McCarty, *Humanities Computing* (London: Palgrave Macmillan, 2005).

28 Such a historical-epistemic and operational taxonomy should not be taken as absolute, but rather as exemplifying “political” forces of technology (Benoît Turquety, *Politiques de la technicité* [Milan: Éditions Mimésis, 2022]), marked by different community and technological interests, as is the case, for instance, with the entry into 2025–2026 of a new mobile and portable inspection table marketed by CIR: the “Nomadic Archival Inspection Bench” (Banco Ispezione Archivistica Nomade, BIAN). An essential, affordable device designed in collaboration with newly established Italian grassroots (non-theatrical) film archives, it was conceived to meet the needs of analysis of film collections in their territorial sites of preservation and with, at its core, an archival thinking sensitive to post-colonial and global-south issues and the permanence of collections in local communities.

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30 Karen F. Gracy, *Film Preservation* (Chicago: Society of American Archivists, 2007).

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| 301

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CHAPTER 20

Jan Bot

Exposing the Bits & Pieces Collection Using AI and Algorithmic Montage

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| 303

ABSTRACT

Jan Bot was an experimental computer programme that used AI to produce over 25,000 micro-length experimental films inspired by trending news. These films were composed of fragments from the Eye Filmmuseum's Bits & Pieces collection, using algorithmic editing techniques. The project revisited a fundamental question in the presentation of film heritage: can archives be experienced as aesthetic objects rather than historical documents? By embracing AI's semantic misalignments, Jan Bot explored AI aesthetics and human-machine co-creation to generate new audiovisual experiences that activate dormant archival materials. The work demonstrates how algorithmic remix challenges both conventional archival narratives and predominant uses of AI, suggesting that experimental approaches to emerging technologies can reimagine how film heritage engages with audiences in our hypermediated culture.

KEYWORDS

Algorithmic editing; human-machine co-creation; film heritage; AI aesthetics; archival narratives; remix culture



FIGURE 25
Jan Bot installation.

FILMMAKING ALGORITHM

A filmmaking algorithm is a computational system that automates the process of creating films through programmed instructions. In the case of the Jan Bot programme (2017–2023), this technology combines computer vision, natural language processing, and algorithmic editing to generate short experimental films. The system analyses archival footage using image recognition to extract visual metadata, connects this data with Internet trending topics, and employs predefined montage algorithms to sequence shots. These algorithms control editing parameters, including rhythm, repetition patterns, and intertitle placement. Unlike manual editing, a filmmaking algorithm operates continuously without human intervention, producing films at scale, while introducing elements of computational serendipity through the machine's interpretive limitations. The primary source material for Jan Bot was Eye Filmmuseum's Bits & Pieces collection, initiated in the early 1990s as an experimental project focused on unidentified film fragments selected primarily for their aesthetic qualities. The absence of identifying information was a creative advantage for the algorithmic system, allowing machine vision to interpret these fragments without human preconceptions. The collection's aesthetic diversity—spanning slapstick comedy, documentary cityscapes, anthropological portraits, and experimental animation techniques—provided rich visual material for the algorithm to process, creating unexpected connections between historical film fragments and contemporary news.

| 305

THEORETICAL FRAMING

Jan Bot's filmmaking algorithm can be positioned at the intersection of archival practices and computational aesthetics. It exemplifies how machine vision introduces a distinctive aesthetic through its aberrant pattern recognition, eliciting meaning through misalignments between human and machine intelligence. This approach corresponds with the growing influence of automated machine vision in contemporary media, where algorithmic interpretation becomes a creative force rather than merely a technical process. The system's repurposing of archival fragments resonates with emerging perspectives on viewing archives beyond historical categorisation, instead treating images as aesthetic objects judged by sensory experience. As an experimental apparatus, the filmmaking algorithm challenges conventional notions of authorship and creativity, suggesting a collaborative model where machine interpretation and human curation exist in productive tension. This chapter presents algorithmic filmmaking not merely as a technological innovation but as a critical practice that interrogates the ontology of film heritage and its relationship to contemporary digital culture.

INTRODUCTION

Jan Bot was a computer programme, a website and an installation created by experimental filmmakers Bram Loogman and myself, Pablo Núñez Palma, in collaboration with Eye Filmmuseum. For almost six years, between 2017 and 2023, Jan Bot worked day and night generating micro-experimental films (each about 30 seconds long) using footage from Eye's Bits & Pieces collection. The themes of these films were loosely inspired by trending news, which the bot collected daily from the Internet using Google Trends.

At its core, Jan Bot was an artistic experiment to present films from a distant past through the prism of today's Internet trends, using a critical approach to artificial intelligence (AI) and algorithmic editing. In 2016, during Jan Bot's development, a new wave of AI image recognition, spearheaded by Google Vision and IBM Watson, was sweeping the headlines of news outlets

306 | and social media.¹ At the same time, software like Apple and Google Photos, and platforms like Snapchat and Instagram, were starting to introduce algorithmic video editing in the form of generative video slideshows—like Apple's "Memories"²—and interactive video feeds edited by recommendation algorithms—like Instagram Stories.³ Inspired by these contingencies, we thought of an artistic device to bring old media to new platforms, inducing a critical, playful and educational approach to expose and demystify these technologies.

This chapter will examine the different dimensions of Jan Bot. It starts by discussing the archival issue it sought to address: the challenge of presenting Bits & Pieces, a collection of film fragments, curated mainly on the basis of aesthetic criteria rather than, as with most collections, serving as documentation of historical events. It will then address Jan Bot's critical use of AI in two stages: first, generating metadata for the Bits & Pieces collection and, second, creating meaningful connections between the collection and trending news online. The following section will discuss Jan Bot's unique approach to algorithmic video editing, and, in the final section, the text will briefly refer to the end of the project, which concluded in 2023 with Jan Bot's funeral ceremony and the creation of a decentralised online collection of curated works.

THE CHALLENGE OF PRESENTING THE BITS & PIECES COLLECTION

The main ingredient that makes Jan Bot's experimental pieces unique is Eye Filmmuseum's Bits & Pieces collection. This collection of unidentified film fragments was initiated in the early 1990s by the museum's deputy director, Erik de Kuyper, and filmmaker Peter Delpeut. Fascinated by the leftovers they discovered in the museum's archive depots, they began curating a catalogue

whose primary selection criterion was aesthetical. The Bits & Pieces catalogue comprised film fragments that could not be identified and yet possessed an aura distinctive of early cinema culture. Delpueut explains his curatorial process in an essay—arguably a manifesto—originally published in 1990 in *Versus Magazine*, titled “Bits & Pieces: The Limits of the Film Archive.”⁴ There he claims that working with a collection of this nature, devoid of titles and metadata, forces archivists to free themselves from viewing archives solely as something to categorise historically, and invites them to view images as aesthetic objects judged by their own senses and taste. This approach, which compels archivists to explore the boundaries between their profession and personal enjoyment, diverges from conventional archiving methods, where guidelines, typically historical, judge archival objects based on their ability to document and serve as factual evidence of historical events.

Over the years, the Bits & Pieces catalogue has remained open and gradually expanded. By 2016, it included approximately 20 hours of material, of which 12 hours had been digitised. The collection covers a wide array of themes, from slapstick comedy to documentary cityscapes, from anthropological portraits of individuals in former colonies to innovative animation techniques. Despite this diversity, a unifying thread lies in the material’s age, with most appearing to have been shot before the 1950s. Also, as previously mentioned, the fragments share the commonality of being unidentified. This latter element, the absence of contextual information, far from being a hindrance, presented a thought-provoking challenge for the Jan Bot project.

| 307

GENERATIVE METADATA

Leveraging AI’s highly marketed image recognition capabilities around the year of Jan Bot’s production, we created a script to extract one representative frame from each shot within the Bits & Pieces digitized catalogue. We then applied AI software—Clarifai⁵—to generate descriptive tags for these extracted frames, thereby automating the process of identifying the catalogue’s themes.

It is critical to acknowledge that the footage in Bits & Pieces is old and, in many cases, has deteriorated due to debris or natural decomposition. For this reason, as may have been expected with an emerging technology applied to less-than-ideal images, many of the AI software’s tags were imprecise or simply wrong in describing the content of the shots. To illustrate, it would take a white screen for a table, a black screen for a starry sky, a monkey for a cat, a desert for a beach, and a soldier for a football player. That said, considering the artistic nature of the Jan Bot project, which aimed to critically explore, demystify and expose the misalignments between human and machine intelligence,

we decided to accept these aberrations and leave the descriptions untouched, embracing the stories and aesthetics that would emerge from doing so.

JAN BOT'S AI SYSTEM

Contrary to the general belief fostered by tech companies and media outlets, Artificial Intelligence is not one general and overarching technology that applies equally and magically to any situation. On the contrary, AI covers various workflows that involve datasets and algorithms arranged in a system designed to produce a specific outcome. Such a system usually comprises multiple steps, most of them related to automation rather than intelligence and, of those, many involve human supervision and labour.⁶

Jan Bot was no exception. Although its workflow involved less direct supervision than the average AI system—as the project intended to expose the aesthetic qualities arising from an AI's ability to make interpretations—Jan Bot was designed with one goal in mind: to generate short experimental films inspired by trending news. For this reason, Jan Bot's AI system was composed of workflows that could optimise this process.

Using AI to generate descriptive metadata for the Bits & Pieces collection was only one part of the system. The other part involved collecting trending news from the Internet and using it as inspiration to generate experimental films. Here, the notion of inspiration was critical, as it assumes intention, meaning-making and creativity. How could we design a system that distils meaning from an array of text? How could this meaning be used to select footage from the Bits & Pieces catalogue to edit a short film? Jan Bot's research and development process took place in 2016, a year before the famous paper "Attention Is All You Need" introduced the concept of transformers,⁷ drastically upgrading AI's capacity to make interpretations and simulate intention.⁸ Before the start of that new era, Jan Bot already offered a glimpse into the creative use of AI by embracing its fractures and imperfections. It was an unscalable, artistic and, to some extent, human-unfriendly vision, but it was a vision after all.

SELECTING TRENDING NEWS FROM THE INTERNET

Using Google Trends RSS feeds, a service that analyses aggregated search queries from Google's engine to identify the most clicked news items per country, Jan Bot was updated in real-time about news trending in most Western European countries, the United States and Canada. If a news item would trend in

more than three countries within 24 hours, that news would be selected by Jan Bot to edit a film. Based on this criterion, Jan Bot generated an average of twelve films daily, every day for almost five years. By late 2022, Jan Bot had registered over twenty-five-thousand short films in its catalogue.

The choice to focus on news trending in Western European and North American regions stemmed from several considerations. First, Google Trends does not provide a single indicator of worldwide trending news; instead, it presents data country-by-country, forcing us to make a conscious selection. Second, this choice aligned with the gaze represented by the Bits & Pieces collection, a Dutch archive whose footage reflects the point of view of industrialised nations in the first half of the twentieth century. Third, early tests indicated that considering trending news from around the world resulted in averages revealing stories focused solely on Internet celebrities and football players, making Jan Bot insensitive to other trends. While acknowledging the Internet's fixation on influencers, media personalities and sports, we wanted to engage with a more diverse array of narratives.

| 309

CONNECTING TRENDING NEWS TO BITS & PIECES

Selecting trending news from the Internet was an automated process, not one deemed a product of Artificial Intelligence. However, selecting footage from Bits & Pieces based on these news items did involve AI. Specifically, we employed a Natural Language Processing (NLP) tool created by the Swiss company Cortical,⁹ which calculates semantic relatedness between word groups by translating them into numerical values. With this tool's aid, we could allocate semantic value to a news item—based on its headline and introductory paragraph—and estimate its semantic proximity to individual shots from the Bits & Pieces catalogue, using the associated keywords previously generated via Clarifai AI. The shots identified as semantically closest to a specific news item—usually three to six—were selected to create a short film. Between these shots, generated intertitles appeared using a template structure filled with random words extracted from the original news item.

It goes without saying that this process of connecting shots with news items using semantic approximations was reasonable in theory but imperfect in practice. As a result, it produced unexpected associations, which became idiosyncratic identifiers in Jan Bot's films. One example is the film *Kepler Discovery #1303*,¹⁰ inspired by NASA's discovery of the planet Kepler-90i. The piece shows images of a desert, a shot of fireworks, and contains an intertitle that reads "So Google takes a watch." While these connections may not be fully sensical for a human, they are for Jan Bot. Digging deeper into the bot's think-

ing process, one may conclude that a desert contains sand, sand comes from rocks, and rocky landscapes are often found in interplanetary explorations. In a similar logic of semantic proximity, fireworks shine in the dark sky, just as stars and supernovas glow in outer space. Finally, while not explained in Jan Bot's film, a close reading of the news item reveals that planet Kepler-9oi was found using Google's technology, which explains in part why the company is named in the intertitles.

ALGORITHMIC MONTAGE

As a following step, we developed an algorithmic montage process to execute the editing of the selected film fragments. This was not a single step but many small steps with different variables. Unlike the previous phases, which

310 | can be reasonably explained, this process was highly subjective and largely based on trial and error. We freely extrapolated ideas from music, film theory and movie scenes. For example, we drew inspiration from Maya Deren's use of optical associations to connect scenes in her films *Meshes in the Afternoon* (dir. Maya Deren, 1943)¹¹ and *At Land* (dir. Maya Deren, 1944);¹² we also studied Sergei Eisenstein's research on syntactic film editing through his theories of metric, rhythmic and tonal montage.¹³ References like these helped us explore concepts and sketch edits. If we liked the results of our experiments, we would translate them into algorithms and add them to Jan Bot's larger set of human-crafted montage algorithms, expanding its assortment of rhythms, intertitles and image loops.

Three distinctive editing features deserve special mention when discussing editing style, as they characterise Jan Bot's approach: the rapid tempo of the edits, frequent use of repetition, and the inclusion of intertitles.

Editing on a rapid tempo, combined with the repetition of shots, was to a great extent inspired by Vine, the first social media platform dedicated to short-format videos.¹⁴ The Vine format consisted of looping videos with a maximum length of six seconds. The styles that emerged from these creative constraints gave rise to many video editing trends, particularly in comedy, abstract video remixing, and animation. Vine closed in 2017 as bigger and more competitive social media platforms introduced their own video features.¹⁵ However, its influence is still palpable in Internet media culture, including platforms like TikTok and YouTube Stories.

The short length of Vine videos, combined with their default endless-loop setting, inspired us to explore an unconventional approach to film spectatorship. This approach sought to overwhelm the viewer with rapid associations, allowing meaning and narrative to emerge gradually after repeated viewings,

much as in Vine. Rather than a linear experience with a beginning, middle and end, we intended to convey a dream-like experience in which the high intensity of images, rhythms and associations would either capture the viewer's curiosity or evoke abjection—nothing in between.

Just as pop music uses choir and poetry anaphora, so editing fast-paced, non-narrative videos demanded, in our opinion, the use of repetition. Besides its poetic allure, repetition was one of the few editing resources we could count on in designing the montage algorithms, as we could not know beforehand exactly which shots would populate the timeline nor in which order. Informed by early editing theories, such as the Kuleshov effect¹⁶ and Eisenstein montages,¹⁷ we reckoned that, regardless of the image, some form of meaning and emotions was likely to be triggered in the viewer's mind by combining parameters of rhythm and repetition. This idea was also applied to the intertitles, which were composed of random words extracted from the selected news item and placed into templates consisting of connecting words such as "but," "suddenly" or "and." Based on our observations of voice-overs from movie trailers, we knew that including these connectors could enhance a sense of drama or suspense, regardless of the content. An example of how all these elements come into play is the film *Fake Chase #0104*,¹⁸ inspired by a scene from a BBC documentary series where snakes chase an iguana. The piece combines flashing shots of a woman's face in panic, a man in anger grabbing and shaking another man, a sea of hands and natural ice blocks crashing. Between these images, intertitles read "The BBC reports a BBC" and "So it faked an iguana," among others. Regardless of the film's central theme, connecting words enhances the likelihood of sparking curiosity, encouraging viewers to gather all the textual and visual fragments and derive interpretations.

| 311

JAN BOT IS DEAD; LONG LIVE JAN BOT!

The term "killing" is often used in software development to refer to computer programmes that will be turned off and removed from circulation. On 31 March 2023, having generated more than twenty-five-thousand experimental film pieces, we killed Jan Bot. As the technology the bot was critically reflecting upon—AI and algorithmic editing—continued to evolve into much more advanced forms and products, Jan Bot itself, once avant-garde, had become a piece of media archaeology. Paradoxically, we killed Jan Bot to keep the project's memory alive and well-registered rather than allowing it to passively fade away, as many online projects do, into the obsolescence of unclaimed depreciation.

We organised a campaign called “Jan Bot is dead; Long live Jan Bot” to promote the adoption of Jan Bot’s films, as it was our intention not to keep them all but only a small fraction that would be a meaningful representation of the bot’s oeuvre. The campaign ended with a funeral ceremony where we unplugged the physical installation and took down Jan Bot’s online server. All that is left of Jan Bot is an archive of 151 hand-curated films that a group of digital art collectors purchased as non-fungible tokens, or NFTs. The works are registered in the Tezos blockchain, and the media files are archived in Eye Filmmuseum’s collection.¹⁹

In retrospect, Jan Bot’s approach to AI filmmaking was part of a visionary movement of AI art that playfully and critically exposed some of the myths behind this emerging technology. As time passes and AI’s cultural construct grows in notoriety, scholars start to theorise about artistic practices that, back in 2016, were foundational to Jan Bot’s creation. Lev Manovich and

312 | Emanuele Arielli, for example, describe AI aberrant pattern recognition—a notion present in Jan Bot’s unsupervised feature extraction from the Bits & Pieces collection—as a distinctive component of generative AI’s aesthetics in the twenty-first century, which they refer to as “the artificial gaze.”²⁰ Shane Denson’s writings on the growing influence of automated machine vision in creating and interpreting images within media culture resonate with Jan Bot’s automated process of algorithmic montage.²¹ Even outside the realms of AI, Jan Bot’s approach to defining trending news by repurposing big tech’s open-access data aligns with today’s data-activist ideas, such as Sam Lavigne’s manifesto on “scrapism.”²²

Jan Bot’s enduring legacy lies not only in its pioneering role in AI aesthetics and algorithmic editing but also in its ability to foster new ways of seeing and experiencing film archives. By breathing new life into the forgotten cinematic fragments of the Bits & Pieces collection and recontextualising them through the perspective of twenty-first-century news and emerging technologies, Jan Bot paved the way for future artistic explorations to use emerging technologies in re-examining the past. On a deeper level, this field of work suggests a closer look at the meaning of film heritage and its ontology. Is film heritage, first and foremost, a document of the past that validates historical narratives and categories? Or can it be viewed instead as an aesthetic object intended to evoke a sense of collective memory existing beyond historical discussions? To what extent can film heritage be remixed and appropriated while still maintaining its integrity and cultural value? For example, musical pieces can evoke other times without needing to be scrutinised as historical artefacts. One can appreciate Béla Bartók’s compositions without knowing their connections to East European folklore, or listen to a song by Kate Bush and feel transported to a 1980s landscape without knowing the exact events that

inspired the piece. These are questions worth asking, as archiving involves not only the preservation of films but also their presentation. In a hypermediated culture of remixed and deterritorialised media, where knowledge and memory are more co-constructed than ever before among media sources, digital platforms, and unpredictable audience behaviours, film heritage needs new strategies to become an active participant in public debates. In this context, we hope Jan Bot's impact will resonate far beyond its active lifespan, inspiring new perspectives on preserving, curating and interpreting our love for cinema and its tradition.

NOTES

314 |

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| 315

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316 |

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Moving on a Budget

The Mahlase-Roodt Eco Dolly

TUMISHO MAHLASE AND WALDO ROODT

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| 317

ABSTRACT

Drawing from film production studies, this chapter explores how a film dolly can be made using materials found at a local hardware store at a low price, while still achieving the same function as custom-built dollies used by the industry. Such semi-professional dollies have been constructed using steel tracks and a steel body, the tracks allowing the camera placed on top of the dolly to glide smoothly over the tracks during filming. This chapter focuses on the use of limited resources in small-budget productions and in teaching to create professional-quality results. It explores how filmmakers can use their creativity, resourcefulness and hands-on skills to build a functional dolly system without relying on expensive equipment.

KEYWORDS

Dolly; camera movement; cinematography; DIY



FIGURE 26
The Mahlase-Roodt Dolly.

THE DIY ECO DOLLY

A dolly is a “wheeled cart with dedicated tracks or a similar device upon which a camera can be mounted to create smooth movement on screen that enhances the narrative and emotional impact of a scene.”¹ In South Africa, as with many lower-income countries, using a dolly in film and television production is reserved for productions with high budgets. The cost of hiring a dolly creates a challenge for producers when films need to adhere to a limited budget. Then production schedules are focused on cutting costs by shooting films in the shortest possible time and cutting back on the budget for equipment, such as expensive dollies. This chapter explores the option for low-budget filmmakers to create their own Eco Dolly and still achieve the same shots as they would have in a big-budget production using an expensive dolly.

| 319

THEORETICAL FRAMING

Drawing from film production studies, this chapter explores how a film dolly can be made using eco(nomically) friendly materials found at a local hardware store at a low price, while still achieving the same function as custom-built dollies used by the industry. Such semi-professional dollies have been constructed using steel tracks and a steel body, the tracks allowing the camera placed on top of the dolly to glide smoothly over the tracks during filming. This chapter focuses on the use of limited resources in small-budget productions and in teaching to create professional-quality results. It explores how filmmakers can use their creativity, resourcefulness and hands-on skills to build a functional dolly system without relying on expensive equipment. The second part of this chapter, then, offers a guide to building a dolly based on the authors' own experiences of designing and constructing an Eco Dolly in 2013 while acquiring a degree in film and television production at the Tshwane University of Technology, South Africa.

THE DOLLY AND ITS USE: A SHORT HISTORY

According to Lucia Cores Sarria, “The breathing camera is an immersive perceptual device that should increase the engagement of the viewer with the narrative.”² The use of a dolly assists in this aim. Some basic camera movement in film can mimic and be linked to real life human experience, making a dolly shot more lifelike for the audience and less like a two-dimensional digital space. There are four basic camera movements that mimic true human experience—tracking, pan and tilt, zoom, and dolly or Steadicam shots.³ If this technique of movement of the total field is employed, then the eye accepts the frame as stable and ascribes all movement to the figure within it.⁴

Dollies can be as basic as a platform with wheels on which the camera is mounted, or they can be sophisticated equipment that carries both the camera and its operator. It can run on wheels or on pre-laid tracks. It can be pushed manually or be motorised. In the latter case, it requires a driver-operator.⁵

320 |

An early inventor of the dolly was the Spanish filmmaker and cinematographer Segundo de Chomón. He first used a prototype of the dolly early in his career in a scene for *La Vie et la Passion de Notre Seigneur Jesus Christ* directed by Lucien Nonguet and Ferdinand Zecca in 1903. However, he focused on special effects cinematography for most of his career, especially the latter part.⁶ Since Chomón’s invention has gone mainstream, his idea and design has been adopted and adapted by multiple film equipment companies around the world, selling many different kinds of film dolly. They range from high-end professional industry dollies, such as those of J. L. Fisher, Chapman and Leonhardt, and Panther TV, to multiple budget-friendly options offered by smaller companies, such as E-Image and ProAim. The films made using dollies appeal to a larger audience as opposed to independent films which tend to reach a smaller audience. Dollies have allowed filmmakers to introduce movement in film shots. Prior to this, film shots remained static because of the huge and heavy cameras used at the end of the nineteenth century.⁷

Alan Dwan has been credited with introducing the “dolly shot” in 1915. Dwan used a moving automobile to film actor William H. Crane’s stroll in the film *David Harum*⁸ in Hollywood.⁹ But it was in 1927, when the film *Wings*¹⁰ was released, that the dolly shot really captivated the audiences watching the film. According to Meg Shields, the Folies Bergère café from the movie was built as an indoor set, and a specially constructed camera mount was attached to an overhead track to give the illusion that the camera was floating at table level and passing between the patrons.¹¹

Studies indicate that the first patent application for a dolly was made in 1936, when it was referred to as a camera carriage; it was designed by Victor Raby and made by the Studio Equipment Company. Initially, it had three

wheels: one at the front and two at the back. In 1937, the Fearless Camera Corporation introduced the four-wheeled Panorama Dolly in the USA.¹²

The first dollies were big, bulky and extremely heavy to accommodate the cameras, which were still quite large. In some cases, the industry used dollies which were even as big as cars! Throughout the decades, the dolly's design has remained basically the same. However, high-end professional dollies did incorporate specific changes, such as improving size, while adding more refined functions.¹³ Today there are multiple types, from basic sliders with limited functions, to basic tripod dollies, and advanced dollies that utilise a combination of functions and even include a hydraulic lift.¹⁴ The dolly has been used in many creative ways, as demonstrated by award-winning films such as *The Shining*,¹⁵ *Jaws*,¹⁶ most films from the action-driven James Bond franchise—for example, *Spectre*¹⁷—and the 2020 film, *Parasite*.¹⁸

| 321

THE STEADICAM AS AN ALTERNATIVE TO THE DOLLY

The dolly's main competitor is the Steadicam device, which is a camera stabiliser that combines the stability of a tripod, the flexibility of a hand-held camera, and the movement capability of a dolly. Steadicams absorb shake by mechanically isolating the operator's movement, always producing smooth tracking shots.¹⁹ Although Steadicam and dolly shots are similar in so many ways, Steadicam shots are seldom put in the same category as dolly shots. This is because directors use Steadicam to create the effect of a steady image that is dynamic, flexible, and integrated into the scene. In contrast, dollies tend to be noted by viewers because of the movements made by the camera, which may strike them as pronounced, complex and stylistically distinct. Therefore, in consultation with the cinematographer, the director will decide whether to use a dolly or a Steadicam, based on the film's genre, its tone or mood, or their own personal style.²⁰

Dolly shots mainly consist of six types of movements.²¹ There is the “dolly-in,” where the operator pushes the camera forward; the “dolly-out,” where the operator moves the camera backwards on the tracks; and the “dolly-zoom,” where the shot is achieved by dollying out, then zooming or dollying in, and zooming out. “Dolly tracking,” is “following alongside a subject as they move, usually filming profile to the character.”²² The “double dolly” involves placing both the camera and the subject on a dolly track. Lastly, we have a 360-degree dolly shot, which positions the subject (such as the actor) in the centre of a circular dolly track while the camera moves on the track around it.

Blain Brown states that a dolly is intended to draw the viewers' attention to a specific action. In the same way, a dolly shot can focus the viewers' atten-

tion on a particular object, such as a prop. The dolly is also used to show the location and create depth by revealing the details of a scene's location, which helps the audience to understand the scene.²³

THE ADVANTAGE OF CONSTRUCTING A DOLLY FOR LOW-BUDGET FILM PRODUCTIONS AND EDUCATION

Since the costs of hiring a dolly create a challenge for low-budget film productions, as well as educators on a limited budget, in low-income countries like South Africa, filmmakers have started to create their own dollies that use parts often found around the home or in a building-supply store. This makes it possible for low-budget filmmakers to achieve similar shots to those in big-budget Hollywood productions.

322 | The next part of this chapter offers a guide to building a dolly based on the authors' own experiences of designing and constructing an Eco Dolly in 2013 while acquiring a degree in film and television production at the Tshwane University of Technology, South Africa. In our second year of film school, we constructed the Eco Dolly, which we called D1, to shoot an array of dolly shots for our student films at a minimal cost.

We were aware that there are multiple DIY dolly designs on the market, from basic, intermediate and advanced, to professionally made. Since we were students with limited funds, we opted for a basic, affordable, yet versatile dolly, realising that a dolly can be constructed using a variety of different materials, depending on the budget available. Our experience of building this, and what we have learned subsequently, is what we share in the outline below, also providing possible sources with illustrations of the products to be used.

HOW TO CONSTRUCT AN ECO DOLLY: A MANUAL

1. THE BASE

The first step in building a dolly is to start the process with the base, since it determines the width of the tracks. For this, we used cut-offs from old leftover chipboard. During construction, it is important to ensure the base is perfectly flat and in good condition. Our base was made of a 55 x 43 x 3 cm piece of chipboard. You can make the base wider or narrower but remember that your choice will determine the width of the tracks. The wider the tracks, the larger the curve it needs to turn around objects or to do a 360-degree circle. The narrower the tracks, the smaller the curve or circle it needs to turn, but it has the disadvantage that the smaller the platform the less stable it will be.

2. THE BRACKETS

Next, you need to fix four predrilled galvanised mild steel corner brackets under the base of the board. These should be 5 x 5 x 5 cm or an MiTek EMPB-B Type Bracket with a 90-degree bend in the middle, with a +/- 1.5 cm hole on each side. You must ensure that the distance between each bracket and the one opposite it is the same, to ensure that the wheels fit accurately on the tracks.

| 323

3. THE WHEELS

The next step is to connect two 5 x 3 cm skateboard wheels to the MiTek EMPB-B Type Brackets by fastening them with a series of 1.3 cm bolts, nuts, and metal washers. Due to the lack of resources that we had available, we had to fix the brackets with cable ties at the time. The holes were drilled through the base and the cable ties fastened around each bracket to secure it (figs. 27 and 28).

FIGURE 27

Skateboard wheel, bolt, nut, washers and chipboard background, 6 October 2023.

Photo: Waldo Roodt. ↵



HOW TO CONSTRUCT AN ECO DOLLY: A MANUAL (CONTINUED)

324 |



FIGURE 28

Chipboard base with skateboard wheels, mitek brackets, bolts, nuts, washers, October 6, 2023. Photo: Waldo Roodt. ↗

4. THE TRACKS

The D1 tracks and connectors can be entirely constructed using white Marley Plumbers PVC pipe. The main track sections are 200 x 5 cm PVC pipe, with four 87.5-degree bend connectors on each side.

Two 32 x 5 cm segments of pipe on each end complete the tracks and connect them (figs. 29 and 30).



FIGURE 29

Eco Dolly 1 Top View (all parts), 6 October 2023. Photo: Waldo Roodt. ↗

FIGURE 30
Eco Dolly 1 Front
View (all parts),
6 October 2023.
Photo: Waldo
Roodt. 



The estimated cost of the Eco Dolly is around 800 Rands (approximately €39) if you buy all the parts brand new. But there is the possibility of recycling used material, as we did with the chipboard base. If you source some of your materials second hand, costs can be reduced to as little as 500 Rands (€25), or even less.

| 325

A CRITIQUE OF ECO TROLLEY D1

Some experts would argue that what we designed is more of a slider than a dolly but, with some creative thinking, the tracks can be raised off the ground and the tripod replaced with soft bags or a so-called *Hi hat* or *Low hat*, and the Eco Dolly D1 can also perform as a slider.

Although the D1 is not expensive or complicated to construct, it does have some drawbacks. Transporting the D1's tracks can be difficult in certain situations since the main tracks are almost two metres long. If there is no truck available for carrying the dolly, or if public transport is used, this can cause some problems. Cutting the main tracks into smaller sections would solve this, but then you need to find a way to seamlessly join the sections back together on set, so that there is no unevenness that would cause a bump when the dolly moves over the joint. A common way to join the sections together is to insert and glue a slightly smaller, tight-fitting pipe inside the track on one side of a joint. Scratching the other side of the smaller pipe creates a rough surface, which will make it fit more tightly into the opposite track joint.

The base of our dolly faced a few design challenges. Since the dolly was constructed from a cut-off, the base is too small for a video tripod to be extend-

ed all the way up, as the span of the tripod legs increases as they are extended. There are a few possible solutions for this problem: the dolly can be raised from the ground and other film mounting equipment used to replace the tripod (*Hi hat* or *Low hat*); or a larger secondary base can be placed over the first base to increase its dimensions. We do not recommend increasing the width of the tracks or wheels, as structural stability will then be lost.

The cable ties on the base were an excellent temporary fix, but unfortunately, they are not a good permanent solution for the fixture of the brackets. Since the brackets held with ties are loose, constant movement makes them shift, and this affects the overall performance of the D1. A better solution is to drill two centre holes in the middle of the bracket and fix the bracket directly to the base with two additional bolts and nuts. This avoids any unwanted movement. Alternatively, the holes for the bolts can be drilled through both sides of the bracket towards the bottom.

326 | An additional problem with the D1 is unwanted vibration, since there is no shock mount system. This problem can be counteracted with different types of shock mounts (rubber, metal wire or springs), or by adding gimbals or post-production stabilisation. If needed, all three methods can be applied, which solves the problem completely.

To secure the tripod more effectively, one can also attach a screw-in metal hook to the platform, slightly off-centre, to where the middle of the tripod will be. This can then be used to attach the tripod using thick rubber cords, such as those used to secure luggage on the roof rack of a car.

To eliminate light reflecting off the platform onto the set—or simply to beautify the dolly—you can paint the platform in a dark matt colour, or you can staple a piece of dark carpet over the base. It is also better to use black PVC pipes for the tracks, since that is less noticeable if the dolly accidentally intrudes into the shot.

The D1 might not be perfect, but it gets the job done at a reasonable price. It has to be borne in mind that this design is for the tripod and camera only and would not support the camera operator as well. Constructing a larger dolly that could accommodate the operator would require a second person to push the dolly. However, that does have the advantage that the camera operator could then focus solely on executing the cinematography, instead of having to push the dolly while shooting.

To construct a larger dolly, the same design could be followed, except that the platform should be approximately 20–30 per cent longer and appropriately thicker. It would also need two or four additional sets of wheels, depending on the weight of the operator, and a handle at the back for an assistant to push the dolly. The handle could be made from thinner PVC pipe, or a simple rail made from a round bar or square tubing. An optional extra is a low bar

stool seat, preferably one that can be elevated or lowered, on which the camera operator can sit while filming.

CONCLUSION

The success of the Eco Dolly D1 has meant that we have the possibility of getting a dolly shot for student films as well as independent films that we are working on. This has proved that we do not need a big budget but rather artistic initiative for ways to get the shots we want at the lowest possible cost. Students continue to use the D1 and learn various ways of getting cinematic shots. The explanations help students to understand film movements and when to use them. The disadvantage with the D1 is that it is 1.5 metres long and does not fit into cars unless they are large station wagons. Just as with traditional dollies, transportation becomes a problem. Another disadvantage is that a flat surface is required; however, this can be fixed by using apple boxes, although that increases set-up time. Alternative ways to break down the dolly need to be investigated as this would allow students to travel more frequently with the D1, instead of needing additional transportation. We are in the process of constructing D2, which is raised and sits on a platform, making it level and easier to set up. The diameter of the pipes is much smaller, and it is made of aluminium, which makes it even more lightweight than the PVC pipes. We anticipate that the D2 dolly will provide a better solution for creating moving shots on film, whether for our students or our own independent films.

NOTES

328 |

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| 329

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Rear Projection in Brazilian Silent Movie Theatres

Sobrados, Wet Screens and Alternative Media History

RAFAEL DE LUNA FREIRE

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| 333

ABSTRACT

Although rear projection is best remembered as a special effect of classic Hollywood, it was also a commonly utilised system in Brazilian movie theatres during the silent era. The chapter considers the case study of rear projection to emphasise the importance of space and geography, which have historically received less attention than time and history in early cinema studies and media archaeology. Reevaluating geography involves examining early cinema practices in countries like Brazil, frequently marginalised in research that is focused almost exclusively on the Global North. Highlighting space encompasses the exploration of the significance of the *sobrados* (townhouses) in the adoption of rear projection technology in Brazilian movie theatres.

KEYWORDS

Film history; exhibition; Brazil; film projection; silent cinema; rear projection

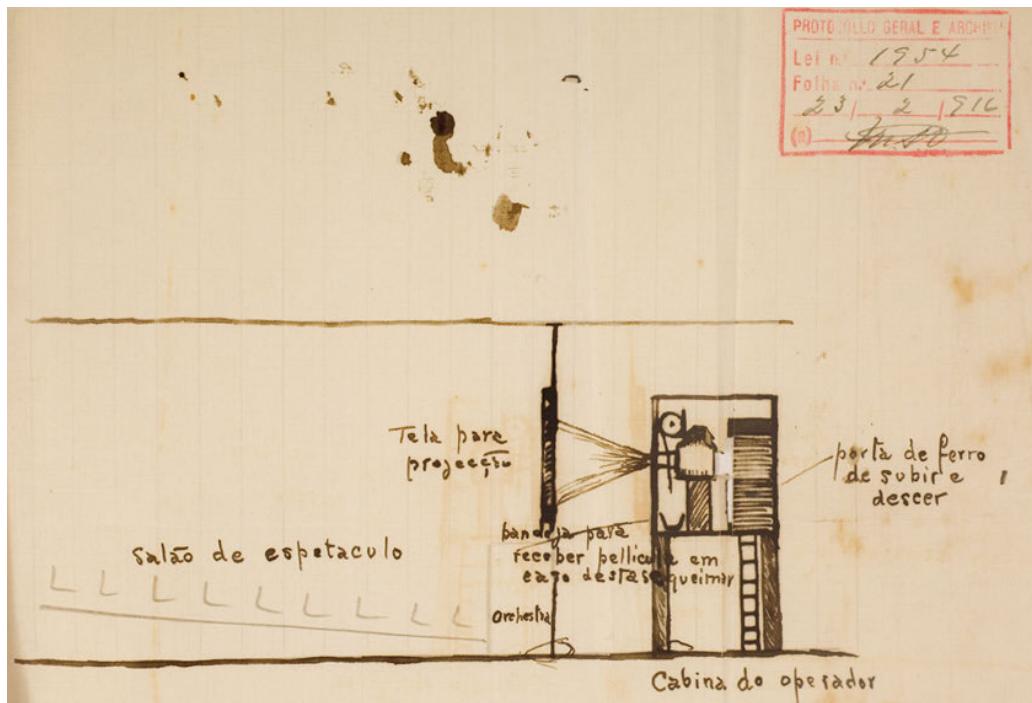


FIGURE 31

Diagram illustrating Bill no. 1,954 of 1916 (São Paulo Historical Archive collection).

REAR PROJECTION

There are two main types of moving image projection systems: frontal projection, in which the projector is facing a reflective screen, with the spectator situated between the two; and rear projection, in which the projector is situated behind a translucent screen, allowing viewers to watch the film projection from the opposite side. Although rear projection is best remembered as a special effect of classic Hollywood, it was also a commonly utilised system in Brazilian movie theatres during the silent era.

| 335

THEORETICAL FRAMING

The chapter utilises the case study of rear projection to emphasise the importance of space and geography, which have historically received less attention than time and history in early cinema studies and media archaeology. Reevaluating geography involves examining early cinema practices in countries like Brazil, frequently marginalised in research that is focused almost exclusively on the Global North. Highlighting space encompasses exploring the significance of the *sobrados* (townhouses) in the adoption of rear projection technology in Brazilian movie theatres.

INTRODUCTION

Rear projection or *la projection par transparence* traces its origins back to the shadow theatre. However, it was the phantasmagorias of late eighteenth-century Europe that popularised this system. Concealing the projection apparatus behind the screen served to heighten the mystery surrounding the fantastic images projected. While phantasmagoria came to denote a form of magic lantern projection for entertainment purposes, the nineteenth century witnessed the dissemination of optical projection presentations rooted in scientific and pedagogical principles. In the early 1860s in the United States, the use of modern electric lanterns and photographic slides, often in support of illustrated lectures, led to the emergence of an alternative term: the stereopticon (referred to as the “optical lantern” in Britain). Charles Musser has discussed whether the stereopticon (which used photographic slides) could be

336 | considered as different from the magic lantern (and its hand-painted slides), just as photography was from painting.¹ I contend that the mode of projection constitutes another crucial difference, as exemplified in an 1881 manual on the utilisation of projection devices. Authored by the French photographer and optician Alfred Molteni, the manual advocated for the use of frontal projection in classrooms and conferences “*où l’effet à produire doit être plutôt scientifique que théâtral*” (where the desired effect should be more scientific than theatrical). Conversely, when the goal was to create an illusion for the audience, rear projection was deemed more appropriate.² The frontal projection system, displaying modern technology to the public gaze, was at odds with the illusionist spectacle that aimed to conceal the mechanisms behind the tricks.

In this sense, it is possible to analyse rear projection and frontal projection as two cultural series that permeate the beginning of moving pictures projections. The concept of a cultural series could be appropriate for the purposes of this discussion, as it was coined by Andre Gaudreault to emphasise the continuities between what historians have been calling early cinema (or kine-attractography, as Gaudreault prefers) and the practices, media and forms that preceded it, before the institutionalisation of cinema as a new media.³ This concept was often used to analyse the “forms of signification” that different early films adopted from photography, music hall, magic sketches, and so on, aligning them with distinct cultural series. However, beyond its application as a tool for textual analysis, Gaudreault and Philippe Gauthier suggest an exploration of two cultural series pertaining to modes of presentation: the cultural series of *conférence-avec-projection* and *projection-avec-boniment*, one with the aim of “educating” through a lecturer, and the other with the aim of “entertaining” the audience with a live commentator.⁴ Yet, these authors did not examine the modes of projection associated with these series.

Considering the modes of projection suggests the existence of cultural series framed in a different way. The first, favouring rear projection, originated in the phantasmagorias associated with illusion and concealment (magic lanterns, painted-slides, dissolving views). In contrast, another series, associated with enlightenment and the displaying of technology (stereopticon, photographic slides, illustrated lectures), leaned towards frontal projection. This suggestion does not imply rigid oppositions, since the illusionist intention could also be maintained by hiding the frontal projection system from the audience's direct view, by enclosing the machine and its operator in a closed booth, for example.

The concept of cultural series chimes with media archaeology in disavowing single chronological evolutionary narratives, while valuing intermedial approaches. However, prevailing analyses using both concepts have still prioritised time over space and history over geography.⁵ This critique extends to the more specialised field of screen archaeology (or screenology, per Erkki Huhtamo's proposal),⁶ which remains under scrutiny. A recent book dedicated to screen genealogy advocates for comprehending screen history not merely as an optical device but also as an environmental medium, "always shaping and shaped by the space in which it was located."⁷ This is a focal concern that I aim to explore in this chapter.

| 337

Nevertheless, despite these valuable theoretical revisions, it is crucial to acknowledge that the diminished focus on space and geography is also a consequence of the entrenched Eurocentrism pervasive in early cinema and media archaeology studies. These disciplines often naturalise the exclusion of territories such as Africa and Latin America from the scope of their universalising analyses. Geography hardly seems an issue when most research is naturally and repeatedly confined to the same territories.⁸

It would be convenient to restrict my analysis to the Global North and frame the divergence between the two cultural series within the traditional rivalry between France and the United States—even more so, given that the first public and paid film projection by the Lumière brothers at the Grand Café purportedly employed rear projection, in contrast to the prevailing belief today.⁹ Conversely, in the United States, the pioneering film projection at Koster and Bial's Music Hall notably utilised frontal projection from the theatre's balcony.¹⁰ Moreover, while North American film historians typically regard rear projection as a technique used only "exceptionally" in movie theatres in the United States during the silent era,¹¹ it is acknowledged that this system was relatively common in French cinemas of the same period.¹² For a revitalised understanding of early cinema history and even media archaeology, however, I would argue that it becomes imperative to contemplate spaces beyond the usual places such as Paris and New York.

REAR PROJECTION IN BRAZIL

Therefore, I aim to delve deeper into the adoption of rear projection within Brazilian movie theatres during the silent era. My focus extends to examining the precise circumstances that prompted its incorporation in the country, not seeing it as an exotic detour or as the local misuse of foreign practices. On the contrary, this outsider example can be particularly illuminating for alternative media histories.¹³ In pursuing this, my aim is less to describe different cultural series that coexisted during the traditional chronology of early cinema, as established according to film histories of the Global North, but to highlight specific practices that existed in understudied places within their own chronologies.

The first indication of the widespread use of rear projection in Brazil was made by researchers Ricardo Mendes and José Inácio de Melo Souza, drawing on documentation found in the Historical Archive of São Paulo.¹⁴ During the first two decades of film projection in Brazil, movie theatre regulations were vague, and inspection was lenient. However, with the enactment of Law No. 1,954 in 1916, the city of São Paulo established more stringent regulations, assigning greater responsibility to engineers for supervising theatres, rather than police officers. The first article of this law established that the projection booth should “always be at the back of the theatre, although it may be at the front when there is a permanent and wide exit to the public street at the back.”¹⁵ Given that most properties housing cinemas in São Paulo had entrances and exits only at the front, the legal requirement implied, in a way, the widespread adoption of rear projection, since the general trend was for the screen to also be located at the back of the room. Positioning the projection booth at the rear reduced the risk of a fire blocking the sole access routes at the front of the building. It is not a mere detail that the process related to Law No. 1,954 was accompanied by a drawing illustrating a rear projection system, showcasing the booth situated behind the translucent screen.

In his research, Mendes found at least 53 instances of rear-projection booths in cinemas in the city of São Paulo between 1910 and 1930, representing a markedly high proportion of the total number of theatres. After scrutinizing blueprints and reports, Mendes concluded: “the rear projection system will be widely employed in the capital until the 1920s, although the law only crystallizes as a norm what already was a local practice.”¹⁶ While Mendes accurately highlighted the law’s role in solidifying rather than mandating the rear projection system that was already widely used before 1916, his assertion that this was a practice specific to São Paulo may contain an oversight. Indeed, rear projection was a practice regularly adopted throughout Brazil, as evidenced by newspaper advertisements, photographs of cinemas, and memorial accounts.

The substantial influence of French cinema on Brazilian film culture until World War I can provide an immediate—and easy—answer to explain the widespread adoption of rear projection, exemplified by the work of Marc Ferrez & Filhos, a pioneering Brazilian film distributor based in Rio de Janeiro.¹⁷ In the company's precious paper collection, there is a catalogue of Gaumont products, for example, which differentiated between two types of screens for sale: “*Pour projections par réflexion*” and “*Pour projections par transparence*.¹⁸

However, another reason can be found by looking even more closely at the *sobrados* (townhouses), which were the predominant urban property type in Brazil and served as the initial abode for numerous pioneering film projection venues. The first large *sobrados* represented a pivotal shift from extensive rural estates to urban developments within the country. Given the gradual growth of Brazilian cities, often constrained by natural features such as the sea, lagoons, rivers and hills, a proliferation of smaller and narrower *sobrados* ensued. Yet these structures expanded vertically, boasting two, three, or even five to six floors. The ground level of many of these *sobrados* accommodated stores, warehouses and workshops, occupying spaces originally dedicated to housing animals and enslaved black people.¹⁹

| 339

In a city such as Rio de Janeiro, the enduring legacy of the colonial land structure persisted even after Brazil's declaration of independence in 1822 and the establishment of the Republic in 1889. This was particularly evident in the older districts, where elongated and slender plots, lacking any setbacks from the street or from neighbouring lots, maintained their colonial characteristics. The renovation of Brazilian architecture during the latter half of the nineteenth century primarily occurred in the construction of newer residences situated in recently settled neighbourhoods or farther away from the city centre.²⁰

SOBRADOS AS FILM VENUES

Perhaps the relatively scant attention given by most Brazilian film historians to the practice of rear projection can be attributed to the inauguration of the country's first and most renowned movie theatres in 1907, along the newly constructed Avenida Central in Rio de Janeiro. Inspired by Haussman's reforms in Paris, a wide, modern and Europeanised boulevard emerged as a central feature of the federal capital between 1904 and 1905. This led to the demolition of hundreds of old *sobrados*, which were replaced by brand-new buildings. On the spacious first floors of these new structures, luxurious cinemas were installed. The Avenida Central cinemas, including the Parisiense (1907), Pathé (1907), Odeon (1909), Kosmos (1910), Avenida (1911), Pathé (1913), Éclair-Palace (1914) and

Palais (1914), were the best known and most profitable in the country until the end of the First World War, and only used frontal projection. The choice of this system can be attributed to the unique characteristics of the plots upon which the new Beaux-Arts style buildings were erected along Avenida Central. These monumental structures required wider lots, resulting in a departure from the traditional narrow city buildings. The new constructions boasted a minimum frontage of ten metres and relatively limited depth, in stark contrast to the traditional *sobrados*, which often measured only three to six metres in width and extended up to 40 metres in depth.²¹

It was in the traditional *sobrados* that had been designated for commercial purposes that the predominant utilisation of rear projection was found. These *sobrados* were usually situated in the oldest central areas of cities such as Rio de Janeiro, Recife, Belém or São Paulo. It is not fortuitous that, in 1919, when there was a cry for the construction of better, larger and specially built

340 |

cinemas in Rio de Janeiro, the film press accused the majority of movie theatres existing in the city, beyond Avenida Central, of being installed in the same kind of outdated properties as popular dry goods stores (*secos e molhados*).²²

According to this frequent type of criticism, most cinemas were adapted to the traditional features of the old *sobrados* and their plots, with minimal investments in renovations or significant architectural alterations. One distinctive feature of traditional *sobrados*, for example, was the presence of internal rooms named alcoves, which, without windows, were traditionally used as bedrooms. Since the mid-nineteenth century, these enclosed spaces faced criticism due to their insufficient light and ventilation, rendering them unsanitary and unhealthy.²³ On the other hand, these dark spaces were easily adapted for film screenings, and indeed were frequently so used.

Obviously, the installation of cinemas in *sobrados* did not inherently entail the adoption of rear projection, but this type of property was more suited to this mode than to frontal projection. In addition to being very narrow, elongated and lacking space separating them from neighbouring buildings, many *sobrados* possessed open space solely at the rear of the plots, remnants of private backyards or gardens not visible from the street; there independent projection booths could be installed separately from the main body of the property.

Apart from the long length of the plot, the *sobrados*' comparatively low ceilings made it more difficult to screen a film from behind and above the audience. But the adoption of rear projection was also driven by safety issues. The projection of nitrate prints in movie theatres located in attached buildings, including residential ones, with access restricted to the front of the buildings, posed a significant fire hazard. Consequently, it was deemed prudent to position the projection booth behind the screen, often in a separate structure at

the rear of the property, distinct from the main structure. This strategic placement distanced the highly flammable nitrate film from the audience physically and symbolically, thereby augmenting safety measures for spectators, as was extensively promoted in newspapers. The wet screen used for rear projection was an additional protection, albeit fragile, against fire.

As highlighted in various contemporary technical manuals, the rear-projection system demanded the continuous wetting of the screen to enhance its transparency. In Brazil, the practice of wetting the screen with water and glycerine was common, either through automatic hose systems or, during intervals in the programme at the most popular cinemas, by little boys hired for the task. In some cinemas, the seats closest to the screen were second class, with cheaper tickets, primarily because these spectators were more susceptible to getting wet; in a sense this brought early cinema closer to the later concept of 4D cinema. Interestingly, the original rationale behind wetting the screen has often been overlooked in the recollections of early cinemagoers, particularly with the subsequent standardisation of frontal projection. But in Brazil, much more than a silver (reflective) screen, early cinema is most often remembered as having a wet (translucid) screen.

| 341

CONCLUSION

The emergence of sound film projection in the late 1920s, coupled with the placement of loudspeakers behind now perforated screens, provided another reason for reducing the use of rear projection in conventional cinemas, where screens had to become “transparent to sound.”²⁴

A heightened focus on the relationship between the screen and its spatial context prompts an examination of situations where rear projection remained recommended. These include religious services, corporate events and wedding ceremonies, where people needed to be able to stand in front of screens without obstructing the projection beam. Rear projection also found continuous and frequent use in portable 16mm or 8mm projectors utilised at fairs, department stores and offices, as well as in trucks equipped with built-in projection systems.²⁵ The more compact rear projection system guaranteed greater mobility for the screen, predating the current ubiquity of digital monitors in public spaces and in various kinds of vehicles. Although the system was less used in movie theatres from the 1930s onwards,²⁶ smaller rear-projected screens became widespread in both public and private spaces, as they offered the advantage of daylight projections. In this sense, thinking in terms of light-emitting and light-reflecting screens, it is possible to reconsider the traditional division between the history of television and cinema before the digital

convergence. In this initial category, cathode ray tube TVs are unsurprisingly similar to translucent screen devices with built-in small-gauge film projectors, often employing mirror systems: all of them are small screens, which are part of relatively big, yet still quite portable, apparatus.²⁷ However, the term “big” applies only when viewed from our contemporary standpoint, in the era of ever-smaller smartphones and progressively slimmer LED screens fashioned to resemble wall-mounted frames. In recent years, light-emitting screens are even returning to movie theatres, with the current trend of booth-less cinemas where the projector machine finds no more space.²⁸ It seems obvious but, both in the past and in the present, projection systems have been diverse and influenced by space and geography. Cinema has never been the same everywhere.

NOTES

- 1 Charles Musser, *Politicking and Emergent Media: US Presidential Elections of the 1890s* (Oakland, CA: University of California Press, 2016), 54.
- 2 A. Molteni, *Instructions pratiques sur l'emploi des appareils de projection: lanternes magiques, fantasmagories, polyoramas, appareils pour l'enseignement*, 2nd. ed. (Paris: F. Aureau, 1881), 165.
- 3 André Gaudreault, *Film and Attraction: From Kinematography to Cinema* (Urbana, IL: University of Illinois Press, 2011).
- 4 André Gaudreault and Philippe Gauthier, “Les séries culturelles de la conférence-avec-projection et de la projection-avec-boniment: continuités et ruptures,” in *Beyond the Screen: Institutions, Networks and Publics of Early Cinema*, eds. Marta Braun, Charlie Keil, Rob King, Paul Moore, and Louis Pelletier (New Barnet, UK: John Libbey Publishing, 2016), 233–238.
- 5 Daniel Morgan, “Introduction: Media Archaeology and the Resources of Film Studies,” *Boundary 2* 49, no. 1 (1 February 2022): 5–23, <https://doi.org/10.1215/01903659-9615375>. | 343
- 6 Erkki Huhtamo, “Elements of Screenology: Toward an Archaeology of the Screen,” *Iconics: International Studies of the Modern Image* 7 (2004): 31–82, <https://doi.org/10.25969/mediarep/1958>.
- 7 Craig Buckley, Rüdiger Campe, and Francesco Casetti, “Introduction,” in *Screen Genealogies: From Optical Device to Environmental Medium*, eds. Craig Buckley, Rüdiger Campe, and Francesco Casetti (Amsterdam: Amsterdam University Press, 2019), 8.
- 8 On the other hand, one can mention the “spatial turn” in New Cinema History, more focused on “new histories of movie exhibition, movie audiences and the social experience of moviegoing” (Jeffrey Klenotic, “Putting Cinema History on the Map: Using GIS to Explore the Spatiality of Cinema,” in *Explorations in New Cinema History: Approaches and Case Studies*, eds. Richard Maltby, Daniel Biltreyest and Philippe Meers. [Malden, MA: Blackwell, 2011], 61–66). However, even New Cinema History has not usually escaped from pervasive Eurocentrism; see Rafael de Luna Freire, “Colegas norteamericanos y europeos: ¿qué no hay de nuevo en la New Cinema History desde un punto de vista que no es el de ustedes?” in *Salas, negocios y públicos de cine en Latinoamérica (1896–1960)*, eds. Clara Kriger and Nicolás Poppe (Buenos Aires: Prometeo, 2023), 19–40.
- 9 Jean-Pierre Sirois-Trahan, “Il y a 125 ans, le Cinématographe Lumière au Salon indien du Grand Café,” *Le Devoir* (31 December 2020), <https://www.ledevoir.com/opinion/idees/592560/il-y-a-125-ans-le-cinematographe-lumiere-au-salon-indien-du-grand-cafe>.
- 10 William Paul, *When Movies Were Theater: Architecture, Exhibition, and the Evolution of American Film* (New York: Columbia University Press, 2016), 40–41.

- 11 Ibid., 89.
- 12 Jean-Jacques Meusy, *Écrans français de l'entre-deux guerres: L'Apogée de l'Art muet*, v.1 (Paris: AFRHC, 2017), 67. See also Jennifer Wild, *The Parisian Avant-Garde in the Age of Cinema: 1900–1923* (Oakland, CA: University of California Press, 2015).
- 13 Laura-Zoë Humphreys, “Utopia in a Package? Digital Media Piracy and the Politics of Entertainment in Cuba,” *Boundary 2* 49, no. 1 (1 February 2022): 231–262, <https://doi.org/10.1215/01903659-9615473>.
- 14 Ricardo Mendes, “Contribuição para a história da tecnologia de projeção da imagem em movimento,” *Informativo Arquivo Histórico de São Paulo* 8, no. 32 (2013); José Inácio de Melo Souza, *Salas de cinema e história urbana de São Paulo (1894–1930): o cinema dos engenheiros* (São Paulo: SENAC, 2016).
- 15 Law no. 1,954, 23 February 1916.
- 16 Mendes, “Contribuição para a história.”
- 17 Rafael de Luna Freire, “‘The Most Important Thing in This Business Is the Films’: Marc Ferrez & Filhos, Exclusive Agent of Pathé Frères and Film Distribution Pioneer in Brazil (1907–1908),” *Film History: An International Journal* 34, no. 3 (2022): 1–22, <https://doi.org/10.2979/filmhistory.34.3.01>.
- 18 Société des Etablissements Gaumont, *Cinématographie* (Paris: Gaumont, 1913), 43. Ferrez family collection, Arquivo Nacional.
- 19 Gilberto Freyre, *Sobrados e mucambos: decadência do patriarcado e desenvolvimento urbano*, 16^a edição (São Paulo: Global, 2006).
- 20 Nestor Goulart Reis Filho, *O quadro da arquitetura no Brasil* (São Paulo: Perspectiva, 2000).
- 21 Sandra Zágari-Cardoso, *Avenida Central: Arquitetura e Tecnologia no Início do Século XX* (Rio de Janeiro: Mestrado em Arquitetura, Universidade Federal do Rio de Janeiro, 2008), 42.
- 22 *Palcos e telas*, Rio de Janeiro, no. 91 (18 December 1919).
- 23 Paula De Paoli, *Entre relíquias e casas velhas: a arquitetura das reformas urbanas de Pereira Passos no Centro do Rio de Janeiro* (Rio de Janeiro: Rio Books, 2013), 139–149.
- 24 Ariel Rogers, *On the Screen: Displaying the Moving Image, 1926–1942* (New York: Columbia University Press, 2019), 63.
- 25 Haidee Wasson, *Everyday Movies: Portability and the Transformation of American Culture* (Oakland, CA: University of California Press, 2021).
- 26 There are some exceptions to this trend in the 1930s, even in the United States, such as the Trans-Lux theatres, which were dedicated to sound newsreels and short films. However, they did not represent “the emergence of rear projection as an exhibition practice in the United States,” as Rogers contended. It is enough to mention the hundreds of venues of the Hale’s tour of the world, starting from 1904, that frequently used rear projection (Rogers, *On the Screen*, 117). See

Raymond Fielding, "Hale's Tours: Ultrarealism in the Pre-1910 Motion Picture," *Cinema Journal* 10, no. 1 (1970): 39.

27 For example, the CanoVision 8 film projector, marketed in 1967, allowed users to watch Super 8 prints in "TV Style."

28 Fernanda Mendes, "Exibidores e fornecedores falam sobre cinema sem cabine," *O Exibidor* (31 October 2017), <https://www.exibidor.com.br/noticias/mercado/7611-exibidores-e-fornecedores-falam-sobre-o-cinema-sem-cabine>.

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346 |

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Empowerment or Digital Colonialism?

Indigenous Virtual Reality in Colombia's Sierra Nevada de Santa Marta

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| 349

ABSTRACT

This chapter examines Virtual Reality (VR) not as a value-neutral medium, but as a device that structures sound, vision, embodiment and agency in ways that reproduce specific cultural, spatial and epistemic logics. Focusing on a co-created immersive media project with the Indigenous Kogi community of the Sierra Nevada de Santa Marta, Colombia, it repositions VR from technological novelty to a situated, ethically grounded practice of relational media-making. The chapter explores how immersive technologies intersect with Indigenous cosmologies, spiritual protocols and media sovereignty, involving both human and non-human agents. It challenges the assumption that self-representation through emerging technologies inherently leads to empowerment, arguing instead for a nuanced, community-led approach that respects sacred boundaries and resists digital colonialism.

KEYWORDS

Indigenous media; media sovereignty; Kogi cosmology; virtual reality; technonimism; co-creation



FIGURE 32
Indigenous film student Carlos Mojica testing.

VIRTUAL REALITY

Virtual Reality (VR) refers to a set of technologies to capture and reproduce immersive environments, experienced primarily through head-mounted displays (HMDs). These environments can be navigated either through pre-recorded spherical video (360° video) or interactive, computer-generated spaces (explorable VR). While early experiments with VR date back to the mid-twentieth century, recent advances in computing power and sensor tracking have rendered the technology increasingly accessible to content creators and audiences alike. Central to VR is the evocation of “presence”—the illusion of being in the projected world. This sense of embodied immersion is what distinguishes VR from traditional two-dimensional media. | 351

THEORETICAL FRAMING

This chapter posits VR not as a value-neutral medium but rather as a device that structures sound and vision, embodiment and agency, in ways that reproduce specific cultural, spatial and epistemic logics. By embedding VR within Indigenous cosmologies, this chapter reorients its potential from technological novelty to a situated, ethically grounded practice of relational media-making. It describes how immersive media, co-created with the Indigenous Kogi community of Colombia, constitutes a reciprocal collaboration involving Indigenous and non-Indigenous media makers as well as spirit beings. It questions the assumption that self-representation of Indigenous communities through novel technologies necessarily leads to empowerment. Instead, it calls for a nuanced approach, driven and controlled by the Indigenous communities.

IMMERSIVE MEDIA AND SACRED WORLDS

“I am in the temple of Taikú. I can touch the sacred mask that was taken from us; it is back where it is supposed to be. But can everyone have access to our sacred spaces?”¹ With these words, Arregocé Conchacala, the leader of the Indigenous Kogi community of northern Colombia, summed up both the potential and risk of our co-creative virtual reality prototype *Masks of the Sierra VR*, which I developed with the help of the Kogi priest Alejandro Nieves. This reveals the dual nature of immersive media: it can empower and restore presence to what was taken, yet it also risks violating sacred boundaries. Its impact depends on who controls the narrative, how cultural protocols are respected, and whether Indigenous cosmologies can be meaningfully integrated.

This collaboration began in early 2020. Following a three-day meeting with Kogi priests and community leaders, I was asked to conduct research into

352 | how two sacred masks were extracted from Indigenous territory in 1915 by the German anthropologist Konrad Theodor Preuss.² At the time, these masks were kept in the storage facilities of the Ethnographic Museum in Berlin. The Kogi priests also requested the production of an audio-visual piece—to be developed in collaboration with a small team of Kogi media makers—that would highlight the spiritual significance of the masks and the necessity of their repatriation. However, the emerging COVID-19 pandemic rendered in-person filming unfeasible. I proposed an alternative: to explore the creation of a virtual reality experience that would convey the same information in an immersive format. Unlike the production of a conventional documentary film, this approach allowed us to proceed with minimal human contact, reducing the risk of viral transmission.

Appropriating Western-based representational technology, such as photography, video or, in this case, VR in an Indigenous context has both benefits and drawbacks that need to be considered. Introducing VR technology could further strengthen the Kogi’s media sovereignty, adding to the existing audio-visual means of expression already adopted by the community, such as video and radio. Media sovereignty, a term coined by Faye Ginsburg, describes the “practices through which people exercise the right and develop the capacity to control their own images and words, including how these circulate.”³ Since the emergence of affordable video technology in the 1980s and 1990s, Indigenous media have become more commonplace, and can be considered a driving factor for the so-called “Indigenous turn,” characterised by a growing acceptance and appreciation of Indigenous knowledge systems.⁴ And there is indeed a growing consensus that we should look more closely at Indigenous knowledge systems as a counter-narrative to traditional Eurocentric views.⁵ As visual anthropologist Jay Ruby provocatively asked, “if anthropologists

want to see the world through native eyes, why don't they simply watch their videos?"⁶

Yet, Indigenous media often raises questions of authorship and ownership.⁷ It therefore becomes relevant to understand who made these videos, how they were made, and how they are unique for exploring the genre. Further implications may arise from introducing cameras and other production equipment to Indigenous communities, as well as providing media training, all with their associated Western narrative and aesthetic conventions. Such interventions by Western-based media makers, activists or anthropologists could potentially be conducive to a loss of "authenticity" through imposed Western techniques and ideas.⁸ Likewise, the assumption that self-representation through emerging technologies equates to empowerment can be considered a Western imposition. As Glen Coulthard argues, the expectation for Indigenous communities to represent themselves to settler audiences is often framed within a politics of recognition that demands that Indigenous communities make themselves legible to the colonial state.⁹ This process, he contends, reinforces settler sovereignty by positioning Indigenous communities as subjects who must continually "explain themselves" to the settler-colonial order. Rather than empowering Indigenous communities, this expectation can reproduce colonial power dynamics by situating Indigenous representation within epistemic frameworks devised by the colonisers. Similarly, Édouard Glissant's notion of the "right to opacity" challenges the assumption that Indigenous cultures and knowledge systems should be made transparent and comprehensible to non-Indigenous audiences.¹⁰ He argues for the ethical imperative of opacity—of preserving the inaccessibility and complexity of cultural knowledge as a form of resistance against colonial epistemologies that demand visibility and legibility.

So, how does our co-creative VR project *Masks of the Sierra VR* fit into this discussion?

IMMERSION, PRESENCE AND MEDIA SOVEREIGNTY

VR technology has now reached a stage where it is both powerful and affordable, increasing its mass appeal. Although most (lucrative) applications focus on immersive videogames, VR has found fertile ground in non-fiction storytelling. It has the capacity to create the illusion of transporting audiences into other worlds—be they imaginary or representations of the real world—through a perceived sense of "presence."¹¹ Here, we should differentiate between 360° video and fully explorable VR experiences. The former is captured with 360° cameras that record in all directions simultaneously. When

reproduced in a VR headset, it enables the audience to move their heads freely within the spherical video, providing three degrees of freedom (3DoF: yaw, pitch and roll). The advantage of 360° video is its ability for audiences to feel immersed in other worlds, while maintaining an indexical relation to real places, people or events. The framing of a 360° video is not pre-defined by the careful composition of a camera operator. Rather, in a process called *post-framing*,¹² the selection of the content areas of a spherical video is intuitively guided by the audience's gaze, limited only by the original positioning of the 360° camera. Despite these affordances that benefit the audience's agency, 360° videos may cause "an improper distance and an ironic mode of moral engagement,"¹³ or be perceived as "intensely voyeuristic."¹⁴ Furthermore, in 360° videos the audience can *see* but not *be seen* by the protagonists, leading to what has been described as the "Swayze effect,"¹⁵ an allusion to the lack of meaningful agency of Patrick Swayze in the film *Ghost*.¹⁶ This is due to the *illusion* of presence, leading to a discrepancy between perception (*I feel present*) and desired agency (*I can only move my head*).

Explorable VR allows for the exploration of three-dimensional spaces that can be interacted with due to the underlying reactive programming. In addition to the aforementioned movements, audiences now enjoy six degrees of freedom (6DoF: yaw, pitch, roll, surge, sway and heave). VR with 6DoF generally feels more natural, as the permitted movements more closely imitate the way we move in the real world. Furthermore, interactions with in-world virtual objects or characters can be programmed to heighten a sense of control over the narrative outcome. However, explorable VR principally relies on computer-generated 3D graphics that lack a direct indexical relationship with the real world.

In both 360° and explorable VR, the viewer-user is central to the experience, with agency emerging through their gaze and movement within the narrative space. This term, *viewer-user*, encapsulates the new levels of agency that drive narrative progression in immersive media.¹⁷ More action is required compared to the relatively passive viewing experience of traditional two-dimensional media, but not at the same level as a user of a computer programme. By donning a virtual reality headset, audiences may experience a sense of immersion that transports them to distant narrative worlds from the comfort of their home. In fact, the heightened sense of presence elicited through immersive media appears to take us one step closer to André Bazin's myth of "Total Cinema," to be able to capture and reproduce "an integral realism, a recreation of the world in its own image, an image unburdened by the freedom of interpretation of the artist or the irreversibility of time."¹⁸

Discussions of Indigenous empowerment through immersive media such as VR are often linked to resistance against dominant settler-state epis-

temes, through which communities assert their right to self-determination and ensure the continuation of ancestral practices.¹⁹ Media sovereignty forms part of wider Indigenous sovereignty projects within these settler states.²⁰ On the surface, VR may align more closely with the holistic ontologies of interconnectedness that characterise many Indigenous knowledge systems than traditional two-dimensional media, as it can provide a more direct and embodied experience.

Yet, as with other Indigenous media, it remains crucial to question whose worldview is reproduced, under what conditions, and for whom. As I have already outlined, the drive for immersive “authenticity” can easily replicate colonial modes of access and consumption, particularly when complex Indigenous ontologies are reproduced through immersive media.

CO-CREATING WITH THE SPIRITS

| 355

To address some of these concerns, *Masks of the Sierra VR*, a 6DoF interactive experience, was designed in close collaboration with Kogi representatives. The prototype included photorealistic models of sacred spaces, such as the main temple of *Taikú*, and natural environments rendered through a combination of photogrammetry (a technique to create photo-realistic 3D models) and 360° video. This helped to convey the intricate relationship between the environment and the spiritual plane in the Kogi’s cosmovision, where every stone, tree or river is inhabited by a spiritual ancestor. The same principle even applies to foreign objects introduced into Kogi territory: each must undergo ritual cleansing and be assigned a spiritual ancestor, forming a bond with the spirit world. Audio-visual media are no exception. To be incorporated into Kogi cosmology, these technologies must be adopted by a spiritual ancestor. The spirit ancestor *Nuñgá* (“The Father of Shiny Things”), who serves as the ancestor of gold and precious stones, is now also connected to audio-visual equipment.²¹

Before beginning any audio-visual project, including our VR prototype, the Kogi invoke *zhigoneshi*: the term that describes collaboration toward a common goal, ensuring that all involved benefit from the process. *Zhigoneshi* is not limited to human actors; it encompasses both the physical world and the spirit world. In *Masks of the Sierra VR*, this collaboration is actualised through a series of explorable virtual environments based on real-world natural environments and a sacred temple with a three-dimensional model of an illicitly extracted mask. As Arregocé Conchacala indicated, the VR device acts—much like real sacred spaces—as a conduit for these human-spirit interactions. As a result, viewer-users of the *Masks of the Sierra VR* prototype may, through their

embodied presence, engage unknowingly with spiritual ancestors embedded in the virtualised sacred spaces and objects.

This convergence of human and non-human agency has been described as “techno-animism,”²² which considers human/non-human cohabitation through technological devices outside Euro-American contexts.²³ The techno-animistic principles of Indigenous VR may lead to a human/non-human cohabitation within virtual spaces, potentially affecting delicate cosmological balances. As the embodied experience of VR differs fundamentally from 2D media, the ancestor of audio-visual media, *Nuñgá*, is not assigned the responsibility for immersive media, so that it requires a new process of spiritual adoption. And this is where new ethical issues arise.

Access to real-world sacred sites and ritual paraphernalia of the Kogi requires a series of initiation rites and ritual offerings to the ancestral spirits. Kogi priests grant or restrict access based on spiritual consultations. *Masks of the Sierra VR*, designed as a single-user experience, currently lacks any form of spiritual preparation—real-world or virtual—for the audience. The virtual reproduction of sacred sites and objects bypasses traditional spiritual gate-keeping, creating a tension between the digital experience and the belief that access to sacred knowledge must be earned through ritual practice.

IMMERSION WITHOUT EXTRACTION?

This concern intensifies as viewer-users experience embodied emplacement within sacred virtual spaces, encountering a story-world that feels less mediated and more immediate. These newfound freedoms, rather than fostering mutual understanding, may risk disrespectful behaviour within sacred sites, potentially commodifying cultural practices. Such shifts may weaken Indigenous media empowerment by limiting their control over representation and agency. Restricting user agency, however, runs counter to VR’s core phenomenological principles of user-centred design. One possible solution is to add multi-user functionality, allowing Kogi priests to act as virtual gatekeepers to sensitive areas or knowledge, and to perform virtual initiation rites. However, Moisés Villafaña, an Indigenous leader of the neighbouring Arhuaco community, cautioned that virtual rituals might risk commodification, too, and should only be performed under careful consideration with Indigenous priests at designated sites within their territory. This reflects Glissant’s statement that “opacity is the force that drives every community.”²⁴ Opacity, in this context, is thus not merely a refusal to assimilate novel technologies such as VR but should be regarded as a relational ethics that preserves difference.

Immersive media operates through complex interrelationships between

the original content creators, the content itself, the audience and, in the case of the Kogi, the unseen spirit world. Ati Gundíwa, the leader of an Indigenous student movement, suggested that VR may be a solution for allowing tourists to explore certain areas of their traditional villages without “contaminating our villages and culture with tourism.” However, as Villafaña suggested, this may risk commodifying Indigenous culture rather than protecting their ancestral knowledge. Ultimately, immersive media’s potential for Indigenous empowerment depends less on its technological affordances than on whether it can be embedded within Indigenous cosmologies, spiritual protocols and sovereignty over self-representation—without reproducing the extractive practices of digital colonialism, where immersive technologies serve external interests rather than Indigenous empowerment.

The two sacred masks at the centre of this collaboration were returned to the Kogi community in 2023.

NOTES

- 1 The statements attributed to Arregocé Conchacala, Alejandro Nieves, Ati Gúndiwa and Moisés Villafañe are based on personal conversations that took place between February 2022 and April 2025, as part of the co-creative development process of *Masks of the Sierra VR*.
- 2 Konrad Theodor Preuss, *Forschungsreise zu den Kágaba* (Vienna: Anthropos, 1926).
- 3 Faye Ginsburg, “Indigenous Media from U-Matic to YouTube: Media Sovereignty in the Digital Age,” *Sociologia & Antropologia* 6, no. 3 (2016): 583.
- 4 Pat Dudgeon and Abigail Bray, “The Indigenous Turn: Epistemic Justice, Indigenous Knowledge Systems, and Social and Emotional Well-Being,” in *Handbook of Critical Whiteness: Deconstructing Dominant Discourses Across Disciplines*, eds. Jioji Ravulo, Katarzyna Olcoń, Tinashe Dune, Alex Workman, and Pranee Liamputpong (Singapore: Springer, 2023), 1–19.
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- 5 Anibal Quijano, “The ‘Indigenous Movement’ and Unresolved Questions in Latin America,” in *Foundational Essays on the Coloniality of Power*, ed. Walter D. Mignolo (Durham, NC: Duke University Press, 2024), 229–255.
- 6 Jay Ruby, “The Moral Burden of Authorship in Ethnographic Film,” *Visual Anthropology Review* 11, no. 2 (1995): 75, <https://doi.org/10.1525/var.1995.11.2.77>.
- 7 Richard Pace, “Embedded Aesthetics and Envisioning Sovereignty,” in *From Filmmaker Warriors to Flash Drive Shamans*, ed. Richard Pace (Nashville, TN: Vanderbilt University Press, 2018), 1–28.
- 8 Terence Turner, “Representation, Politics, and Cultural Imagination in Indigenous Video,” in *Media Worlds: Anthropology on a New Terrain*, eds. Faye D. Ginsburg, Lila Abu-Lughod, and Brian Larkin (Berkeley, CA: University of California Press, 2002), 75–89.
- 9 Glen Sean Coulthard, *Red Skin, White Masks: Rejecting the Colonial Politics of Recognition* (Minneapolis, MN: University of Minnesota Press, 2014).
- 10 Édouard Glissant, *Poetics of Relation*, translated by Betsy Wing (Ann Arbor, MI: University of Michigan Press, 1997).
- 11 Mel Slater, “Place Illusion and Plausibility Can Lead to Realistic Behaviour in Immersive Virtual Environments,” *Philosophical Transactions of the Royal Society B: Biological Sciences* 364, no. 1535 (2009): 3549–3557, <https://doi.org/10.1098/rstb.2009.0138>.
- 12 Jenna Ng, *The Post-Screen through Virtual Reality, Holograms and Light Projections: Where Screen Boundaries Lie* (Amsterdam: Amsterdam University Press, 2021).
- 13 Kate Nash, “Virtual Reality Witness: Exploring the Ethics of Mediated Presence,” *Studies in Documentary Film* 12, no. 2 (2018): 125.
- 14 Mandy Rose, “The Immersive Turn: Hype and Hope in the Emergence of Virtual Reality as a Nonfiction Platform,” *Studies in Documentary Film* 12, no. 2 (2018): 140.

15 Matt Burdette, "The Swayze Effect," *Oculus Story Studio Blog*, 2015, <https://www.oculus.com/story-studio/blog/the-swayze-effect>.

16 *Ghost* (dir. Jerry Zucker, 1990).

17 Andrew Simon Tucker and Miklós Kiss, "Autopoiesis through Agency in Virtual Reality Nonfiction," *Studies in Documentary Film* 17, no. 3 (2023): 285–303.

18 André Bazin, "The Myth of Total Cinema," in *What Is Cinema?* Vol. 1, ed. Hugh Gray (Berkeley, CA: University of California Press, 1967), 22.

19 Jeffrey Sissons, *First Peoples: Indigenous Cultures and Their Futures* (London: Reaktion Books, 2005); Quijano, "The 'Indigenous Movement'."

20 Faye Ginsburg, "Indigenous Media: Faustian Contract or Global Village?" *Cultural Anthropology* 6, no. 1 (1991): 92–112; Ginsburg, "Indigenous Media."

21 Pablo Mora-Calderón, "La tecnología al servicio de la madre naturaleza," *Signo y Pensamiento* 28, no. 54 (2009): 349–452.

22 Anne Allison, *Millennial Monsters: Japanese Toys and the Global Imagination* (Berkeley, CA: University of California Press, 2006).

23 Casper Bruun Jensen and Anders Blok, "Techno-Animism in Japan: Shinto Cosmograms, Actor-Network Theory, and the Enabling Powers of Non-Human Agencies," *Theory, Culture & Society* 30, no. 2 (2013): 84–115.

24 Glissant, *Poetics of Relation*, 189.

| 359

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Sensing Film Archival Data

The Film Catcher

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| 363

ABSTRACT

Analysing the Eye Filmmuseum's permanent installation *The Film Catcher* through the lens of film cataloguing and digital heritage theory, this chapter argues that the installation reflects the confluence of a long-standing wish for multimedia retrieval in film scholarship, and a current turn towards sensory collection access in museology, where leaving behind the written word as a privileged entry point is increasingly seen as affording greater participation, agency and inclusivity. Placing *The Film Catcher* in the context of historical and contemporary debates, the chapter discusses how the installation reflects current sensory heritage approaches to collection access, and the visualisation-driven sense-making of audiovisual archives, while recasting the Filmmuseum's practice of challenging traditional film historical categories.

KEYWORDS

Sensory heritage; film cataloguing; data enrichments; film installation; generous interfaces; digitization



FIGURE 33
The Film Catcher. Photo: Jordi Wallenburg.

THE FILM CATCHER

Eye Filmmuseum's permanent installation *The Film Catcher*, located in the museum's basement area and aimed at a general audience, offers an immersive 360-degree experience for browsing clips from around 1,000 titles preserved in Eye's collection. The walls of the installation room house numerous displays in adjacent vertical frames containing snippets from different films, moving either up or down. Tablets placed around the installation room allow visitors to decide what to show in the individual display in front of them, based on thirty categories created using computer vision, which range from abstract visual categories to the semantically specific. Visitors choose a category by "throwing" a filter from the tablet towards the wall by swiping forward, and may subsequently "catch" a film using the tablet as a pointer. Catching returns a title to the tablet with its archival metadata and the option of full playback. By inviting visitors to browse and explore its collection based on visual categories that are not traditionally included in archival metadata, the installation reflects how a number of audiovisual archives are currently moving in the direction of enriching and affording exploration of collections through multimedia retrieval and sensory data to afford embodied experiences of archival browsing.

| 365

THEORETICAL FRAMING

The Film Catcher is analysed through the lens of film cataloguing and digital heritage theory, speaking from the vantage point of someone who was involved in the research project *The Sensory Moving Image Archive* that preceded and led up to the installation. I argue that *The Film Catcher* reflects the confluence of a long-standing wish for multimedia retrieval in film scholarship and a current turn towards sensory collection access in museology: forsaking the written word as a privileged entry point is increasingly seen as affording greater participation, agency and inclusivity. Placing *The Film Catcher* in the context of historical and contemporary debates, this chapter discusses how the installation reflects current sensory heritage approaches to collection access and the visualisation-driven sense-making of audiovisual archives, while recasting the Filmmuseum's practice of challenging traditional film historical categories.

SENSING FILM ARCHIVAL DATA

When looking at the image of *The Film Catcher* it is at first glance tempting to identify it as a continuation of the previous permanent installation at the Eye Filmmuseum in Amsterdam, *The Panorama* (2012–2022), which it replaced in 2022.¹ The installations share the feature of 360-degree immersion, and offer visitors the ability to control an individual screen area through a selection of categories made available through consoles or tablets. Both also employ sound showers that acoustically delineate individual visitor spaces in a busy auditory setting and, at the core of their interaction, feature an overall playful approach to archival moving image classification. Yet, in spite of these similarities, it is exactly in the latter aspect that the two installations differ significantly, revealing an important change that has occurred in the ten years separating their openings. When taking a closer look, it becomes clear that they offer remarkably different propositions of moving image classification. *The Panorama's* categories—which included *Discovery of the World*, *Film Stars*, *Colour*, *The Netherlands*, *Slapstick*, *Battle* and *Magic*—to some extent reflected classic film historical coordinates, such as a notion of national cinema, themes and genres. Through its selection of clips, it revealed the scope of Eye's then ongoing renegotiation of such categories in curatorial work, found footage filmmaking, remixing and crowd-curation projects.² *The Film Catcher* also includes semantic categories that reflect classic film historical and theoretical areas of interest—*Aviation*, *Dancing*, *Cities* or *Landscape* to name a few—but overall places stronger emphasis on abstract visual categories and simpler semantic entities or motifs at the core of its navigational regime. In particular, colours and shapes, alongside a wide array of objects, body parts or settings are a means for exploring a digitized film collection through sensory, in this case primarily visual, features.³ A significant difference in this regard is that *The Panorama's* categories were put together mainly by curators, whereas the creation of *The Film Catcher's* categories involved computer vision. By involving computer vision in moving image classification, *The Film Catcher* reflects a development that has accelerated in the past ten years towards analysing and presenting collections as datafied entities, and privileging low-level, syntactic data enrichments in collection access. Where does this development come from? How does the way in which *The Film Catcher* affords exploration of such features reflect currently emerging strategies in audiovisual archiving, presentation and digital cultural heritage, and relate to previous projects at Eye?

DATAFYING FILM CLASSIFICATION: FROM TEXT TO AUDIOVISUAL CONCEPTS

In the mid-1970s, institutions belonging to the International Federation of Film Archives (FIAF) increasingly began considering their archival collections as data, by exploring opportunities for computerising film cataloguing. Early initiatives revolved around standardising filmographic metadata in machine-readable formats, at the time centred on the Library of Congress's new MARC formats (MAchine-Readable Cataloguing).⁴ Initially, the computerisation of film cataloguing was enacted on the promise of easing labour-intensive tasks such as metadata creation and exchange, and enabling targeted cross-collection searches between institutions, by creating shared standards aimed primarily at an audience of specialised film historians. Since the 1990s, the primary focus of such discussions has shifted from computerising text descriptions in catalogue records, to computational analysis of audiovisual features in digitized films. This shift of focus is premised on the assumption that such analysis can enable types of classification and browsing more attuned to the properties of audiovisual media. As media theorist Wolfgang Ernst and filmmaker Harun Farocki contended in the early 2000s, citing the work of computer scientists active in the area of multimedia retrieval, “available methods depend on ID’s, keywords, or texts associated with the images. They do not allow queries based directly on the visual properties of images.”⁵ In highlighting this point, they problematised the prevalence of text search and description for audiovisual materials, making a plea for using computer vision to analyse digital archives, to facilitate the creation of an index and history of visual concepts. Special issues and introductory texts on digital scholarship and audiovisual collections have routinely reiterated this point in the past couple of decades. For instance, as Andreas Fickers, Pelle Snickars and Mark Williams wrote in their 2018 introduction to the special issue of the *VIEW* journal on “Audiovisual Data in Digital Humanities”: “DH as a field is still dominated by a focus on textual studies (studies of word culture) that are largely ‘deaf and blind’ in their capacity to search, discover, and study AV materials.”⁶

To the extent that film archives have engaged with computer vision in the past decades, this has happened largely in the context of restoration or digitization workflows that involve automated classification—for instance, to facilitate semi-automated digital repair tasks such as dust removal, or semantic entity recognition for film cataloguing.⁷ In these cases, the intelligibilities afforded by such applications have primarily been embedded in scientific conservation practices’ notions of objecthood and desire for material repair, or in traditional, semantic archival categories.⁸ However, echoing past pleas of AV-oriented digital scholarship, the current turn towards sensory data and interaction

design for collection access argues for alternatives to these regimes of vision. As digital film scholar Daniel Chávez Heras has recently noted, the combined proliferation of computer vision approaches and the ease with which digitized films can now be broken into smaller entities—images or shots—to detect connections independent of traditional categories—year, country, director, etc.—means that “[f]ilm archives can [...] be reconceptualised as datasets, enabling in the process different modalities for the production of meanings.”⁹ Beyond established film archives, a similar tendency can be observed in independent, community-driven video annotation software, which seeks to subvert institutional traditions of archival classification and their underlying power dynamics. The community-driven archiving platform *Pad.ma* (Public Access Digital Media Archive), based on the open-source software pan.do/ra, which enables collective archiving and annotation of collections using a linear timeline view in combination with basic visualisation views, comes with the programmatic corrective from co-founder Shaina Anand that “[h]istorians have merely interpreted the Archive. The Point however is to Feel it.”¹⁰ Such objections to traditional, historically informed archival classification underpin the current turn toward sensory data.

This development dovetails with an increased emphasis on sensory experience in heritage studies and museology, and the emergence of approaches that explore the affordances of analysing, visualising and engaging with collections through sensory data, to challenge conventional catalogue descriptions and textual searches. In these contexts, digital heritage scholar Mitchell Whitelaw’s idea of the “generous interface” has gained widespread traction.¹¹ Premised on the assertion that text-based search in archives limits our horizons to only a small handful of select items expressed in lists, Whitelaw makes the case for visually exploring the material properties of archival items at a large scale as a way to discover new connections. In the context of efforts in museology to challenge conventional display modes, anthropologist David Howes argues that embodied sensory interaction design potentially allows the viewer to break free from a traditional, mid-nineteenth-century idea of “pure spectatorship” dependent on the display convention of “objects in cases and visitors warned to keep their hands off.”¹²

SENSORY ENGAGEMENTS IN *THE FILM CATCHER*

As researcher and designer Nadia Piet notes, regarding audiovisual archives, sensory approaches tend to result in interface “overlays” in web-based projects or physical installations, which complement existing catalogues.¹³ Such approaches seldom become integrated with or replace the latter, and there is

a long way to go before institutional catalogues with a long history can achieve this, especially at large scale.¹⁴ By default, institutions with a long history, such as the Eye Filmmuseum, see their catalogue data turn into “legacy” data that often reflect standards, worldviews, biases or priorities of past times, and for these reasons tend to impede integration with data enrichments.¹⁵ However, the current momentum of data-driven sensory interaction design in audio-visual archives testifies to the extent to which sensory data enrichments are becoming a host for fundamentally renegotiating, reimagining or subverting existing traditions of collection access through experimentation. In many ways, *The Film Catcher* reflects this.

First, the installation is a clear-cut example of a generous interface in the way it offers visitors a visual environment for browsing a digitized subset of its collections. Rather than creating lists based on collection metadata or keywords, it is the choice of a category (colour, body part, activity, object or setting) that changes the view of clips on the screen in front of the visitor. Not unlike those in *The Panorama*, the categories group together examples unrestricted by genre or period, allowing users to observe similarities or patterns across widely divergent films. For example, in the category *Orange*, which comes the closest to invoking a sense of national cinema in the installation, a clip from Joram Lürsen’s family drama *In Oranje* (2004), which revolves around the boy Remco and his dream of playing for the Dutch national team, appears alongside a clip from Joost Rekveld’s experimental #11, *Marey <-> Moiré* (1999). In a similar fashion, the circular shapes of abstract light-plays in Karel Doing’s *Lichtjaren* (1993) is paired with disks and circular objects in feature films in the category *Circle*.

| 369

The concept of a generous interface underpinning *The Film Catcher* stems from two prior research projects: *The Sensory Moving Image Archive* (SEMA, 2017–2020) and *The Movie Mirror* (2018–2019).¹⁶ SEMIA experimented with computational analysis of the low-level features of colour, shape, movement and visual clutter in 103,273 shots from 6,969 open-licence broadcast and film items, made digitally available via the Open Images platform by the Netherlands Institute for Sound and Vision and Eye Filmmuseum. The result was a web-based interface for exploring connections between shots.¹⁷ While not excluding archival metadata, the SEMIA interface hid it as a primary entry point, positioning users in a visual navigational regime that required them to first zoom in on and select a shot through a T-SNE cloud visualisation, and then to toggle between feature spaces, using icon keys in a pop-up video player to navigate between feature spaces and shots. *The Movie Mirror* built on this approach by prototyping an on-site installation for retrieving shots based on body poses. The principles developed in both projects informed *The Film Catcher*’s development, yet only SEMIA’s principle of exploring shot similarity

ties in different feature spaces was retained. *The Film Catcher* also expanded the range of features to include mid- and high-level semantic categories—for instance objects or settings—as part of its concept.¹⁸

The Film Catcher also carries on SEMIA's principle of working with what film scholar and preservationist Adelheid Heftberger terms “non-reductionist” visualisation, which shows groupings or clusterings of full frames ordered into different categories, rather than reducing frames or shots to abstracted data points in a graphic representation.¹⁹ However, the installation is arguably more figurative than SEMIA insofar as its entry point does not start with an overwhelming, distant macro-view of tens of thousands of frames that one needs to grasp before being able to navigate and playback a shot. Instead, it invites users inside on the meso-level: no zooming is needed for clips to be viewable and, through the action of catching, visitors can navigate to the micro-level and explore archival metadata and view shots and films closely.

370 | In this aspect, the installation is typical of “computational sensing,” which facilitates sensory experience through data enrichments and the type of multimedia retrieval that scholars had already called for some twenty years ago.²⁰ Privileging the sense of vision, *The Film Catcher* strips the clips shown of the historical contexts they have hitherto been assigned through cataloguing, opening a space for visitors to experience, reflect and make sense on their own. Again, this aspect of the installation can be taken to carry on one of the SEMIA project's core objectives, namely: “to delay the moment in time when significance is assigned—that is, when the meaning of specific sensory features, or of the relations between them, is determined—but also to place this task in the users' own hands.”²¹ From a classic phenomenological standpoint, the idea of computational sensing may come across as crude insofar as it operationalises sense perception into ground truths for computer vision, and tends to separate senses into different information streams, rather than acknowledging experience as multisensory or multimodal: computer scientists seldom specialise in both image and sound, not to mention senses such as touch or smell. Moreover, it should not be ignored that media studies debates have a longstanding history of scrutinising the very concepts of interactivity and the sensory, paying attention to the sensory hierarchies and types of interactive spectatorship afforded by multimedia configurations.²² However, *The Film Catcher*, and before it SEMIA, does feel congruent with core tenets of classic film phenomenological analysis in the way it propels the museum visitor into a space of sense-making and experience that is not overdetermined by a preset theoretical framework, nor by an impulse to immediately explain or interpret.²³ The interface becomes a proposition for visitors to explore, rather than finding answers or exact matches between items, and in the process to potentially also produce unexpected connections.

Coming back to where we began, *The Panorama* and the Eye Filmmuseum's long-standing ambition to challenge familiar film historical narratives ultimately also resonates in *The Film Catcher*. In a sense, the installation's iteration of a playful approach to moving image classification seems consistent with what was referred to for several years in collection policy documents as "cinematographic appreciation," initially formulated as a way to anchor the valorisation of unidentified films and fragments in subjective experience. As senior curator Mark-Paul Meyer has explained, this approach is "aesthetically-driven, but in a much more naïve and intuitive way," in that it avoids using traditional categories of aesthetic and formal analysis as a "checklist" for determining stylistically significant films.²⁴ *The Film Catcher* can be said to echo this concept in its sensory interaction design, and in how it positions visitors, offering a starting point for sense-making. It amalgamates with a sensory AI-driven approach to (further) challenge text-based search and established film historical categories. While much has happened in the years separating *The Panorama* and *The Film Catcher* in terms of grappling with AI in archival workflows, currently emerging sensory approaches seem to productively broaden the modalities through which we can reimagine moving image classification and collection access, while thinking of ways to reconfigure the historical foundations of film cataloguing.

NOTES

1 For an introduction to *The Panorama*, see Caylin Smith's "Extending the Archival Life of Film: Presenting Film History with Eye Film Institute Netherlands' Panorama," in *Exposing the Film Apparatus: The Film Archive as Research Laboratory*, edited by Giovanna Fossati and Annie van den Oever (Amsterdam: Amsterdam University Press, 2016): 323–332.

2 Grazia Ingravalle, "Remixing Early Cinema: Historical Explorations at the EYE Film Institute Netherlands," *The Moving Image* 15, no. 2 (2015): 93–94.

3 The installation's categories include: *Umbrella, Hand, Green, Portrait, Dance, Eye, Close-Up, Orange, Cycling, Orange, Cycling, Crowd, Landscape, Fire, Animal, Food, Beach, Traffic, Hat, Sport, Concert, Blue, Water, Clock, Circle, Red, Child, Drawing, Flower, Pink/purple, Cityscape, Aviation*.

4 Roger Smither, "Formats and Standards: A Film Archive Perspective on Exchanging Computerized Data." *American Archivist* 50, no. 3 (1987): 324–337.

372 | 5 Flickner et al. cited in Wolfgang Ernst and Harun Farocki, "Towards an Archive for Visual Concepts," in *Harun Farocki: Working the Sight-Lines*, ed. Thomas Elsaesser (Amsterdam: Amsterdam University Press, 2004), 261.

6 Andreas Fickers, Pelle Snickars, and Mark Williams, "Editorial Special Issue Audiovisual Data in Digital Humanities," *VIEW* 7, no. 14 (2018): 1.

7 Giovanna Fossati, *From Grain to Pixel: The Archival Life of Film in Transition* (Amsterdam: Amsterdam University Press: 2018), 276.

8 Salvador Muñoz Viñas, *Contemporary Theory of Conservation* (Oxon: Routledge, 2011), 155.

9 Daniel Chávez Heras, "Cinema and Machine Vision: Artificial Intelligence, Aesthetics and Spectatorship" (Edinburgh: Edinburgh University Press, 2024), 26.

10 Shaina Anand, "10 Theses on the Archive," in *Autonomous Archiving*, ed. Artikişler Collective (Özge Çelikaslan, Alper Şen, Pelin Tan) (Barcelona: dpr-barcelona, 2016), 84. The software's visualisation views comprise "Anti-alias," "Slit-Scan," "Keyframes" and "Waveform."

11 Mitchell Whitelaw, "Generous Interfaces for Digital Cultural Collections," *Digital Humanities Quarterly* 9, no. 1 (2015),
<https://www.digitalhumanities.org/dhq/vol/9/1/000205/000205.html>.

12 David Howes, "Introduction to Sensory Museology," *The Senses and Society* 9, no. 3 (2014): 260.

13 Nadia Piet, *Beyond Search: Exploring Creative Approaches to Interfacing with Cultural Heritage Collections (A Case Study Analysis)* (Hilversum: Netherlands Institute for Sound & Vision), 65.

14 Yuchen Yang, "The Digital Turn of Audiovisual Archives," *Future Cinema Live: Speculations & Theory* (blog), 23 March 2022,
<https://www.futurecinema.live/the-digital-turn-of-audiovisual-archives/>.

15 Johanna Drucker, *The Digital Humanities Coursebook: An Introduction to Digital Methods for Research and Scholarship* (London: Routledge, 2021), 77.

16 These projects involved collaboration between the University of Amsterdam, the Amsterdam University of Applied Sciences, museum installation design studio Studio Louter and the Eye Filmmuseum.

17 For an overview of the various interfaces developed in the project, see https://sensorymovingimagearchive.humanities.uva.nl/index.php/tool_and_prototypes/.

18 For this purpose, *The Film Catcher* built on the SEMIA project by using proprietary Microsoft software Azure AI.

19 Adelheid Heftberger, *Digital Humanities and Film Studies: Visualising Dziga Vertov's Work* (Cham: Springer, 2018), 164.

20 Piet, *Beyond Search*, 39.

21 Eef Masson et al., “Exploring Digitised Moving Image Collections: The SEMIA Project, Visual Analysis and the Turn to Abstraction,” *Digital Humanities Quarterly* | 373 14, no. 4 (2020), <https://www.digitalhumanities.org/dhq/vol/14/4/000497/000497.html>.

22 For an in-depth critical discussion of interactivity in relation to sensory hierarchies, see Marina Hassapopoulou, *Interactive Cinema: The Ambiguous Ethics of Media Participation* (Minneapolis, MN: University of Minnesota Press, 2024).

23 Vivian Sobchack, “Fleshing Out the Image: Phenomenology, Pedagogy, and Derek Jarman’s *Blue*,” in *New Takes in Film-Philosophy*, eds. Havi Carel and Greg Tuck (London: Palgrave Macmillan, 2011), 205.

24 Quoted in Christian Gosvig Olesen, Found Footage Photogénie: An Interview with Elif Rongen-Kaynakçı and Mark-Paul Meyer,” *NECSUS* 2, no. 2 (2013): 557–558.

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374 | Olesen, Christian Gosvig. "Found Footage Photogénie: An Interview with Elif Rongen-Kaynakçı and Mark-Paul Meyer." *NECSUS* 2, no. 2 (2013): 555–562.

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Ancestral Images, Cultural Protocols and the Politics of Digital Storage

Restricted Storage at the National Film and Sound Archive of Australia

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| 377

ABSTRACT

This chapter examines the storage apparatus for culturally restricted images and sounds of Aboriginal cultures, ancestors and lifeways devised by the National Film and Sound Archive of Australia (NFSA), with a focus on the Strehlow Collection. Designed in consultation with Indigenous communities, restricted storage reconfigures archival protocols and infrastructure to reflect Aboriginal understandings of cultural significance and appropriate custodianship of sensitive audiovisual collections. Analysing analogue and digital storage systems, access restrictions, and technical-cultural co-design processes, the chapter positions storage as a site of cross-cultural conservation, where institutional norms are reshaped in response to Indigenous demands for authority, secrecy and control. It proposes a reparative archival model grounded in decentralised authority and ongoing obligations of care within equitable relationships with claimants.

KEYWORDS

Australian Indigenous audiovisual heritage; cultural protocols; digital returns; digitization; restricted storage

STOP

Work on Culturally Sensitive material in progress

Do Not pass this point

Strehlow Project team members ONLY

Report to Audio Services Office or call X2051



FIGURE 34

Door signage at the Digitisation Lab at the NFSA.

A STORAGE APPARATUS FOR ABORIGINAL IMAGES AND SOUNDS

This chapter delineates the storage apparatus—comprising archival infrastructures, practices and protocols—for the preservation of culturally restricted images and sounds pertaining to Australian Indigenous peoples at the National Film and Sound Archive of Australia. Designed in consultation with descendant communities, restricted storage is a key site for institutional efforts to align the stewardship of such sensitive collections with Aboriginal understandings of their cultural significance. | 379

THEORETICAL FRAMING

The discussion builds on Fernando Domínguez Rubio's insight that, far from an "inert [...] repository," storage is a "complex infrastructural apparatus."¹ The storage apparatus or dispositif under consideration encompasses everything from physical cages and compactors to computer servers and archival metadata—alongside the discourses, regulations and administrative procedures that legitimise their use. A site of "cross-cultural conservation," where established institutional norms and standards are challenged and reformatted to accommodate the specific requirements of Indigenous cultural heritage, this apparatus is both contact and conflict zone.² Its operation is complicated by the fact that storage now takes place at the intersection of analogue and digital technologies, and across archival infrastructures and procedures which, like the technical objects they transmit, are themselves "in transition."³ Linking into broader questions of archival restitution and reparation, this chapter argues that restricted storage offers a critical precedent for rethinking the stewardship of sensitive and contested audiovisual collections.

If questions of storage are generally underexamined in the field of heritage studies,⁴ they have acquired greater salience more recently amid intensifying mobilisations for climate justice, restitution and reparations—and in the context of “sustainability” and “decolonisation” policies that heritage institutions have mounted in response. Complementing long-standing debates about the “politics of display,” art historians and heritage scholars are now increasingly turning toward a “politics of storage.”⁵ It is through this critical lens that the present chapter approaches the storage apparatus established to accommodate the Strehlow Collection—a body of ethnographic films and sound recordings relating to the Arrernte people of Central Australia—at the National Film and Sound Archive of Australia (NFSA). To fully understand the workings of this uniquely complex archival dispositif, some historical and cultural context must be laid out first.

380 |

A PARALLEL DISPLACEMENT

The imposing art deco building that now houses the NFSA’s main building in Canberra was purpose-built in 1931 as the Australian Institute of Anatomy, a natural history museum and medical research institute, which until its closure in 1984 held and displayed the skeletal remains of Australian Indigenous people as “scientific specimens.” Between 1929 and 1950, agents in the employ of the Institute’s first director Sir Colin MacKenzie and his successor, Alfred Radcliffe-Brown, amassed the skeletons of around 1,600 individuals, causing “the destruction of burials and grave sites, and serious disturbance of cultural practices.”⁶ Adding insult to injury, the storage conditions in the country’s largest repository of human remains reportedly were an “embarrassment” to curators: “Bodies and tools lay side by side, unsorted, in the basement.”⁷ When writer, filmmaker and poet Romaine Moreton of Goernpil and Bundjalung descent, learning of this history, visited the current site of NFSA to inquire into the cultural and intellectual property of ethnographic recordings held there, she registered the presence of Indigenous Australians as a form of haunting. She became aware of “spiritual unrest,” stemming from “the still living spirits of our people who have yet to be treated right,” as she told the filmmaker Warwick Thornton in a first-hand account of her experience: “To me their voices are really clear.”⁸ Not only is the restitution of these human remains incomplete (after the Institute’s closure, the remains were placed in the charge of the Australian National Museum, where repatriation efforts continue), but the ethnographic images and sounds of Australian Indigenous people still stored in the NFSA vaults suggested to Moreton a “parallel” displacement: “The place that would have housed our remains—the remains of Indigenous peoples—now housed

the representation of us.”⁹

As with the ancestral remains and sacred patrimony of Indigenous Australians, film and sound recordings of ethnographic provenance—what we might call “ancestral images”¹⁰—have more recently also been subject to a process of restitution or “return to country.” Often this takes the form of “digital repatriations,” where cultural heritage institutions make available digital surrogates in gathering places proximate to descendant communities, while the original information carriers remain in remote storage.¹¹ This is the case for the Strehlow Collection, comprising 160 hours of sound recordings in various formats, and hundreds of reels of 16mm film, taken among the Arrernte people of Central Australia by German-Australian anthropologist T. G. H. Strehlow (1908–1978).¹² In agreement with the communities concerned, the NFSA retains physical image carriers along with digital preservation masters, while digital copies can be accessed by interested parties at the Strehlow Research Centre (SRC) in Mpwernte (Alice Springs), in Central Australia.

| 381

The ongoing restitution of ancestral images, then, does not relieve holding institutions of their responsibility but creates new and enduring obligations of care—notably in storage. Anmatyerr men interviewed by anthropologist Jason M. Gibson professed a preference for these materials to be “kept safe” by the holding institution; some of Gibson’s Arrernte interlocutors even suggested that film archivists be issued with official badges identifying them as *Kwertengerl*, an Aboriginal word designating the role of ritual managers and keepers.¹³ Images of ancestors are a special bequest: because of their “direct and spiritual connection to the person photographed,” they are frequently imbued with “significant spiritual and emotional qualities.”¹⁴ Rather than mere *representations*, they are better thought of as *presences* expressive of agency.¹⁵ Most of the images and sounds that make up the Strehlow Collection at the NFSA concern “men’s business,” that is, rituals and other kinds of secret-sacred knowledge restricted to Aboriginal men. Storage of such culturally restricted images is not a technical issue alone but presents secular heritage institutions with unprecedented duties of ritual management and ancestor care.¹⁶

Previous keepers of the collection had acted in contravention of these cultural restrictions. Strehlow himself notoriously sold photographs depicting secret-sacred rituals he knew to be restricted to the German illustrated magazine *Stern*; these were later also published in Australia. After Strehlow’s widow inherited the collection, the idea that a woman was in control of men’s business was as worrying to descendant communities as were rumours of an impending overseas sale. In 1985, when the collection was finally acquired by the Museum and Art Gallery of the Northern Territory (MAGNT), the bulk was transferred to the SRC in Mpwernte, a facility established specifically to support research into

the collection and enable access locally. In 1990, film and sound elements were deposited at the NFSA for safekeeping, under terms defined in a Memorandum of Understanding (MoU) signed by all three parties. Some twenty years later, as many of the film and audio recordings were found to be at imminent risk of deterioration, a second MoU was signed, authorising the NFSA to digitise these materials and return their digital surrogates to the SRC, where access would be governed by Aboriginal Elders. The Central Australian Aboriginal Men's Digitisation Project (2020) resulted in the digitization of 400 reels of film and 1,000 audio recordings, including 800 ceremonial acts and 150 hours of language, stories and songs. It was this project which prompted further community consultation on appropriate storage and preservation of the elements still held in the NFSA vaults in Canberra, deepening extant “cultural safety protocols” through a process of “technical and cultural co-design” with Aboriginal Elders. Supported by Aboriginal Heritage Officers based at the SRC who acted as intermediaries, the consultation ranged across analogue and digital storage procedures and devices. The outcome was a complex archival dispositif, some key elements of which will be outlined in the following.¹⁷

382 |

STORING ANCESTRAL IMAGES

In the NFSA's climate-controlled vaults, all culturally restricted analogue elements are kept in locked cages in dedicated mobile shelving units, separate from other items in the archive. LTO tapes carrying digital preservation copies of these same elements are treated much like their analogue pendants, and kept separately from the rest of the tape library in specialised lockable containers. Additional signage on the compactors and stickers attached to analogue and digital carriers indicate restricted access. Culturally restricted material related to the Strehlow Collection may be sighted and handled by male personnel only. For the digitisation of the collection, two preservation areas at the NFSA were made into temporary restricted spaces. All windows to these digitisation studios were masked out; doors had to remain locked at all times, except to grant passage to specially authorised staff who had signed confidentiality agreements. Gendered restrictions applied across the entire workflow. In addition, each digitisation studio was equipped with dedicated secure storage units to accommodate restricted materials that were outside their regular holding place in the vaults. Physical image and sound carriers had to be concealed in transit.

Shaun Angeles, a researcher at the SRC, was on site to provide ongoing support for NFSA staff, in case they encountered “anything that was upsetting or confronting.”¹⁸ At stake was not only the safety of archivists handling

restricted materials but also that of the ancestors themselves, whose presence in these media raised difficult questions regarding the meaning of digitisation from an Aboriginal point of view. Scanning ancestral images and recoding them into data would dematerialise and diffuse the bounded analogue objects into binary strings on the NFSA's server, where nothing, strictly speaking, would keep them apart. To address concerns over the separation of restricted items from other holdings, it was decided that the digital transmission of such materials via the NFSA server would have to occur outside regular work hours, at a time when there was no other network traffic. As Audio Services Officer Cameron Reese explains, LTO tapes were taken out of their locked containers and manually inserted into the tape robot by specially authorised IT staff. When the data stream passed through the archive's centralised digital asset management tool Mediaflex, only a time stamp was registered to indicate when the data had been transferred; no derivatives or copies were made or added to the central digital library.¹⁹

| 383

Making informed decisions on appropriate storage required the Aboriginal Elders to obtain a granular technical understanding of archival infrastructures and operations that are in a state of constant flux. In physical as in digital storage, to preserve is always also to transform.²⁰ The instability and obsolescence of digital supports necessitates continual data migration—a cyclical, “never-ending process”²¹ whereby data are transferred onto new carriers and formats—as a condition of long-term storage. Archives and cultural memory are always in some sense “dynamic,” but the technological instability and dynamism of digital storage poses particular challenges for the storage and preservation of ancestral and culturally restricted images and sounds. As Fred Myers has pointed out, the new materialities of mechanical and digital reproduction present a marked departure from previous modes for the production and circulation of Aboriginal knowledge “through voice, ritual, and object-presentation.”²² But how these new and evolving technological affordances should be interpreted is far from obvious. What is more, attitudes among Australian Indigenous communities regarding culturally appropriate digital storage and preservation are mutable and plural rather than static and monolithic. To account for the diversity of Aboriginal experience, community consultations regarding the digital avatars of ancestors and surrogates of secret-sacred heritage must proceed on a case-by-case basis; to keep up with changing technological objects and cultures, they must be ongoing.

Encompassing an array of archival spaces, devices and protocols, the storage apparatus delineated in this chapter would be incomplete without a list—an index, catalogue or database—indicating both its contents and their (physical or virtual) location. In the context of Indigenous cultural heritage, such lists and the archival metadata they hold have been subject to sustained

criticism. Following Aboriginal scholar and activist Henrietta Marrie (née Fourmile), the common imposition of non-Indigenous names, concepts and categories amounts to a form of archival capture.²³ In response to such criticisms, heritage institutions that house Indigenous cultural heritage now frequently aim to expand and rewrite archival metadata, whether through the inclusion of Indigenous knowledge labels, community-based annotation, or by naming previously unnamed individuals.²⁴ In Australia, a number of joint initiatives involving museums, archives and communities have led to the development of digital databases that embrace an Indigenous conceptual-cosmological horizon.²⁵

At the NFSA, by contrast, a different approach to data sovereignty has evolved responding to needs of secrecy, separation and control, which aims to circumscribe rather than reform the knowledge retained by the holding institution. In the NFSA's catalogue, culturally restricted images and sounds

384 | from the Strehlow Collection are listed separately from the remainder of the archive's holdings and identified by generic titles only. More detailed knowledge of these materials and their provenance is being created as archivists and community members work through digital surrogates at the SRC. But this knowledge will be managed on site in Mpwernte and not imported back into the NFSA's main catalogue, keeping the holding institution in the dark about the true meaning of the items in storage. As a local access centre that also assumes other archival functions and responsibilities—including the authority to manage storage data—the SRC thus marks a permanent decentralisation of the storage apparatus outlined here, modelling the devolution of core curatorial prerogatives to autonomous “gathering places” on country.

STORAGE AS RELATION

Restricted storage, as Jason M. Gibson explains, “simulates the traditional Aboriginal site where objects were secreted in the bush.”²⁶ At the NFSA, film and sound recordings of culturally restricted Arrernte rituals and knowledges are in effect afforded a status similar to secret-sacred objects or *Tywerreng* held in museum storage. Similar practices have been documented as far back as the 1890s, when an Arrernte man concealed photographic prints of secret-sacred significance in a shallow tin case hidden in a remote location.²⁷ Today, digital image carriers such as DVDs and USB flash drives are sometimes stored in a similar fashion, often alongside other *Tywerreng*. As the experience of the NFSA demonstrates, the simulation of such “sacred storehouses” within the walls of secular heritage institutions poses entirely distinctive challenges without obvious precedent. In conclusion, I wish to draw attention to some

wider implications of the politics of storage at play in this case study, linking into broader questions of archival restitution and reparation.

While the *return* of artefacts may be narrowly conceived as a finite event, *storage* is irreducibly process-like—and virtually without end. Considering the problems of storage thus compels us to think beyond restitution-as-repatriation, and to instead envision restitutive archival practice in a more enduring and encompassing sense, predicated on the establishment of mutual and equitable relationships between heritage institutions and community collaborators in the longer term. This can take many forms: from regular community consultations to a more substantive devolution of archival authority and decentralisation of archival capacity. I have presented restricted storage at the NFSA as an object lesson in the management of sensitive and contested audiovisual collections. But, while the politics of storage surrounding Australian Indigenous audiovisual heritage is highly context-specific, I believe that its insights are relevant far beyond Australia. Temi Odumosu, looking at photographic images of colonial subjects in the Dutch Virgin Islands, has similarly framed these images as “ancestor remains,” thus raising a whole new set of questions about responsibilities of care for images of colonial and ethnographic provenance.²⁸ Heritage institutions that store such “sensitive” audiovisual archivalia should take note, wherever in the world they may be.

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NOTES

1 Fernando Domínguez Rubio, “Storage as a Form of Violence,” *British Art Studies* 19 (2021), <https://britishartstudies.ac.uk/issues/issue-index/issue-19/death-writing-in-the-colonial-museums#006>.

2 See Mary Louise Pratt, “Arts of the Contact Zone,” *Profession* (1991): 33–40; Noémie Étienne, “When Thing Do Talk (In Storage): Materiality and Agency Between Contact and Conflict Zones,” in *The Agency of Display: Objects, Framings and Parerga*, ed. Johannes Grave et al. (Dresden: Sandstein, 2018), 176.

3 For a definitive account of the digital transition in audiovisual archiving, see Giovanna Fossati, *From Grain to Pixel: The Archival Life of Film in Transition* (Amsterdam: Amsterdam University Press, 2018).

4 As the editors of a recent volume on the subject assert; see Mirjam Brusius and Kavita Singh, “Introduction,” in *Museum Storage and Meaning*, ed. Mirjam Brusius and Kavita Singh (London: Routledge, 2018), 1–33.

386 | 5 See, for example, Fernando Domínguez Rubio, *Still Life: Ecologies of the Modern Imagination at the Art Museum* (Chicago, IL: University of Chicago Press, 2020), 147–148; Noémie Etienne, “Esthétique et politique des réserves,” in *Les réserves des musées – Écologies des collections*, eds. Tiziana N. Beltrame and Yaël Kreplak (Dijon: Les presses du réel, 2024); Eunsong Kim, *The Politics of Collecting: Race and the Aestheticization of Property* (Durham, NC: Duke University Press, 2024). Writing about the massive underground storage vaults of the British Museum, author Noah Angell speaks of a “netherworld” where “thousands of items [...] are held as though in purgatory”; Angell, *Ghosts of the British Museum: A True Story of Colonial Loot and Restless Objects* (London: Hachette, 2024), 168.

6 Ann Robb, “Returning Indigenous Cultural Materials,” National Film and Sound Archive of Australia, 2020, <https://www.nfsa.gov.au/latest/returning-indigenous-cultural-materials>.

7 Libby Robin, “Weird and Wonderful: The First Objects of the National Historical Collection,” *reCollections: A Journal of Museums and Collections* 1, no. 2 (2006), https://recollections.nma.gov.au/issues/vol_1_no_2/papers/weird_and_wonderful.

8 See *The Darkside* (dir. Warwick Thornton, 2013), a film gathering ghost stories from different parts of Australia.

9 Ibid.

10 For an instructive discussion of this term, see Christopher Morton, “The Ancestral Image in the Present Tense,” *Photographies* 8, no. 3 (2015): 253–270.

11 Anna Edmundson, in her discussion of “digital repatriations,” argues that, to avoid abuse and co-optation of that term, it should be used to “refer exclusively to the return of born-digital and digitized materials in which full legal control and

copyright is accorded to the community of origin"; Edmundson, "Decolonisation, Indigenisation and Digital Returns: Two Case Studies from Australia," *Museum International* 74, nos. 3–4 (2022): 94.

- 12 The larger collection also comprises field diaries, genealogies, photographs and slides.
- 13 Jason M. Gibson, "Urrempel Men: A Collaborative Interrogation of TGH Strehlow's Collection" (PhD diss., Monash University, 2017), 256; see also Howard Morphy, *Museums, Infinity and the Culture of Protocols: Ethnographic Collections and Source Communities* (New York: Routledge, 2020), 92.
- 14 Morton, "The Ancestral Image," 263.
- 15 In anthropologist Alfred Gell's conception, art in general is agential in this way, rather than simply representational. For a useful discussion of these terms, see Maurizio Peleggi, "The Power of the Copy: Rethinking Replication Through the Cult Image," *The British Journal of Aesthetics* 62, no. 3 (2022): 340.
- 16 For a detailed and informed account of the NFSA's changing policy for the management of Australian Indigenous archivalia, see Ramesh Kumar, "National Film Archives: Policies, Practices, and Histories: A Study of the National Film Archive of India, Eye Film Institute Netherlands, and the National Film and Sound Archive, Australia" (PhD diss., New York University, 2016).
- 17 I am grateful to Cameron Reese, Audio Services Officer, and Tasha James, formerly Indigenous Connections Manager, for generously sharing their knowledge of restricted storage at the NFSA, which informs the description and analysis in this chapter.
- 18 Tasha James, personal communication, 30 October 2024.
- 19 Cameron Rees, personal communication, 7 November 2024.
- 20 In the wider debate on the politics of storage renewed attention has been directed at physical and chemical interventions, from the regulation of temperature and humidity levels to the introduction of poisonous preserving agents, which allows perishable objects to withstand the ravages of time. See Lotte Arndt and Noémie Étienne, "Transforming Conservation: Challenging Hegemonic Models, Broadening the Realm of the Concerned, Changing Practices," *Museums & Social Issues* 17, nos. 1–2 (2024): 1–9.
- 21 Fossati, *From Grain to Pixel*, 91.
- 22 Fred Myers, "Ontologies of the Image and Economies of Exchange," *American Ethnologist* 31, no. 1 (2004): 2.
- 23 Henrietta Fourmile, "Who Owns the Past? Aborigines as Captives of the Archives," *Aboriginal History* 13, no. 1 (1989): 1–8.
- 24 For an example outside of Australia see, for instance, Project Naming by Library and Archives Canada (<https://library-archives.canada.ca/eng/collection/research-help/indigenous-heritage/Pages/project-naming.aspx>).

25 See the Ara Irititja Project (<https://irititja.com/>), Mulka Project (<http://www.mulka.org>), Mukurtu platform (<https://mukurtu.org/>, or OCCAMS (<https://anu.edu.au/occams/>).

26 Jason M. Gibson, “Aboriginal Secret-Sacred Objects, Their Values and Future Prospects,” in *Museums, Societies and the Creation of Value*, eds. Howard Morphy and Robyn McKenzie (New York: Routledge, 2022), 111.

27 Anthropologist Frank Gillen, quoted in Gibson, *Urrempe Men*, 265.

28 See Temi Odumosu, “The Crying Child: On Colonial Archives, Digitization, and Ethics of Care in the Cultural Commons,” *Current Anthropology* 61, no. S22 (2020): S289–302.

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388 |

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https://recollections.nma.gov.au/issues/vol_1_no_2/papers/weird_and_wonderful.

| 389

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