PUBLIC 47

Edited by Dan Adler, Janine Marchessault and Sanja Obradovic

CONTRIBUTORS

Robert S. Allison, Laurie M. Wilcox and Ali Kazimi
Oliver Asselin and Louis Auger Gosselin
Ron Burnett
Owen Chapman and Alison Reiko Loader
Lance Duerfahrd
Sergei Eisenstein
Alla Gadassik
Leon Gurevitch and Miriam Ross
Rebecca Hackemann
Barbara Klinger
Willy Le Maitre
Naomi Salaman and Maria Westersthal
David Harris Smith
Nicholas J. Wade
Haidee Wasson
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Kenneth White
Ray Zone

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Column by Ian Balfour
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3D CINEMA AND BEYOND

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EDITED BY
DAN ADLER, JANINE MARCHESSAULT AND SANJA OBRADOVIC

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303 Goldfarb Centre for Fine Arts
York University, 4700 Keele St
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public@yorku.ca
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custserv@turpin-distribution.com

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For Ray Zone (1947 – 2012)

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CONTRIBUTORS

DAN ADLER is an Associate Professor of Modern and Contemporary Art at York University. He is the author of *Hanne Darboven: Cultural History 1880-1983* (Afterall Books/MIT Press, 2009) and co-editor of *German Art History and Scientific Thought: Beyond Formalism* (Ashgate Press, 2012). A former senior editor of the *Bibliography of the History of Art* at the Getty Research Institute in Los Angeles, he has published in the journal *Art History* and regularly contributes reviews to *Artforum* and *C Magazine*. He is currently working on a book manuscript on the aesthetics of contemporary sculpture.

ROBERT S. ALLISON is Associate Professor of Computer Science and Engineering at York University. He works on the perception of space and self-motion in virtual environments, the measurement and analysis of eye-movements, and stereoscopic vision. His research investigates how we can reconstruct and navigate the three-dimensional world around us from the two-dimensional images on the retinas.

OLIVIER ASSELIN is Associate Professor in the Department of Art History and Film Studies at the Université de Montréal. Recently, he has co-edited *Precarious Visualities: New Perspectives on Identification in Contemporary Art and Visual Culture* (McGill-Queen's University Press, 2008) and *The Electric Age* (University of Ottawa Press, 2011). He has made several films, among which *La liberté d'une statue* and *Un capitalisme sentimental*, and he is currently working on an interactive film involving both S3D and AR.

RON BURNETT RCA is the President and Vice-Chancellor of Emily Carr University of Art and Design in Vancouver. He is the author of over of 150 essays and articles in books and journals. He was the editor-in-chief and founder of *Ciné-Tracts Magazine*. He is also a photographer, videomaker, and filmmaker. In 2010, he received a knighthood from the French Government, Chevalier de l'ordre des arts et des lettres. Prior to coming to Emily Carr, he was the Director of the Graduate Program in Communications at McGill University.

OWEN CHAPMAN is an audio artist whose work involves sample-based music, mobile phones, contact microphones, and old electronic instruments. He is co-director of the Montreal wing of the Mobile Media Lab, located in the Communication Studies department at Concordia University, where he is also an Associate Professor in Sound Production and Scholarship.

LANCE DUERFAHRD received his Ph.D. from Yale University and is an Assistant Professor of Film at Purdue University. He is the author of *The Work of Poverty: Samuel Beckett's Vagabonds and the Theater of Crisis* (The Ohio State University Press, October, 2013). He has written recently on actor Klaus Kinski (*Blackwell Companion to Werner Herzog*, 2012) and on the BP oil spill video (*Imaginations Journal*, September, 2012). He has appeared on the CBC, BBC, and NPR to discuss his work on bad film.

SERGEI EISENSTEIN was a pioneering Soviet Russian film director and film theorist, often considered to be the "Father of Montage." He is noted in particular for his films *Strike* (1924), *Battleship Potemkin* (1925), *October* (1927), *Alexander Nevsky* (1938), and *Ivan the Terrible* (1944, 1958).

LOUIS AUGER GOSSELIN completed his M.A. in film studies at the Université de Montréal. His research interests center on 3D cinema, IMAX 3D and the way both of these mediums position the spectator. He now works as an education writer for an e-learning business.

ALLA GADASSIK is a Ph.D. candidate in the department of Radio/TV/Film at Northwestern University. Her research examines the encounters between filmmakers and their technology in early cinema and digital media practice. She recently published work in the *Quarterly Review of Film and Video* and the award-winning collection *Popular Ghosts: The Haunted Spaces of Everyday Culture* (Continuum, 2010). She also makes short experimental films and works on collaborative digital media projects.

LEON GUREVITCH is Director of the Culture & Context Programme, Royal Society (NZ) Research Scholar and Senior Lecturer at Victoria University of Wellington's School of Design. He has published his work in *The Journal of Television and New Media, Senses of Cinema, The New Zealand Journal of Media Studies, The Journal of Popular Narrative Media*. He has published "The Birth of a Stereoscopic Nation" in *Animation Journal* and "The Stereoscopic Attraction: 3D Imaging and the Spectacular Paradigm" in *Convergence Journal* is forthcoming. He is also co-founder and administrator of Stereoscopicmedia.org.

ALI KAZIMI is a filmmaker, author, and visual artist. His documentaries include *Dissent* (2001), *Continuous Journey* (2004), *Runaway Grooms* (2006), and *Rex versus Singh* (2009). They have been shown at festivals around the world, winning more than 30 national and international awards and a host of nominations. He has been recognized as innovator in stereoscopic 3D cinema in Canada, and is the recipient of the Canada Foundation for Innovation grant to set up the *Stereoscopic 3D Studio@York*. His research in S3D filmmaking has been ongoing since 2009 as lead filmmaker in 3D FLIC (3D Film Innovation Consortium) an academic/industry partnership. In 2010, he made one of the first stereoscopic 3D short dramas in Canada.

BARBARA KLINGER is President-Elect of the Society for Cinema and Media Studies and Professor of Film and Media Studies in the Department of Communication and Culture at Indiana University in Bloomington. She teaches and writes on cinema and new media, fan and reception studies, and film and media history and historiography. She is author of *Melodrama and Meaning: History, Culture, and the Films of Douglas Sirk* (Indiana University Press, 1994) and *Beyond the Multiplex: Cinema, New Technologies, and the Home* (University of California Press, 2006). She has also published numerous anthology essays and articles in journals, including *Film Quarterly*, *Screen*, and *Cinema Journal*.

ALISON REIKO LOADER has taught in Fine Arts at Concordia University since 2001, and recently began a Ph.D. in Communication Studies. A lapsed NFB filmmaker that specializes in 3D and digital animation, she applies old media technologies such as stereoscopy, anamorphosis, and the camera obscura to making films and installations featuring manipulated moving images.

JANINE MARCHESSAULT is the Director of Sensorium, Centre for Digital Arts and Technology at York University. She is the author of *McLuhan: Cosmic Media* (Sage, 2005), co-editor of *Fluid Screens, Expanded Cinema* (University of Toronto Press, 2007) and *Cartographies of Place: Navigating the Urban* (McGill-Queen's University Press, 2014). Books in preparation include *Total Cinema – Expo 67* (with Monika Kin Gagnon) and *Ecstatic World: Media, Humanism, Ecology*. She is a member of the 3D Film Innovation Consortium (3D FLIC). She received the prestigious Trudeau Award to support her research and curatorial practices in the area of public art and civic cultures.

SANJA OBRADOVIC is a Ph.D. candidate (ABD) in the Joint Program in Communication and Culture at York and Ryerson Universities in Toronto. Her current research explores transnational histories of stereoscopic 3D cinema, with specific focus on Canada and the Soviet Union.

MIRIAM ROSS is Lecturer in the Film Programme at Victoria University of Wellington. She has published extensively, including her recent book, *South American Cinematic Culture: Policy, Production, Distribution and Exhibition* (2010). Her research on 3D media began in 2009 and has a strong focus on the global spread of 3D cinema. She has published "Spectacular Dimensions: 3D Dance Films" in *Senses of Cinema* and her article "The 3D Aesthetic: Avatar and Hyper-Haptic Visuality" is forthcoming in *Screen*. She is also co-founder and administrator of Stereoscopic media.org.

DAVID HARRIS SMITH is Assistant Professor in the Department of Communication Studies and Multimedia at McMaster University. His research interests include film and new media cultures, visual culture, and virtual worlds.

NICHOLAS J. WADE received a degree in psychology from the University of Edinburgh, his Ph.D. from Monash University, and completed a postdoctoral fellowship from the Alexander von Humboldt Stiftung at the Max-Planck-Institute for Behavioural Physiology. His subsequent academic career has been at Dundee University, where he is now Emeritus Professor. His recent books include *Purkinje's Vision: The Dawning of Neuroscience* (2001), *Perception and Illusion. Historical Perspectives* (2005), *Circles: Science, Sense and Symbol* (2007), and *Visual Perception: An Introduction*, 3rd Ed (2012). neuroportraits.eu & www.opprints.co.uk

HAIDEE WASSON is Associate Professor of Cinema at the Mel Hoppenheim School of Cinema, and Associate Dean of Research, Fine Arts, Concordia University. She has published widely on film and cultural history. She is an award-winning author and editor of such books as *Museum Movies* (University of California Press, 2005), *Inventing Film Studies* (Duke University, Press, 2008) and *Useful Cinema* (Duke University, Press, 2011). She is currently writing a history of portable film projectors.

WIM WENDERS is an internationally renowned filmmaker whose work includes *Paris, Texas* (1984), *Wings of Desire* (1987), and the Cuban music documentary *Buena Vista Social Club* (1999). His documentary *Pina* (2011) is a 3D dance film tribute to the legendary German contemporary dancer and choreographer Pina Bausch.

KENNETH WHITE is a Ph.D. candidate in the Department of Art & Art History at Stanford University. He guest-edited *Millennium Film Journal* #54 (Fall 2011): Focus on Carolee Schneemann.

LAURIE M. WILCOX is a Professor of Psychology, and member of the Centre for Vision Research at York University. In addition to basic research on stereoscopic depth perception, she is actively involved in understanding factors that influence viewer depth perception, comfort and satisfaction when watching S3D media. She is one of the founding members of the 3D Film and Innovation Consortium (3D FLIC) and her research has been supported NSERC, the Ontario Centres of Excellence, and most recently through a New Media Initiative (partnership between NSERC and Canada Council of the Arts).

RAY ZONE was an award-winning 3D artist, speaker, and film producer. His books include *3-DIY: Stereoscopic Moviemaking on an Indie Budget* (Focal Press, 2012) and *3-D Revolution: the History of Modern Stereoscopic Cinema* (University Press of Kentucky, 2012).

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English: Description: Audience wearing special glasses watch a 3D "stereoscopic film" at the Telekinema on the South Bank in London during the Festival of Britain

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INTRODUCTION

3D CINEMA AND BEYOND

DAN ADLER, JANINE MARCHESSAULT AND SANJA OBRADOVIC

THIS COLLECTION OF ESSAYS and artist portfolios stems from the Toronto International Stereoscopic 3D Conference, organized by researchers from the 3D Film Innovation Consortium (3D FLIC) at York University, which took place 14-17 June 2011 at the TIFF Bell Lightbox in Toronto[1]. At this event, film producers, industry practitioners, film theorists, scientists, and historians of 3D presented scholarship, new stereoscopic movie productions, and independent art. The conference was a stimulating venue for the exchange of divergent and diverse ideas and methodological approaches. The participants repeatedly called for further vigorous and sustained study of 3D. The present volume reflects this intellectual and creative energy, and this need. We are delighted to include several contributions that originated from the conference, including the landmark keynote address delivered by Wim Wenders about the future of this medium. The collection also includes new scholarship and aesthetic experimentation in the field, which are meant to increase the volume's depth and range.

In recent years, there has been an extraordinary revival of interest in 3D imagery, both among scholars and practitioners of visual media. This revival is often associated with a drive toward the technological development of Hollywood film. This issue of *PUBLIC* devoted to "3D cinema and beyond," brings together essays and portfolios that engage with mainstream entertainment as part of a larger context for examining this visual medium. From cinema and television to video games and augmented realities, the essays consider an "expanded field" of stereoscopic visual culture—one that is inclusive of phenomena outside of the conventional canons of film, and one that draws connections between present-day tendencies and 3D's complex historical roots. Contributors to this issue explore a richly varied array of technological topics, historic instances, artistic strategies, and perceptual qualities of 3D media. Despite this diversity of approaches and topics, the authors share the assumption that we are studying the tendencies of a distinct visual medium, one with specific constraints, technical and semantic problems, and histories that are worthy of study in themselves, rather than merely a supplement to the study of 2D visual culture. Of course, it is both beneficial and productive to challenge any notion of medium-specificity, as well as to consider ramifications of treating 3D as a unified medium, as many of our contributors heartily demonstrate, by stretching and sometimes breaking conventions, moving beyond a single material (such as film stock) or cultural context.

Indeed this volume includes debates that aim to move beyond the recent discussions of 3D phenomena, which tend to focus on technical aspects at the expense of detailed discussion of meaning.

As stereoscopic technology becomes far more available, diverse, and widespread, there is an urgent need to develop new interpretive concepts and grammars—and to revisit and revise older theoretical notions. This is facilitating a critical language of aesthetic interpretation that is enabling comparative analyses between avant-garde and popular practitioners, or between pioneering 3D cinema figures drawn from remarkably different places and times, from Sergei Eisenstein, Edward Muybridge, and Wim Wenders, to Colin Low and James Cameron. Making such varied connections leads to a more critical understanding of the field, and may allow for qualitative judgements about the importance and relevance of stereoscopic visual culture, both past and present.

3D Cinema and Beyond is divided into three sections: 1) Excavating 3D Cinema's Past, 2) Visual Regimes of 3D Cinema, and 3) Poetics and Politics of 3D Space. We open the volume with Sergei Eisenstein's extraordinary 1947 essay "O Stereokino" ("On Stereocinema"), which has never been translated into English in its entirety. This key theoretical text has served for over half a century as a springboard for thinking and writing about 3D cinema. The time was right to commission a full English translation of the original text in the hopes of better contextualizing and further understanding Eisenstein's insights. We are infinitely thankful to Mr. Naum Kleiman and the staff at the Eisenstein Museum in Moscow for their valuable assistance in obtaining the last version of his essay.[2] We are also grateful to Sergey Levchin for his meticulous and scholarly work on the translation. "On Stereocinema" is one of the last essays that Eiseinstein wrote before his untimely death; these are his last words on cinema, and he had not a doubt that stereocinema was the future of cinema and of art. He asks, are we "not clamouring for artistic expression of wholly new, never-before-seen forms and dimensions, far beyond the limits of the palliatives proffered by traditional theatre, traditional sculpture, traditional... cinema?" Like Wenders' 3D manifesto in this issue, Eisenstein beseeches artists: "We must make room in our minds for new themes, consistent with and enhanced by technological advances, which will require a new aesthetic to incarnate them in the astonishing artworks of the future." Eisenstein's focus is largely on a history of spatial aesthetics in both theatre and cinema, and this detailed analysis—and his consideration of performed and phenomenological experiences of space—offers scholars and artists a unique comparative framework for what was in 1948 and continues to be today: an emerging art form.

Focusing on the fascinating case of Charles Wheatstone, Nicholas J. Wade demonstrates the relevance of the early experimental development of moving stereoscopic imagery. Wade situates Wheatstone's ingenious work as a proposal for how motion and depth could be combined, also showing how he was in close dialogue with many of those who made further key innovations with this technology. Wade offers a complex treatment of a deceptively simple premise—simulating motion from a sequence of briefly presented but slightly different pictures—while addressing a series of technical challenges, limitations, and breakthroughs within Wheatstone's experimental practice. Wade's treatment teases out nuances that are often surprisingly suggestive and insightful for the interpretation of subsequent and present-day stereoscopic practice.

Leon Gurevitch and Miriam Ross provide an intricate view of stereoscopic media history, beyond the simplistic determinism focused solely on cyclical busts and booms of commercial 3D films. In order to step away from narratives of the repeated decline of 3D, the authors propose to treat stereoscopy as a technique applicable to multiple media and not as a single unified medium. With that approach, Gurevitch and Ross point to the continual presence of stereoscopic imaging practices within diverse contexts over the past two centuries—including stereo photographs and postcards, stereopticon (Magic Lantern) slides, View-Master stereocards, 3D and IMAX 3D films, stereo-television and 3D video games—outlining varying technological and commercial factors shaping their existence within given moments in history. Even more importantly, their essay foregrounds the crucial role of popular imagination as an impetus for stereoscopy's persistence in contemporary visual culture.

In keeping with the central goals of this volume, Ray Zone lays the cursory groundwork for an "expanded field" history of stereoscopic visual culture, beyond the confines of film. This account incorporates a varied array of technologies and artistic strategies which make use of the third dimension. Zone stages a speculative dialogue between avant-garde figures usually identified with the world of fine art—most notably Surrealists and Dadaists such as Marcel Duchamp—and other practitioners drawn from past and present, including Oskar Fischinger, Norman McLaren, and Hy Hirsch. Treating them all as contributors to a single aesthetic tradition, Zone highlights certain forms of abstraction, created specifically for the third dimension, which liberate stereography from its conventional model, tied to the illusionistic replication of the "real world." Zone offers another criterion for inclusion in this relatively inclusive tradition: an openness to technological innovation and unique display formats, designed to provoke particularly performative viewing experiences.

Kenneth White provides a probing, revisionist account of Eadweard Muybridge's formative experiments with stereoscopic imagery, focusing on works that have not been treated in detail. Against the backdrop of American industrial history, White's analyses of two stereographs, including one featuring David Stoddart's vertical steam pumps, is remarkable in its drawing of connections between Muybridge's patented photographic inventions and Stoddart's new technology—which both strive to represent the solidification of gaseous matter. In addition to key contextual information, White provides poignant, and at times quite poetic, discussion of Muybridge's neglected works, dealing with their depiction of translucent mists, which appear to morph into modeled forms of almost touchable mass. White's formally nuanced treatment is instructive for others who wish to revisit canonical cinema figures, like Muybridge, with fresh eyes.

Owen Chapman and Alison Reiko Loader closely examine Laurens Hammond's 1920s patents and contributions to stereoscopic technology, specifically the inventions of Teleview—a system for theatrical exhibition of 3D films outfitted with shutter-view pieces—and Shadowgraph, live-shadow performances viewed stereoscopically through Teleview. Chapman and Loader read the history of the invention and novelty of stereoscopic moving images in relation to the commercial failure of Hammond's dead-end inventions. They avoid restricting their analysis to another case of either technological or economic limitations of the medium. Instead, they situate Hammond's stereoscopic inventions within the enmeshed domains of the early cinema attractions and vaudeville performances which preceded Teleview, each with their own set of visual clichés that informed audiences' assumptions about the quality of erotic content on display.

Haidee Wasson looks at the emergence of new cinematic technologies as they were tied to the car industry in the 1930s. She argues that this industry relied on film, and a variety of paracinematic technologies emerged in that decade as means to market its automobility. A new genre emerged during this period in the US and was featured at the 1939 New York World's Fair: the "car film," with the recurring theme of a "magical automobile with powers of self-construction and the ability to morph from one thing to another." Car manufacturers during this period could boast the most concentrated industrial film production facilities in the US (outside of Hollywood). Such films

were also tied to new forms of display, made possible by small gauge projectors and portable screens, allowing cinema to operate beyond the conventional context of the movie house, and produce alternative kinds of multi-dimensional experiences, such as the drive-in theatre. This culture of innovation led to Chrysler Motor Company's spectacular and popular exhibit at the World's Fair: the 3D film *In Tune with Tomorrow*.

Section Two of the volume brings together critical examinations of visual regimes of 3D moving images. Robert S. Allison, Laurie M. Wilcox, and Ali Kazimi offer a broad survey account of the evolution of stereoscopic film practices, while advancing arguments about the distinctness of 3D as an artistic medium, rather than as an enhancement to 2D. Offering a balanced and lucid discussion that combines technological and historical developments—including problems associated with perceptual phenomena such as stereopsis and crosstalk—the argument focuses on filmmakers' changing approaches to the specific technological challenges of representing the impression of depth and scale. Key stereoscopic practitioners of the past, they contend, have met these challenges with an eye toward discouraging viewer discomfort and enhancing the potential for narrative and emotional enhancements that are unique to 3D. Building on this historical foundation, the authors address recent works—some of which are the focus of essays in this volume—that are technically innovative, as a means of planting seeds for further study, by artists and scholars.

David Harris Smith's study of *Transitions* (1986)—the first IMAX 3D live-action film produced for Vancouver Expo—examines the project of visionary Canadian filmmaker Colin Low. Smith characterizes Low's work with stereoscopic technology as a quest to erase the distance between the viewer and the image, uniting them through the experience of synthetic immersion in a large, moving stereoscopic picture. Smith argues that this achievement exceeds the ideals of total cinema, as outlined by André Bazin, offering instead a distinctive coupling of humanist ideals and a spectacular cinematic apparatus. The author further situates Low's stereoscopic work as a response to the joint nationalistic mandates of the National Film Board of Canada and the Canadian National Railway: to shape and unite Canada. This first IMAX 3D film fulfilled this ideological mandate, through both its technological and aesthetic innovations.

Lance Duerfahrd offers a close reading of Alf Silliman's famous 3D soft-core feature *The Stewardesses* (1969), while drawing on the idea of unobtainable objects of desire. In analyzing the complex, multi-layered relationship between the stereoscopic image and pornography, the author argues that both porn and 3D share the same goal: to transform, not merely replicate or enhance, our experience of the world. Duerfahrd uses the case study of *The Stewardesses* to support a larger argument, about how 3D cinema may disintegrate the space between audience and screen by reducing the distance between the two. With the use of negative parallax, the enchantment with the cinematic image is disrupted, so that it no longer operates on a separate plane from viewers. Duerfahrd's inspiring work points toward the necessity for further analysis of 3D pornographic imagery, both as specialized visual regimes and as features within our own culture of desire.

Asselin and Gosselin provide us with the most future-oriented essay in the collection, by considering the interface between stereoscopic 3D cinema and AR media. Refining the grammar of immersion, the authors differentiate between "the *exocentric* displays, which leave the user outside the represented world, and the *egocentric* displays, which give users the impression they are immersed in the represented world." This distinction allows them to consider new modalities of immersion which render a reproduced experience of perception, rather than the reproduction of perceived objects. The essay goes on to explore the possibilities for narrative worlds in terms of experiences that bring images closer to the user—in immersive ways that differ from those supplied by the monumental screens which have characterized earlier forms of 3D cinema. Moreover, the tension between virtual worlds and real material environments represents a challenge for the next generation of technology: contact lenses and retinal displays. The authors introduce us to the possibility of "neuronal cinema and the utopian screenless imaging system involving a direct synaptic interface," a fully integrated, mixed-reality environment that stereoscopic cinema has helped to inaugurate.

Essays in the final section focus on the poetics and politics of 3D space, beginning with Wenders' landmark keynote presentation at the 2011 Toronto International Stereoscopic Conference. Wenders opens with a series of questions about 3D cinema: "What sort of film can fit the new technology? How can you fill the promise of the new language? What 'product' (for lack of a better word) do you have to come up with to do justice to this challenge named 3D?!" Wenders recounts the experience of making his film *Pina 3D* (2011), a documentary on the renowned German choreographer Pina Bausch whose dance works, Wenders discovered, could only be filmed in 3D. As is well known, Bausch passed away during the film's production and *Pina* incorporates this loss into an aesthetic of presence as he interviews each member of the Tanztheater dance company. While making the work, Wenders discovered a characteristic of 3D film: "3D has a totally unexplored affinity to…reality." Wenders' contribution is a moving speech by one of the world's most inventive filmmakers. Recalling Eisenstein's reflection on stereocinema, Wenders ends with an "urgent request" to filmmakers using 3D:

> But my deepest desire, my urgent request,
> is that you have an interest in the act of seeing,
> in the physiology and psychology
> of what our eyes and our brains do together, in unison
> in the most amazing perfection,
> to create space, depth, volume and presence.
> Every day, now, "in life,"
> when you go outside of this beautiful theatre into King Street,
> when you go home and see your friends, or kids, or neighbours.
> Your eyes and your spatial perception are miracles.

Alla Gadassik offers a detailed reading of Wenders' *Pina 3D* that serves as a suitably scholarly accompaniment to the filmmaker's own poetic reflections. Gadassik makes an unconventional case for the film's importance, arguing that his work is not really about dance. Although ostensibly dealing with the work of the late choreographer, *Pina 3D* largely avoids the kinesthetic possibilities of S3D cinematography in favor of a more stilled and observational approach. For Gadassik, this approach is partly motivated by Wenders' desire to explore stereoscopy as a medium of anticipatory contact, spatial veiling, and ambiguous treatments of textures and surfaces. Sometimes these treatments are employed to offer bodily "portraits" of Bausch's Tanztheater dance company. In such scenes, the performers' faces take on the form of living sculptures, extended in a state of negative parallax that invites the viewer's probing touch.

Barbara Klinger explores negative parallax, the projection of depth in front of the screen. While critics often prize positive parallax—immersion—as more advanced aesthetically, Klinger's objective is to analyze the cinematic strategies and textual functions of negative parallax in a variety of films, from blockbusters to art-house cinema and documentaries. Rather than dwelling on negative parallax's "deficits," she suggests that "it operates as an influential and multifaceted element of the film text, affecting core aspects of cinema today." In particular, she deals with relationships between negative parallax "pop outs," the stylistic range of a film, and its mise-en-scène, especially props. With this in mind, she turns to examine genres such as horror and comedy to understand the self-reflexive play of breaking through the screen—a kind of cinematic exclamation point that filmmakers have employed since the beginning of film. Klinger also looks to the way negative parallax multiplies layers of meaning in a text, potentially forging innovative transmedia relationships between platforms and corporate sponsors.

Like Asselin and Gosselin, Ron Burnett is concerned with the future of immersive environments. His focus is less on displays than on new forms of "surrogacy" that 3D cinema offers viewers as "a theatricalization of the cinematic experience." Drawing on a diversity of contemporary examples, such as *Pina 3D* and *Avatar* (Cameron, 2009), Burnett seeks to determine how certain 3D filmmakers are expanding the boundaries and potentialities of screen interaction. Along with Eisenstein, he argues that 3D cinema belongs to an ecology of images and represents the evolution of cinema and culture. Digital tools are breaking down the boundaries that divide objects and representations. Surrogacy—both in terms of narratives about this phenomenon (i.e., *Avatar*) and their technologies—could very well be the defining characteristic of twenty-first-century media forms and "the crucial foundation for the transformative power of stereoscopic 3D."

And finally, as a crucial counterpoint to the textual contributions, *3D Cinema and Beyond* features a variety of artists' projects, reflecting a similarly wide-ranging "expanded field" of diverse practices in contemporary art which make use of stereoscopic imagery. We hope that the volume's diversity, breadth, and revisionist tone help to generate further study, especially as stereoscopic technology becomes more available and more studio productions are scheduled for release in 3D format. More urgently than ever, scholars, artists, and industry professionals require more venues for intelligent and innovative dialogue about the aesthetics and importance of 3D, and for critical discussion that goes beyond technical terminology and promotional language.

We were deeply saddened by the sudden passing of 3D pioneer and historian Ray Zone during the process of putting this volume together. So many of the essays that appear here depend on his many years of research in the field. We are grateful that he generously agreed to be part of this volume, and that we are able to include his last completed essay on the topic before his untimely death. We dedicate this publication to him.

NOTES

1 The conference was organized by Juana Awad, Sanja Obradovic, Janine Marchessault, and Christos Giotis. With thanks to Ali Kazimi, Laurie Wilcox, Robert Allison, and Nell Tenhaff, and the generous support of the Ontario Media Development Corporation.

2 The essay was most recently published in Russian in Volume 1 of *Neravnodushnaia Priroda* (Moscow: Musei Kino, Eisenstein Centre, 2004).

PORTFOLIOS

REBECCA HACKEMANN
THE FICTIONAL REFERENT AS SIGNIFIER IN 3D PHOTOGRAPHY

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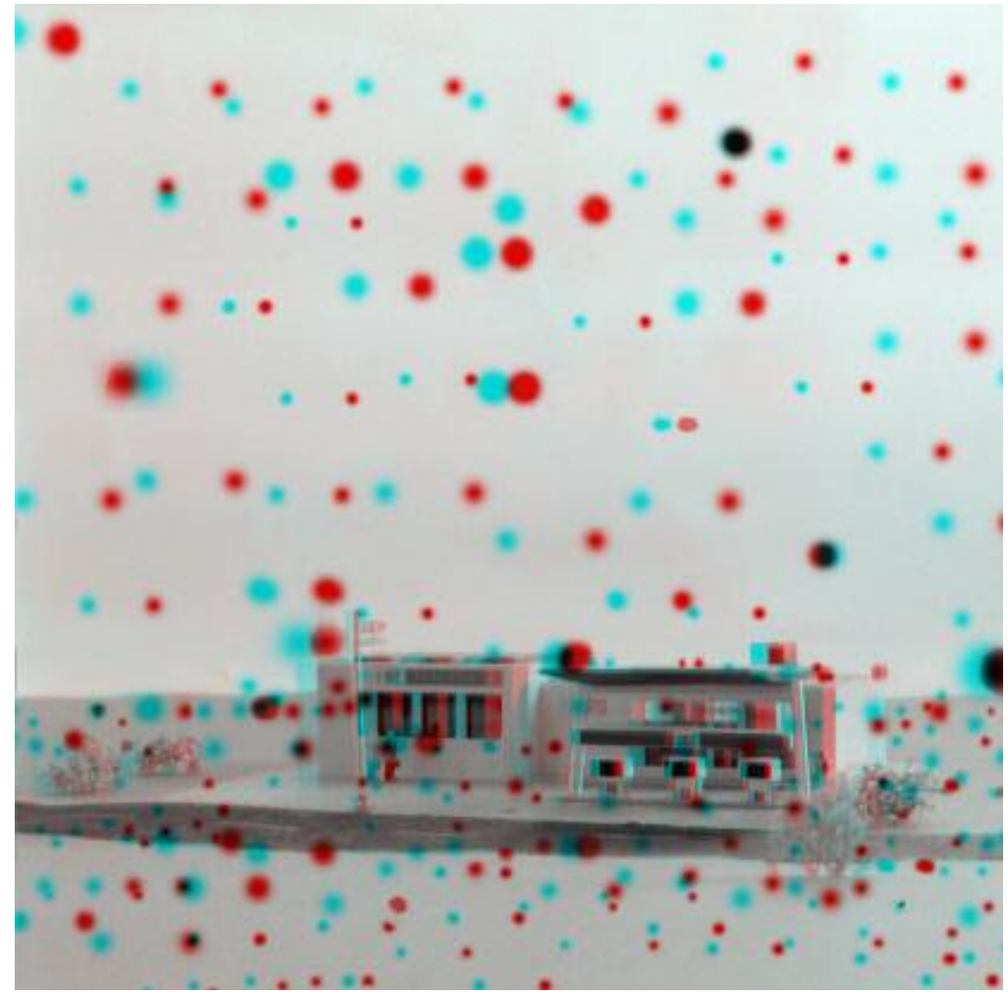
IN THESE CONCEPTUAL stereoscopic works contained in this publication, I use fictionality within photography to create the most extreme opposite of what documentary photography claims to do. 3D scenes are constructed that become worlds unto themselves, to be later destroyed. The final stereoscopic image is combined with non-descriptive, appropriated, or written text. The results are often political, whimsical, or satirical and differ depending on what meaning and connotations are brought to the work by the viewer. The addition of non-descriptive text taken from old literary sources, adds to the multi-faceted connotations that arise from the work. Allan Sekula notes that "the photograph is an incomplete utterance of some sort, a message that depends on some external matrix of conditions and presuppositions for its readability. This, the photograph is only readable if the viewer decodes it."[1] This incompleteness of the utterance of the image is met with the free and chance associations that the visitor brings to it and it is this process that interests me. In other words, the viewer completes this incomplete utterance by bringing his or her own understanding to it. Rosalind Krauss articulates this when she is talking about surrealism—she notes that the "associative fragments within the image are not simply a function of [the] subjectivity" of the viewer, but also of "the space of thought, the unconscious."[2] She continues, that "it is as well a function of external space, of reality convulsed by the condition of the index, in a continual process of reference."[3]—hence one cannot control the meaning of a work. I do not endeavour to control the meaning of my work. In these images then I am attempting to do the opposite, namely infuse as many variables into the image/text combinations as I can, without the message becoming too arbitrary, surrealist, or random. The busyness of the content of the work in many ways matches the intensity of the 3D



© Rebecca Hackemann, *The Black Gold, or, Tribute to Ed Ruscha*, 2007. Stereoscopic Photograph. 3" x 6" as stereo pair, or 6" x 6" as anaglyph or as a projection/installation.

viewing experience. Instead of showing something beautiful to wonder at, the work pokes the viewer with questions and philosophical propositions. The black background in these works eludes perhaps to what Lacan calls the real; namely, "that which is outside language and inassimilable to symbolization."[4]—or to a dream space? Here the metaphor of an "eye torn from the subject and freely thrown around"[5] returns. What is so pertinent here is that it is described as being thrown and it perhaps aptly could be used to refer to one's brain in a dream, throwing images about, which are in fact, very important. Fictionality then can be used as a tool to show reality, because we cannot see how things really are and our only indication may be in a dream like space—perhaps that of 3D. Photography's unique relationship with reality and the retinal therefore serves as a good (rhetorical) tool to draw the viewer closer into this three dimensional space.

To use the metaphor of the camera's eye floating about, what does this mean in the context of two lenses? Jonathan Crary aptly describes this phenomena and claims that we become part of the stereo photograph and it part of us, when we look into it. He questions the Cartesian structure of vision—the idea of subject/viewer—object/artwork separated in space. "The relation of observer to image is no longer to an object quantified in relation to a position in space, but rather to two dissimilar images whose position simulates the anatomical structure of the observer's body."[6] This creates a certain privacy within the viewing experience of 3D, that differs markedly from looking at flat imagery—because of the spatial nature of the visual sphere. One is positioned, seemingly, as the only viewer.

NOTES

These might be life experiences, experiences looking at imagery, our "image bank."

1 Allan Sekula, "On the Invention of Photographic Meaning," *Thinking Photography* (San Diego: Macmillan, 1974), 85.
2 Rosalind Krauss, "Nightwalkers," *Art Journal* (Spring 1981), 41(1): 33-38.
3 Ibid.
4 Dylan Evans, *An Introductory Dictionary of Lacanian Psychoanalysis* (New York: Psychology Press, 1996), 159.
5 Henry Bond, *Lacan at the Scene* (Cambridge, MA: MIT Press, 2009).
6 Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (Cambridge MA: MIT Press, 1992), 128.

REBECCA HACKEMANN is a British/German conceptual visual artist/researcher at Chelsea College of Art, whose practice spans many media. She graduated from Stanford University with an MFA in 1996 and was a Whitney Museum Independent Study Program Fellow in 2001. Her work is concerned with stereo photography, perception, subjectivity, and space, both in the private (white cube) and public sphere. www.rebeccahackemann.com.

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© Rebecca Hackemann, ***The Unmentionables***, 2000. Stereoscopic Photograph, 3" x 6" as stereo pair, or 6" x 6" as anaglyph or as a projection/installation.

© Rebecca Hackemann, ***Tribute to Foucault***, 2006. Stereoscopic Photograph, 3" x 6" as stereo pair, or 6" x 6" as anaglyph or as a projection/installation.

© Rebecca Hackemann, *The First Aid Kit*, 2003. Stereoscopic Photograph, 3" x 6" as stereo pair, or 6" x 6" as anaglyph or as a projection/installation.

© Rebecca Hackemann, *The Unbearable Lightness of Being – an Intellectual*, 2003. Stereoscopic Photograph, 3" x 6" as stereo pair, or 6" x 6" as anaglyph or as a projection/installation.

WORKS AND PHOTOS BY NAOMI SALAMAN, WORDS BY MARIA WESTERSTAHL

SCHOOL

Introduction

Stereo vision is inherently resistant to replication outside of the original set-up because what is seen is as much bodily sensation as visual material. The devices, disciplinary procedures and bodily functions that can be played with rely on the singular merging and mimicry of binocular viewpoints. The result is an event as much as it is a pictorial subject. Looking becomes a consciousness-raising of vision; an encounter with a staged-still-optical interiority.

The stereoscopic installations and projects that have preoccupied Salaman for over a decade present us with a hallucinatory version of our own constructions, which emerge, like all stereoscopic work, only in a fleeting encounter of human observer and machine. Neither memory nor media printing can translate or record this conjunction. Reflecting on the optics of the device, laying out the binocular machine as a kind of open diagram, has been a constituent part of Salaman's work—though this does not diminish the impact or pleasure of being played by these machines and submitting to their regime. There is something complicit in bending forward to the mirrors or lenses, shifting to correct your alignment, picking up the viewer… there is something private and sensual.

Among all the clutter on my table there is one of Salaman's contraptions. It is a small slab of wood painted black, onto which two square, near identical images of a horse are mounted side by side. The two horses are both in mid-turn at the edge of their school, bordering an idyllic summer landscape of primary post card colours. Projecting on two round columns, and forming a narrow canopy over the images, is what looks like a flat Perspex pair of glasses. The contraption has four holes which, evidently, have been used for wall mounting. I hold it up in front of me against this imaginary wall, and look through the glasses.

I am immersed into a single world of suspended animation and depth. The stereophotographic calibration affects the various components of the picture differently, so that the horse is now sharply separated from its background. The brown sand of the school forms a stage floor, watched over by silently marching angular fence fragments defining its edge. The bucolic landscape is a painted backdrop, it could be three or four metres further back. These elements are hyper crisp, vibrating with colour in a sunlight-effect illumination, and in a state of humming repose. On the sand, the shadow of the horse is draped in passive anticipation of its arrival.

The horse, by contrast, is all movement, suspended mid-arc as it canters into and out of the picture at the insistence of the invisible hand that guides the bridle. The constructed depth acts as a chisel on the limitations of the shutter speed, creating an impossible, unreal, statuesque blur among patches of sharpness. The implied actual brevity of the visit is sculpted into a half pirouette perfectly still, an encounter both fleeting and endless. My living, breathing, processing time meets the stolen time of the horse, a moment devoid of actual life, held still for my eye to roam the nooks and crannies of its animated form. I have all the time I want to take in the insinuation of sensuality and life, the way its sweaty, short haired flanks reflect the light, the rich variations of brown from gold to chocolate, the sinewy surface muscles beneath taut skin, the glistening, bared, yellow teeth.

The eyes of the horse are not looking my way. Placed on the sides of the head so as to scan the horizon for circumspect movement, their stereo vision is panoramic and foreign, the equine vistas unrecorded, out of alignment with the constructed depths held in my hand. The horse is my horse now.

I put the contraption down. The vision is gone. All that remains is two flat pictures, and a golden blur in my head.

Maria Westherstahl, July 2012

NAOMI SALAMAN is an artist who works at University of Brighton.
MARIA WESTHERSTAHL is an architect and writer.

School, installation view, gallery visitors looking at a series of stereoscopic colour prints. Impressions Gallery York, 1995.

Stereo viewer showing *School*, 1995.

WILLY LE MAITRE

OCCUPY IMAGE, STEREO 3D VIDEO (2012)

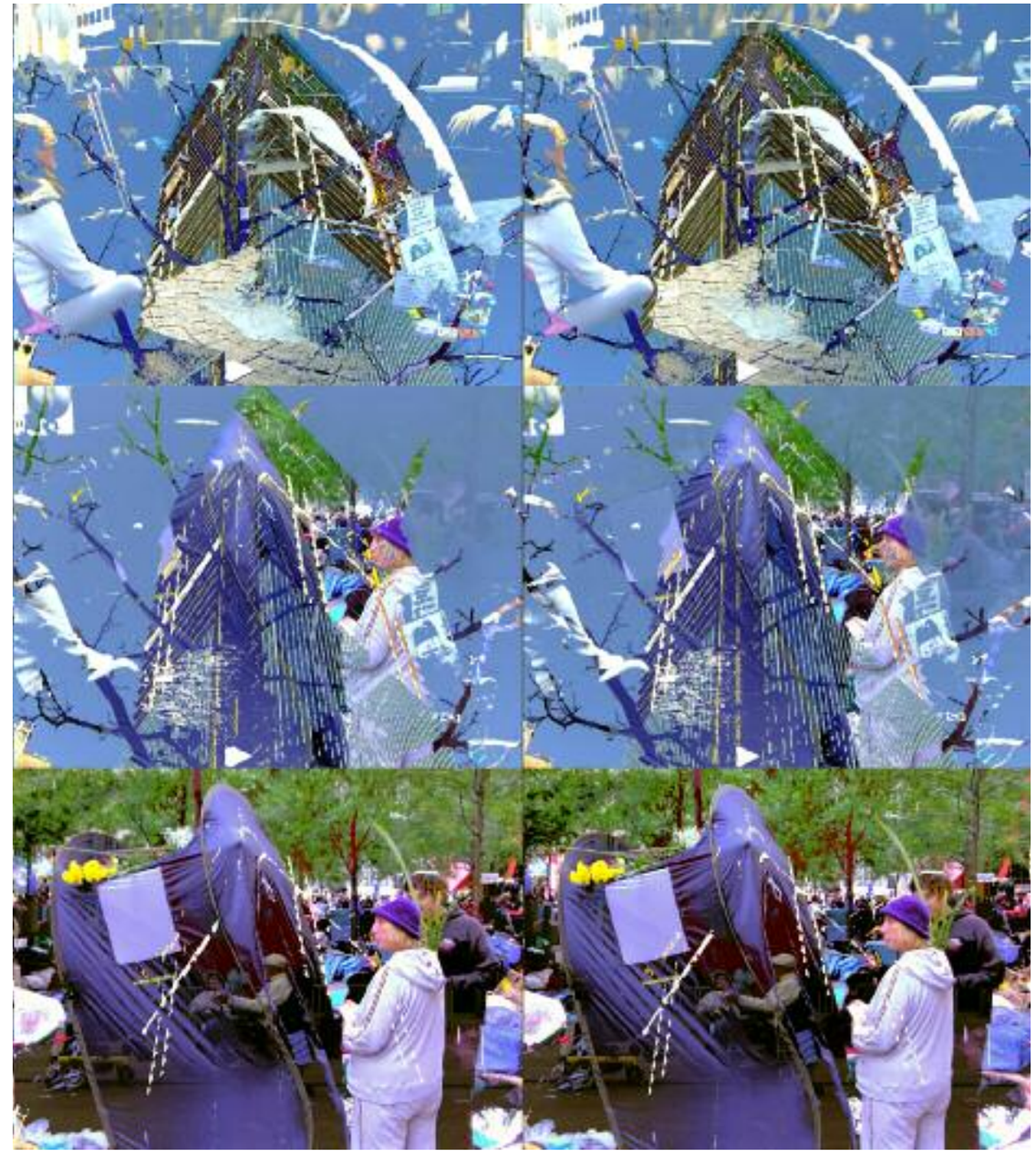
THE 3D VIDEO installation opens with images taken during Occupy Wall Street in Zacotti Park in October 2011. The title, *Occupy Image*, is a play on words which refers to how spaces are produced by images and the passive occupation of these spaces by the contemporary spectator/producer.

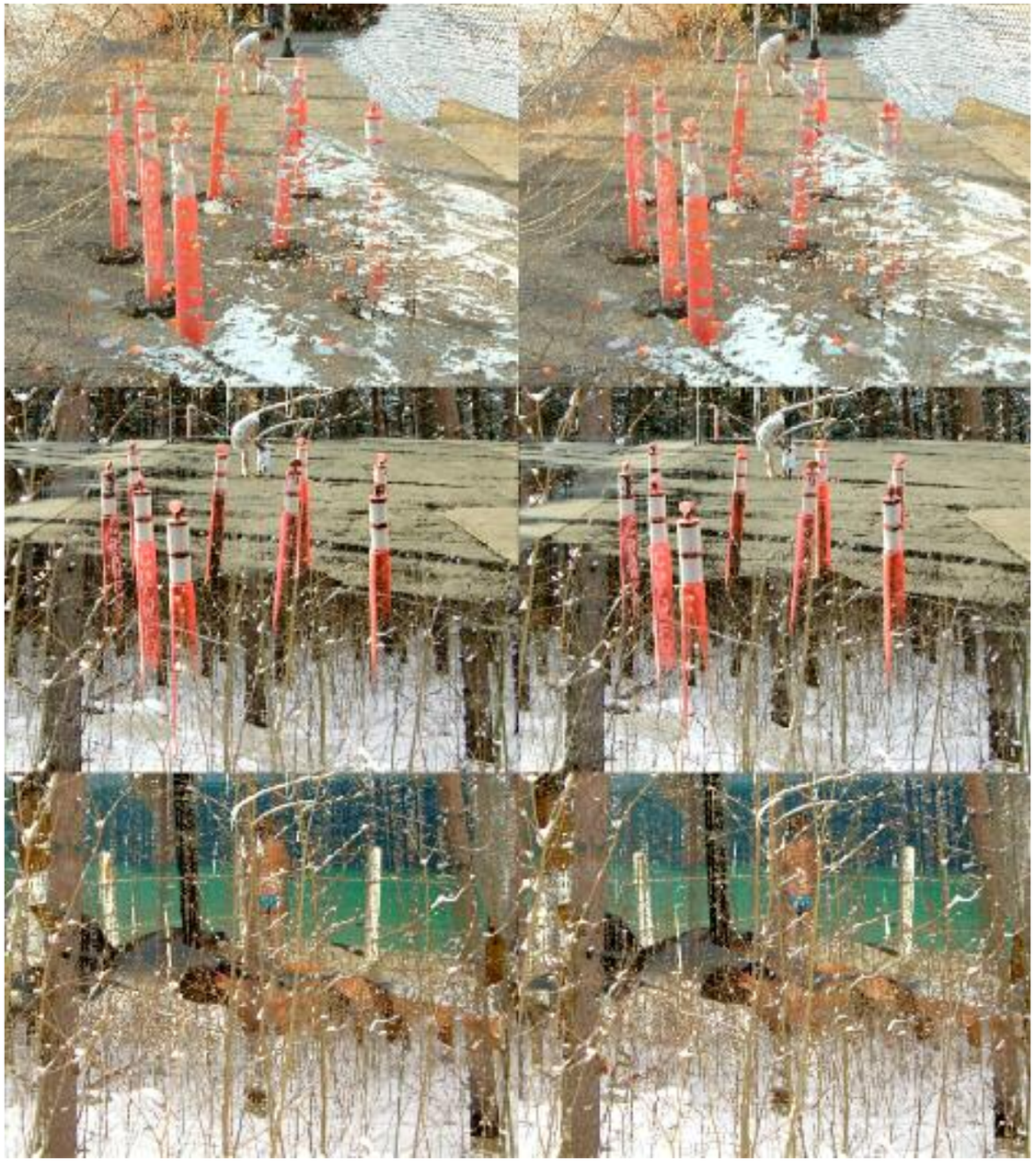
The sequence of dissolving images progresses from the protest images into seemingly unrelated imagery. The slow transitions are gradually mapped onto the previous image's dark-to-light value. The meshing and sequential dissolving of varying perspectives and disparate spaces in *Occupy Image* destabilizes the illusion and expectation of space. What is expressed in its place is an expanded sense that parallax can have to depth. Parallax, referred to in stereographic 3D video relates to a simulation of human sight. A presentation of the images from two aligned cameras produces a depth illusion to the similarly separated eyes of a viewer. This sense of parallax presumes an object in coherent Cartesian space. In the hybrid spaces of *Occupy Image*, depth is a negotiation of difference to be perceived by combining the here with a formally unrelated there, and there and so on.

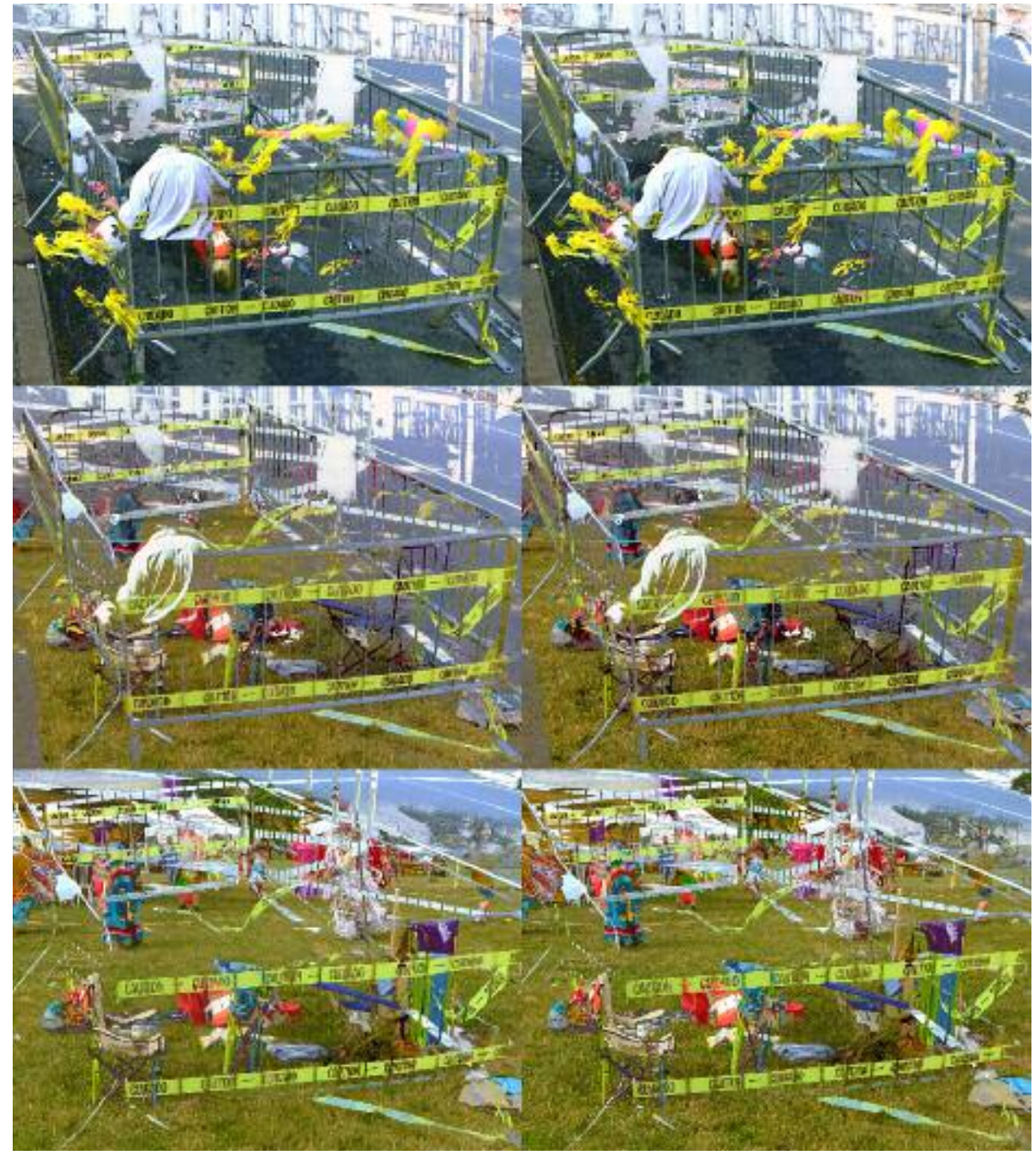
Depth perception is variably shaped by the shifting contours of appearing and vanishing objects. The stills are not shown as isolated times; rather, their depiction emphasizes the notion of moment as a constant negotiation of passing and becoming. The merging of spaces entwine masses with voids. Bound by organic lines, the unfolding juxtapositions present viewers with an experience of reading space that is vivid as our natural sight is but selective and associative like our memories, imaginations and digital exchanges.

The aesthetic of realism that is typical of high definition video technologies has an effect of separating us from what is represented, leaving us with a detached experience of surface appearance. When a viewer's attention roves around the depth planes in the 3D image, an augmented sense of perceptual presence extends the terms of occupation. Despite a separation from context, the experience can be real in the way a dream can. The act of looking is a passive occupation and though the engagement is detached, there is always the potential for transformative consequence.

WILLY LE MAITRE's established practice as a media artist has garnered international acclaim including awards from Vida, Spain (Artificial Life) and the Telefilm prize at Images Festival in Toronto. His works have been featured in public galleries across Canada and in New York. With Eric Rosenzveig he has co-produced pioneering generative and networked artworks such as *The Appearance Machine* and the *Fleabotic Hypermedia Nonet*. In recent years he has developed a body of Stereo 3D artwork in the form of videos, installations, live video performances, and lenticular photographs. This recent concentration is part of his ongoing project on the biology of images.







PART 1

EXCAVATING 3D CINEMA'S PAST

SERGEI EISENSTEIN

ON STEREOCINEMA (1947)

Translated by Sergey Levchin

These days you run into a whole lot of people asking:

"Do you believe in stereocinema?"

To my mind this question sounds about as absurd as if they were to say: do you believe that it will be night-time at midnight, that one day the snow in the streets of Moscow will melt away, that there will be green trees in the summer and apples in the fall?

That today will give way—to tomorrow!

To doubt that tomorrow belongs to stereocinema is just as naïve as it is to doubt the very coming of tomorrow!

Yet what is it that allows us to speak with such confidence? Especially when all we see on the screens today—are but solitary robinsonades!

And it is practically symbolic that the best of what we have seen so far was precisely a screen version of… *Robinson Crusoe*.[a]

But what we saw there above all—was little more than Robinson's raft, inside the picture, struggling to break through the lianas of the jungle (one of the more convincing stereoscopic images in Andrievsky's film)—[i.e., through] the hosts of obstacles blocking the path of stereocinema.

But the day is near when the rafts of lone explorers will give way to stately galleys, frigates and galleons, mighty cruisers, battleships and dreadnoughts of breakthroughs and successes, all streaming into the harbours of stereocinema.

How is it, indeed, that we are able to make such bold predictions?

The answer is that no species of art is truly capable of survival unless it bears in its essential character some aspect of our deepest yearnings and aspirations.

To my mind, this holds as true for the distinctive characteristics of a given species of art as for a particular theme or formal strategy.

In this sense the very nature of an art form is as "significant" as a plotline or its formal treatment.

And if the distinctive characteristics of a given art form fail to embody some of these deep-seated urges—that species of art is doomed to extinction.

Only those species survive, whose constitution and attributes resonate with these deeply rooted, intrinsic, organic tendencies and needs of the spectator and artist alike.

Thus today we are witnessing the implacable, relentless demise of the so-called "objectless" art.

While just beside it another equally "content-less" art form—the circus—endures and has endured for hundreds of years.

Objectless art could only survive for a short time, as a testament of the vacuity of the dying social class that engendered it.

But it could never become an independent branch or species, capable of evolving autonomously alongside other art forms.

And this is because it offers nothing to satisfy the intrinsic cognitive urges of every progressively-minded individual.

While the circus "survives" right beside it.

And the secret of its endurance is that it does not presume to address itself to philosophical questions, leaving this to the far more advanced species, but limits itself to displays of skill, strength, self-control, determination, and courage.

And there precisely finds resonance with our natural drive to develop our innate physical qualities and our character to the fullest extent possible.

Could we argue that the principle of three-dimensionality in cinema also satisfies—thoroughly and in the utmost degree—some sort of inherent need?

Could we assert that in its quest to satisfy these needs mankind has over many centuries "marched toward" stereocinema, as one of the most thorough and immediate expressions of such aspirations?

I believe so.

And I would lay bare the nature of this drive by examining the ways in which the arts have sought to satisfy it in past times, before the technological miracle of stereocinema could give it its most convincing and fully realized form.

* * *

To this end let us first of all characterize the nature of the technological phenomenon that is stereocinema.

What is it that immediately strikes the spectator upon his initial encounter with stereocinema?

Briefly put: the stereoscopic image affords a complete illusion of three-dimensionality.

Moreover, this illusion is thoroughly convincing and free from all doubt—just as in ordinary cinema we never doubt that the screen images are actually moving. The illusion of space, in one instance, and of motion—in the other, are equally inviolable even for those that know full well that in the first instance we are dealing with a scattering of discrete, motionless phases, extracted from a continuous process of movement, and in the second—with nothing more than a cleverly devised process of overlaying two ordinary flat photographic impressions of one and the same object, taken simultaneously from two slightly different perspectives.

In both instances—the powers of spatial and kinetic suggestion are as persuasive as the characters on the screen, who appear to us irrefutably genuine and living, though we know well enough that they are only pale shadows, impressed onto many kilometers of celluloid.

There are three kinds of stereoeffect.

Either the image remains within the boundaries of ordinary cinema as a kind of flat *haut-relief*, poised somewhere within the plane of the reflecting screen.

Or the image plunges deep inside the screen, drawing the spectator along into unprecedented depths.

Or, lastly (and this is the most astonishing effect)—the image, palpably three-dimensional, "tumbles out" of the screen into the auditorium.

A cobweb with a giant spider hangs somewhere between the screen and the spectator...

Birds fly out of the auditorium into the depth of the screen, or settle down along a wire that stretches—literally and palpably—from what was once the "plane of the screen" all the way to... the projection booth.

Overhanging tree branches thrust out into the auditorium on every side...

Pumas and panthers leap out of the screen, landing in our laps. Etc., etc.

A closer look at stereocinema's immediate precursor—two-dimensional cinema—will readily persuade us that the former is but the ultimate expression of the very same aims and aspirations that had attended cinema since the moment of its inception.

Just as a whole range of tendencies, which silent cinema had struggled to satisfy through pantomime, image-sound association and certain forms of montage, were ultimately realized with the advent of speech, direct sound recording and the expressive possibilities of the melodic and rhythmic structure of music.

And the same is true of colour cinematography, which took up the expressive possibilities prefigured in the cinema of the limited black-grey-white palette and raised them to a qualitatively new level.

In our case stereocinema is not simply advancing the technological drive to develop lenses, capable of capturing the full depth of the image.

It is also taking up the effort—to achieve the same end through compositional means.

The most effective of these has always been the type of the so-called "foreground composition" that to this day remains one of my absolute favourite forms of visual expressiveness.

In its more subdued form—this simply means maintaining an "active" background: i.e., keeping track of what is going on in the background, even as attention is generally focused on the foreground.

In the silent period this was done with great care and subtlety by Erich von Stroheim in America.

It is worth noting, moreover, that in his works this "background" is not merely limited to furnishing a believable setting for foreground action, but always operates as a kind of musical accompaniment, realized in visual terms.

An entire picture might play out against a background composed of various details of an amusement park—particularly the merry-go-round (in one of Stroheim's pictures with Mary Philbin, shown here many years ago [*Merry-Go-Round*, 1924]).

And in keeping with its role as musical accompaniment to the main action [the merry-go-round] is partly "muted" by soft focus.

The type of "foreground composition" that I have in mind, however, goes even farther in this respect.

The case we have just discussed succeeds, as it were, in keeping the foreground from emerging out of the background, from breaking with it. The type of composition that concerns me is structured differently.

Here, on the contrary, every effort is made to break up the passive coexistence of foreground and depth.

Every effort is made to differentiate them as much as possible, and to bring them together again in a whole new way—in a reciprocally informed composition.

Different filming strategies force the image to appear either as infinitely expanding (both laterally and inward)—Space,

or as materially emerging and palpably three-dimensional—Volume.

And what we have become accustomed to seeing as an image on the screen suddenly "swallows" us up into unprecedented depths, beyond the plane of the screen, or "thrusts out" at us with unprecedented force.

This is no longer a matter of foreground action with a background "accompaniment," but of dynamic—dramatic!—interaction between foreground and depth, with the foreground actively emerging or bursting forth from the background, distinct from, even antithetical to it, through which antithesis the two fields may at last attain a new active compositional unity. Here the emphatic sharpness of both foreground and background clearly emphasizes the qualitatively different set of problems addressed by this type of composition.

In practical terms this kind of shot was composed through extreme foregrounding (i.e., the foreground subject is framed in extreme close-up), with the background kept almost completely in focus.

(The background was softened only to the extent required by aerial perspective—in the interest of maximum separation of the two planes—and so remained fully legible.)

By creating the impression of a great difference in size between the figures and objects in the foreground and background, this kind of shot affords the maximum illusion of receding space by means of scale alone.

It is further augmented by the use of the "28" lens, which distorts the lines of perspective, [forcing them] to converge rapidly toward the centre.

This quality of the "28" lens—incidentally, the only lens in those days capable of keeping a foreground detail and the distant background in focus simultaneously[b]—ensures that objects shrink rapidly as they move away from the camera, with those in the distance appearing miniscule.

The expressive possibilities of this type of composition remain equally attractive, regardless of whether the two fields (background and foreground) are opposed "dramatically" or linked thematically. As is always the case in matters of composition, they are equally convincing in the service of diametrically opposed ends.

In the first instance—we have the most extreme contraposition imaginable in a single shot, not only of the two planes of action, but of the very categories of volume (protruding foreground) and space (depth).

In such cases the composition can express most forcefully the conflict inherent in a given theme (e.g., a general in the foreground, looking off into the distance—toward the back of the frame, from where the enemy is expected to attack).

In the second instance the same compositional strategy is readily assimilated into an impression of unity of the particular (foreground detail) and the general (the whole, taking up the background).

(E.g., a drum in the foreground beats out a march, as a column of soldiers moves across the screen.)

Of course, how such a composition will be interpreted in each specific case will depend, first and foremost, on the dramatic context, but also—to a great extent—on all the other concurrent formal choices.

(Lighting and colouration of the two planes will play an especially important role here, along with treatment of line and tone—soft vs. sharp, rigid vs. fluid, etc., etc.)

Naturally, those compositions that manage to combine both instances will achieve the greatest dramatic effect.

This happens, for example, wherever the thematic unity of the two planes is rendered visually in terms of maximum contrast—of scale and colour—between the backdrop and the foreground detail.

This was the principle behind one of the most striking images in the 1st part of *Ivan the Terrible*.

I am referring to the rather memorable—climactic—shot in the scene in which the people lead a holy procession to Alexandrova Sloboda to summon Ivan back to power.

The shot is structured against a boundless snowfield, with the thin black curve of the procession in the far distance.

Onto this background—from off-screen—descends the giant profile of Ivan (top and back of the head—cut off), signaling his assent to return to Moscow.

Here, though the tsar and the procession are sharply contrasted in terms of scale and colour, they are at the same time linked by the inner significance of the scene—unity of the tsar and the people—the gesture of the bowing head, giving assent, and the matching outlines of the tsar's profile and the shape of the procession.

This compositional technique became especially "fashionable" in cinema after my picture *The Old and the New* (1926-1929).

Indeed, we had studied it and experimented with it extensively at that time[1], although I distinctly remember my earliest encounters with this technique back in 1924, during our work on *The Strike*; those efforts were ultimately unsuccessful because at the time my "toolkit" still lacked... the proper lens for that kind of photography!

Similar shot compositions in our Mexican picture, filmed right after *The Old and the New* (Mexico, 1931-1932), were also thought to be quite "sensational."

There, in the episode "Day of the Dead," close-up shots of cardboard skulls were superimposed over a wide shot of a Ferris wheel in the background, while at another point the profile of a Mexican woman merged diagonally with a full view of... a whole pyramid.

Since then this type of composition has been regarded as a practically indelible mark of my compositional style.

Yet similar constructions are common in the works of William Wyler.[c]

I doubt there is anything to be said here in the way of influence.

Especially since Wyler's use of this technique has little to do with thematic expressiveness, in fact, it rarely even serves the basic purposes of plot development.

For this reason, Wyler is far more restrained formally, so that in his work this type of composition—quite natural for cinema, in my view, and masterfully executed by the director—is reduced to mere eye-candy.

There are countless shots in the wonderful film *Jezebel* (1938), framed through the wheels of a pulled-up carriage or—through the spread legs of a drunk at a bar counter, etc.

Visually expressive shots of the same order appear in the later film *The Little Foxes* [after the play] by Lillian Hellman, where the use of the "28" lens is taken almost to an unhealthy extreme, but which also features the particularly memorable, superb shot of the dying Herbert Marshall, stumbling on the stairs in the background, behind the close-up of the breathless, murderous Bette Davis.

Here Wyler stands halfway between Stroheim (whom he had previously assisted) and the much later work of Orson Welles, in whose *Citizen Kane* the same technique tends toward gimmickry and absurdity.

This shot composition had its painterly precursors in the works of Edgar Degas and Toulouse-Lautrec, to be sure, but also in the compositional style of those Japanese, who had doubtless influenced them in this respect.[d]

Presumably, my early enthusiasm for the latter and former alike had in turn informed my own approach to the method of "foreground composition," as described above.

In any case—it is evident that the distinctive characteristics of stereocinema are closely linked with the most immediate aesthetic concerns of two-dimensional cinema. And even deeper—with the specific practice of foreground composition in the visual arts, both Eastern and Western.[2]

It may be interesting to note here that the majority of examples of this sort of composition coming from "flat" cinema have so far shown greater affective power than anything that could be achieved in stereocinema today, strictly on account of its technical limitations.

This is largely explained by the fact that stereocinematography has so far been restricted to the use of a single lens—and the least expressive of them all—the "50."

Nevertheless, however imperfectly, stereocinema alone has turned the two spatial objectives—which two-dimensional cinema had long pursued with every available means—into palpable reality.

The ability to "pull" the spectator—with unprecedented intensity—into what was once the plane of the screen, and to "precipitate" upon him—with equally devastating force—all that had previously remained splayed out upon its reflective surface.

"Well, what of it?" you may ask. "Why should the spectator find these two "marvelous" features of the stereoscreen somehow especially attractive?"

Moreover, why should they satisfy some sort of "inherent natural urges," or speak to some "deep-seated human needs?!"

If we were to put this question to a Taoist philosopher of ancient China, he would surely tell us that the very essence of the two universal principles—the positive and the negative, which, in their union and interpenetration, drive and sustain the whole system of universal phenomena—may be glimpsed most vividly in the unique character of stereocinema.

Indeed, nowhere else do we see so plainly this union of the positive volume and its opposite—space, understood as volume captured from "within"; or of the positive space and its opposite—volume, considered as the negative aspect of space—i.e., as the "exterior" membrane, enveloping a "piece" of space.

And certainly, nowhere else in the whole history of the arts will we find another example of such dynamically perfect transmutation of volume into space, space into volume—all transpiring in real time—the two categories interpenetrating and coexisting in simultaneity.

In this respect cinema even trumps architecture, where the occasionally powerful symphonic interplay of mass and circumscribed expanses of space is hampered—as far as its progression and variation are concerned—by the spectator's arbitrarily chosen pace and itinerary, as he moves through the architectural ensemble—the only means available to him to traverse this ensemble—dynamically.

The teaching of Chinese philosophy about the interpenetration of the active and passive or negative and positive principles as the basis of all being—is typically vulgarized in the Western tradition, to the point where these principles are interpreted wholesale as the Masculine and the Feminine,[3] reducing the whole cosmic conception of the Chinese to a projection onto the whole of the cosmos of the strictly biological factors of one's mundane experience.

This sort of outlook, however, is far less characteristic of the ancient East than it is of the decrepit West, stooping, as it has in these past few decades, to every sort of philosophical theory, so long as these keep as far away as possible from... a social interpretation of reality.

And had Otto Weininger or Sigmund Freud lived long enough, they surely would have pronounced this "distinctive characteristic" of stereocinema a most striking "symbolic" manifestation of the great eternal stimuli—the masculine and feminine principles—"the only truly fundamental stimuli of mankind's whole being and progress."

Far be it from me to deny the attraction of such "symbolic" interpretations for minds so "turned"—nevertheless, I expect that the principal phenomenon of stereocinema owes its appeal to an altogether different set of factors.

Within the family of the performing arts, stereocinema is to be classed not only with the grand-nephews of Edison's and Lumière's inventions, but also somewhere among the great-grandchildren of theatre, emerging in its present form as the youngest and latest stage of theatre's generational development.

And the key to the mystery of the affective power of stereocinema (if there is such a thing) will surely be found here, in one of the principal tendencies of theatre, emerging at nearly every stage of its history.

What is this tendency?

And what are its origins?

If we cast an "eagle's eye view" over the history of theatre from its wellsprings down to our own days, we will inevitably discover three successive phases—the very same that are to be found in the developmental history of any other sphere of activity.

The initial state of unity.

The advent of a schism.

The tendency to reproduce the original state, and the attainment of unity through ever evolving, advancing, qualitatively new forms.

We can examine any one of the multitude of elements that go into a theatrical performance—in every instance we will be able to trace this same succession of the three stages of development.

If we take the problem of the coincidence of actor and character—we will see the first phase manifest itself wherever the performer has yet no thought of portraying someone, but appears as "himself"—"himself" above all and in every respect.

And for this we need not go back to some primordial roundelays and folk-dances: the same traits have come down to our own days, and not only among the "girls" or chorus line dancers, circus athletes or tight-rope walkers, Mistinguett or Raquel Meller.

Here also belongs the entire school of acting that would have the actor "get on top" of the situation or the play, i.e., subordinate the role to his personality, rather than attempt to "enter into" or embody a given character—to be "him" above all, rather than "oneself" always and everywhere, the same and unalterable throughout.

And here too we discover the next phase of the theatre—theatre of convention[e]—ardently preaching the union of actor and character in the form of... a mask, partly slipped from the performer's face, [i.e., performing] the rupture, the deliberate schism between actor and his emphatically un-believable "character."

Only to return, more recently, in the art of Stanislavsky and Shalyapin or Khmelev and Cherkasov, to a new, organically indissoluble union of character and its vehicle, no longer a consequence of undifferentiated and unexamined primal unity, but rather understood as the very pinnacle of the actor's craft—the total embodiment of the character.

The very same stages may be traced in the development of the dramatic technique; the problem of modernity vs. historicity in costume design; declamation and dramatic speech vs. natural intonation; the problem of transitioning between stage settings; the aesthetics of stage lighting, etc., etc.

But out of all this great variety, I am interested here above all in looking at this trajectory as it emerges in the history of the interrelation of spectacle and spectator.

And as we have found stereocinema to be distinguished by this unique quality—that the screen spectacle "penetrates" into the auditorium and, at the same time, "swallows" the spectator into "itself," we are naturally led to track the interactions and interrelations of spectacle and spectator through the stages of historical development of the theatre.

Here these interrelations will immediately align themselves along the three phases.

From the stage of the primordial undifferentiated spectacle, unacquainted yet with the division into spectator and actor—to the split into participant and observer.

And from this phase to a new reunification of action and audience into a certain organic whole, where the spectacle penetrates into the mass of spectators and, at the same time, draws it into itself.

Each of these phases is presented vividly and emphatically throughout the course of history.

The primal unity and indivisibility of action and audience at the stage of the "communal" forms of early collective "pageants," ceremonies and rites.

Identical in this respect—whether we take the form of the primordial dithyramb, lost in the mists of time, or the collective rituals of Siam and Bali, persisting well into the middle of the previous century, evidently little changed over the course of millennia.

Here also belong the accounts, penned by an American governess at the Siamese court of the sixties[f], of collective pageants and processions, involving the whole of the citizenry.

Remarkably, these same processions can move through a variety of imagined locations by means of dynamically shifting "sound scenery":

specially tasked sound actors take turns imitating the songs and cries of monkeys and birds using their voices or fanciful instruments—at such times the procession is thought to be passing through the forest; or they may reproduce the sound of the surf—at which time the procession is said to be moving along the surface of the sea. Etc., etc.

Similarly, the streams of pilgrims climbing pyramids on their knees—as I had personally witnessed in Mexico—to reach the cathedrals at the summit, may also be regarded as undifferentiated "collective action."

Along the pilgrims' progress—at certain turns along their path—one finds stone markers, commemorating the "twelve stations" of Christ on his way to Golgotha.

And at each of these markers, the pilgrims re-enact inwardly the corresponding episode of the long-familiar drama of the Lord's passion.

Subsequently, just as the dithyramb breaks up into active and passive participants, i.e. performers and observers—so too these stone "cues" come to life as "living pictures," staged in the altar section of the cathedral, soon to be enacted as real-life dramatic episodes of mystery plays.

By now the pilgrims have turned into spectators (though occasionally still referred to by the old name: recall the mass "pilgrimages" to the Wagnerian festivals in Bayreuth or the annual swarms of "pilgrims" at Reinhardt's plays at Salzburg![g]), "real" spectators, hungry for spectacle, massed before a stage, onto which the spectacle part of the old collective action has decamped decisively, splitting the two functions "action" and "participation" into independent halves, ranged on the opposing sides of the implacable *rampe*...[4]

And it is remarkable that with the advent of this second, crucial phase in the history of the theatre—practically at the very moment of the "split" into actor and participant—a "longing" sets in for the lost unity of the two severed halves!

And [we see it] not only in our own day and age, but everywhere throughout the course of theatrical history: all through the ages, practically at every turn, countless elements of dramatic technique consistently reveal one and the same tendency—in different guises, to be sure, but always identical in its aim—to "bridge the gap," to "throw a line" across the "abyss" dividing the spectator from the actor.

These efforts range from the "crudely material," outward experiments with stage and auditorium layout or acting technique to the subtlest forms of "figurative" bridging, whereby the dream of unity of actor and spectator is made reality. Moreover, in every case we find the two tendencies—to "penetrate" the audience and to "pull" it into the action—competing, alternating or trying to keep in step, as though presaging the two unique characteristics that define the optical phenomenon of stereocinema!

Let us not, however, indulge in empty theorizing. A brisk excursion through the stages of theatrical development will allow us to observe first-hand the abiding tendency to reunite the actor and the spectator, the stage and the auditorium, the viewing masses and the spectacle—in its various manifestations.

Naturally, we will find the most explicit "trace" of the original unity of spectator and performer in the theatre of antiquity.

Here the *orchestra* is still almost completely encircled by mounting concentric "wreaths" of spectators, as though it were a reflection, magnified a thousand-fold, of the circle of dancers that gather spontaneously about the best of their company—arrested by his mastery—to admire his perfection.

Wherever it might be—in the context of a village folk dance, or [at a] negro dancing-hall in Harlem, or even in a ballroom—everywhere and in every case a circle of spectators will form spontaneously around the leading pair or the leading dancer. And this "circular" stratification into performers and admirers is the first, absolutely spontaneous moment of the schism within a uniform body of dancers into spectators and performers.

Notably, this "spontaneous shape," formed by the emerging audience of admirers, did not merely determine the natural "circularity" of the ancient theatre space. Some believe that it is also responsible for the eventual emergence of the "tiered horseshoe" layout—the standard theatre layout, persisting down to our own days.

There is an engraving of Jacques Callot, depicting a theatrical performance in what is today the Uffizi Palace on the occasion of the Florentine Carnival of 1616.

A stage with wooded scenery is set in the back of the hall, with a staircase and two bowed ramps descending down into the pit.

Staggered rows of benches, about four on either side, line the edges of the pit adjacent to the stage.

Moreover, the pit is partly occupied by a standing audience—a typical sight in those days.

The centre of the pit, however, is given over to dancers, descended from the stage, while the spectators have "naturally" fanned out about them in a horseshoe formation.

There are some who believe that this spontaneous arrangement, as captured by Callot in this very engraving, would later inspire the design of the "tiered" theatre, which retained the horseshoe shape even as the pit was filled in with chairs and benches for the audience.

[For some reason Sheldon Cheney does not mention by name the author of this theory—he is Gordon Craig.

So, in the second footnote on p. 24 of his *Books and Theatres* (London, 1925) we read:

"The Teatro Ducale (*once housed in the same palace, where the Uffizi Gallery is today—S.E.*) was built in 1583 by the architect, B. Buontalenti, and is sometimes called Teatro de' Medici. One year later the more academic theatre at Vicenza was built by Palladio. Palladio thinks too long about it all and arrives at less than Buontalenti achieves; and look at how much Callot adds to the whole movement of theatre construction. By this one etching, I find Callot does more to bring about the modern horse-shoe form than anyone else. How valuable is a little touch of inspiration! and here comes Callot into the Medicean theatre in 1616, and, seeing that the people curve the floor to make room for the performers, he emphasizes this fine curve, and fixes it once and for all in a lovely etching with such a way about it that everyone buys a copy. It is in 1616, and slowly it enters the brains of the architects that exactly this curve is pretty fine; and for good or ill they follow the lines of the etching in their future ground plans, the first being 1627 in Bologna so far as I have been able to trace the thing, and the second—in Roma—at the Tor di Nona Theatre in 1671—Specchi the architect."

In the same book Craig points to the layout of the Tor di Nona Theatre, built by Alessandro Specchi in 1671 (destroyed in 1897), as evidence in support of his hypothesis.]

Yet the Greek theatre already carries some of the seeds of the later contraposition of actor and spectator. Already a section of the *orchestra* is sliced off by the chord of the *skene*. And the widening gap and growing opposition between the two sides is reflected in the increasing tendency to shift the action from the *orchestra* onto the *skene*, while the audience gradually fills up the *orchestra* space, transforming it into the *parterre*—leaving only a narrow strip for the future... orchestra pit—to position itself directly in front of the *skene*, long turned into *scene* or the stage, and set facing the auditorium.

Naturally, this parallel placement of stage and audience underscores the opposition between the two sides (like two opposing walls!): this tendency is far more pronounced here than in the preceding phase of circular opposition in the earlier circular type of spectacle.

With the mystery plays this second kind of linear parallelism is firmly established and has definitively replaced circular parallelism.

Such, for example, was the well-known type of stage "of the simultaneous scene," used for the Valenciennes Passion Play of 1547 (after a miniature by Hubert Cailleau).

About the same time we find a stage with "stations" (*mansions*) set out in a row—not facing the auditorium, however, but rather cutting through it, dividing it in half, so that the audience observes the events playing out in its midst from two opposing sides.

This layout is documented in a crude drawing from the sixteenth century that accompanies a manuscript of the "Lord's Passion" from the second half of the fifteenth century, kept in the Fürstenberg Court Library at Donaueschingen.

We find similar scenographic arrangements, where the stage cuts the audience in half, at later times. There is an engraving from the sixteenth, depicting "Le ballet de la Royne,"[5] composed by the Italian Baltazarini and presented in 1582 to Henry III and his court on the occasion of the marriage of Marguerite of Lorraine to the Duke Anne de Joyeuse.

(The staging of the ballet cost about twelve hundred *écus*, and it marks the first in the series of lavish court productions that reached its peak in the reigns of Louis XIII and XIV.)

Here the play is performed indoors—in an oblong hall.

Two tiers accommodating the audience run the length of the hall on either side.

A stage with scenery is set at the far end of the hall—taking up its full width.

At the other end sit the king and the newlyweds, accompanied by guests of honour.

The whole of the pit, practically the entire hall, is ceded to the ballet, encircled by the audience.

Along with the dancers some of the scenery has also been pushed out into the pit.

About the middle of the hall, on the left, we find a rather mysterious object, resembling billows of clouds.

On the right, however, there is a perfectly realistic grove of trees with an actor, dressed as a faun and playing on a pipe, and lanterns suspended amid the foliage.

If I remember correctly, N.N. Evreinov's production of *Francesca da Rimini* at the Petersburg Conservatory some years ago was set on a stage laid out in the Donaueschingen style.

Once more, spectators were seated on either side of the hall, with the action transpiring on the stage set in the centre.

Consequently, one may argue that what was once, in the early days of the theatre, a step toward the gradual dissolution of spectator and actor, later—at the twilight of the bourgeois theatre—was made to serve the cause of their "reunification"! How else could we read this kind of layout—amid the prevailing theatre houses of the day, everywhere asserting the physical separation of the spectacle's participants with *rampes* and curtains—but as a step toward a mutual interpenetration of action and audience?

In any case, the tendency toward a clear separation between stage and audience finally prevailed.

It reached its peak when the curtain came down and the *rampe* came up between the two sides.

But no sooner had the theatre reached this stage than the "backtracking" began: all sorts of efforts were made to restore the lost unity—whether by way of drawing the audience into the action or vice versa.

Remarkably, these efforts tend to progress in a kind of "inverse symmetry."

At first they are manifest in various attempts to "break down" the "fourth wall," dividing the actors from the audience.

Later—closer to our own times, marked by the emergence of cinema—there is a burst of experimental activity aimed at resurrecting the concentric arrangement of spectator and spectacle.

We might recall how eagerly (and profitably) the theatre of those days seized upon the tradition of early spectacle, preserved intact in the circus show: whether it be a performance of the Franconi circus in early nineteenth century Paris or its contemporary, the Sans Pareil Theatre[6] in London, which boasted a fully equipped theatrical stage, as well as a pit that could be readily transformed into a circus arena or, in our own times, the "aquatic pantomimes" of our domestic circuses, such as the Salamonsky, Ciniselli and Truzzi, or the Busch circus in Berlin.

The range of subjects covered by these pantomimes was absolutely limitless.

So, as I child in Riga, I saw a Truzzi pantomime based on the Sherlock Holmes stories of Conan Doyle.

And in the thirties—at the Busch circus—an even more striking spectacle, inspired by the events of... the French Revolution.

This "aquatic" pantomime reaches its high point toward the end, when the ill-fated "aristocrats," recognizing their own inevitable demise, finish their lavish dinner and plunge—voluntarily and with great dignity—into the watery pit of the arena, to vanish mysteriously in its depths.

The less sophisticated members of the audience—unaware of the system of underwater pipes, through which the "drowned aristocrats" emerged from the waters somewhere behind the stables—stood gazing into the watery "depths" of the circus arena for some time after the show had ended, expecting the actors, or perhaps their corpses, to come floating up to the surface!

At the time, the reintroduction of these elements ("hibernating" in the circus) into the theatre, in its effort to revive the scenographic traditions of the ancients, and the increasing intimacy between action and audience yielded such notable results as an *Oedipus*, staged in a circus arena, and a production of *Danton* at the Großes Schauspielhaus (Berlin)[h], where the whole of the pit was cleared for use as the playing space.

This kind of arrangement is not only associated with mass spectacles, pathetic dramas or dramatizations of "epic" events.

A relatively small theatre, built along the same lines, had opened in Washington in the pre-war years, offering "intimate" or "chamber" productions—on a stage, surrounded by spectators on all sides.

Re-enactments of historical events (in front of the Winter Palace and at the Stock Exchange[i]), in the first years after the revolution went even farther. The aim here was to reconnect with an even earlier, collective-action phase of the theatre.

These efforts, however, along with revivals of carnival procession-plays, failed to make a significant impact on theatrical practice.

Presumably for two reasons.

On the one hand, they relied far too much on stylized re-enactment. After all, such productions were often staged by people especially partial to the idea of stylized revival of the theatre of yesteryear.

That is why these early mass celebrations were dominated by the "spirit" of the theatre of another—antiquated—age, a spirit so contrary to our own times and its concerns, neither socially nor even... climatically consistent with what such spectacles ought to have been in the first years of the revolution.

On the other hand, the very "technique" of these "pageants" was far too archaic. What had been a natural form of expression of popular sentiment in the age of "trade guilds" was not quite "doing the job" in the age of the proletarian revolution!

But the impulse to stage mass re-enactments of real events in their original locations soon found its historically justified expression in the... historical revolutionary drama film—pioneered by Soviet cinema, which inherited the ancient tradition of collective performance, and was able to give this tendency new form with the help of the cinematic art and new technology.

So much for the tendency to thrust the action into the midst of spectators and its development over time. It reaches its climax in popular film, insofar as film is able to coax a dynamic performance (no less dynamic than that of a human actor) from palaces and fortresses, bridges and battleships, factories and swaying fields, i.e., the whole of the manifold reality that spread all about the spectator. At this stage we have a hard time distinguishing the "polarity" of the interaction between the spectator and his environment: we cannot say with certainty whether it is the action—once encircled by a crowd of spectators—that is now spilling out, beyond the confines of the theatre, or whether the whole of the physical world has burst through the camera lens to rain down upon the spectator, surrounded by screens and speakers.

Remarkably, this second tendency—to encompass or embrace the spectator, to pull him into the action that is transpiring all about him—runs through the whole of the theatrical history no less vividly or consistently than the first: to thrust the spectacle into the very centre of the concentric rings of spectators, encircling the action.

For example, we know from contemporary accounts that the theatres of Medieval Spain were equipped not only with a proscenium that extended out into the auditorium, but also with a circular proscenium—a platform running along the edges of the house on all sides, so that the action could spread out all about the audience.

I have never been able to locate a picture of such a layout. But I can refer the reader to a seventeenth century design that likewise reflects the idea of encircling the audience with the stage.

This curious design is attributed to Joseph Furttenbach (b. 1591), known primarily for reintroducing the ancient Greek *periaktoi*—which in the sixteenth century were called *telari*—as a staging device.[7]

This particular design was produced about the year 1655.

It is based on a heptagonal layout of the auditorium.

On four sides the heptagon is adjoined by four separate stages.

The action of a play could move in succession from one stage to another, or unfold simultaneously on all four.[8]

This space is especially remarkable, because it allows the players to perform not only "around" the audience, but also "inside"—in the midst of the audience.

For this one must simply remove the audience to the four side-stages, in a kind of amphitheatre formation about the central space.

This setting might be used for tournaments, ballets and other such spectacles and festivities.

I cannot say whether my early memories of Furttenbach (whom I had first encountered in 1915, as a student of architecture) or some other associative links are to blame, but in any case a similar tendency is manifest in the scenography of practically every one of my plays produced in the years before *The Strike*, beginning with the very first effort—a staging (co-directed with Smyshlyaev) of Jack London's *The Mexican* at the First Workers Theatre of the Proletkult (on Karetnyi ryad, in 1920).

To some extent *The Mexican* was a recreation of Furttenbach's design, taking advantage of both of its possibilities. For the play's climactic episode a boxing ring is brought out into the auditorium, and an amphitheatre is set up on the stage for those spectators of the boxing match that would be played by actors. These tiered rows of seats, lined up with the boxes and balconies of the actual auditorium, complete the circle around the new stage at the centre of the hall—in the very midst of the audience.

While in this particular case our design was dictated as much by the actual layout of a boxing arena as it was by aesthetic concerns, a more elaborate realization of the same principle in one of the subsequent productions evolved out of wholly different considerations.

Largely out of the demand for fast scene changes and quick shifts of the action.

The design was for the production of an "American-paced" crime thriller about kidnapped inventors and stolen patents (1921).

The audience would be surrounded by twelve stages with moveable scenery.

The action could leap from one stage to the next, transpire simultaneously on several—or all—stages at once, and even... overhead: on hanging bridges and cables, reserved for particularly dramatic scenes. The seats in the auditorium were supposed to pivot[9], although there were also plans for... a revolving auditorium, which might turn the whole of the audience to face the action, all in one go.

The project was never realized. But I do remember that the Mossovet was willing to let us use the round building of the old manège on the Tsvetnoy Boulevard, next to the State Circus.

So much for the various attempts at a concentric-circular unification of audience and spectacle, from ancient times down to our own.

I do not hesitate, here and elsewhere, to cite examples from my own theatrical practice.

The reason is that my practice belongs to the time when the art of theatre seemed to be on the verge of attaining in cinema the expressive possibilities that had eluded it for so long.

The theatre of my day still strove to realize, within its limited range, the aims that are realized so readily—and realistically!—by cinema alone.

Needless to say, to attain these expressive possibilities the theatre of those days was driven to sacrifice practically all of what is generally comprised under the term "scenic realism."

Cable bridges suspended over the audience; stages running all around the auditorium for instant shifts of action; *periaktoi* on a revolving stage, which precluded the use of traditional painted backdrops—an essential element of realistic set design, etc., etc.

It is altogether telling that once cinema had "found its feet," and was able to realize on the screen many of the tendencies pursued by theatre, the latter promptly disavowed all further "inquiry" and experimentation along these lines.

This fact once again refutes the claim that the period of great experimental foment in theatre—which ought to be dated, perhaps, to the early days of the Art Theatre—may be characterized as a mere pile-up of wanton "gimmickry" and sensationalism, as certain "theatre critics" would have us believe.

At their best, these efforts reflected an increasingly acute need for a thorough recreation of reality.

The more socially-minded, progressive branch of the theatre understood that such realism was integral to the problem of conscientious reflection of social reality and, to the best of its ability, it was able to preserve these traditions for the coming revolution: the sole possible wellspring of a genuinely realistic art—the art of socialist realism.

Hence a number of theatres seeking to capture authentic reality through exigently faithful recreations, sparing no effort to achieve a complete illusion of reality, in all its minutest detail.

An adherence to the principles of naturalism, be it in matters of scenography or acting technique, is perfectly natural here.

Another school of theatre had followed a wholly opposite path.

Unencumbered by progressive aspirations (at times outright reactionary), its exponents sought a "different" reality and a different "truth."

Their "ultimate reality" was to be found in the character's individualistically isolated inner world.

And in matters of staging, theatres of such strictly subjective persuasion sought fundamental reality not in faithful recreations of objective reality, but in the authenticity of the scenic fact as such.

Hence their "conventional" representations of reality, not merely rejecting illusionism, but emphatically reminding the public that ultimately the only authentic reality to be found in the performance is the reality of... the play itself, of the scenic act itself, never of what the act represents.

Nevertheless, we may well profit by certain techniques and expressive means of this "conventional theatre."

We might recall here this theatre's insistence on the use of the "suggestive detail," opposing the tendency to recreate every detail and minutia of a particular setting or action.

A telling detail can create a palpable impression of the whole, dispensing with the need to reproduce the whole on the actual stage.[10]

Hence the natural affinity of this school of theatre for Impressionism, at the time the prevailing tendency in literature and music, not to mention painting.

Such, briefly, are the two irreducible extremes along the spectrum of ideas about reality and its representations. Naturally, in the pre-socialist era they could not be reconciled in a system synthesizing various healthy kernels they contained alongside the inevitable errors, excesses and misconceptions.

The necessary social conditions have not been put in place yet.

And the "theatre of the future"—i.e., cinema, the only art form capable of meeting—by virtue of the fundamental traits of its technical aspects and capabilities—the toughest aesthetic challenges, facing the theatre of the past—was still in its infancy.

It should be noted, however, that even at that stage there was a certain premonition, particularly among our critics, of a possible "synthesis" of these two branches of theatrical culture in Russia.

These authors moreover supposed that such a synthesis might take place not only outside the boundaries of "theatre proper," but specifically within the domain of cinema.

Taking into account the embryonic state of cinema at the time—this would be about the year 1908!—we could hardly deny these authors a certain degree of "farsightedness."

In those days one of the main proponents of this idea was the eminent V. Frietsche[j]—who would be guilty later, in the post-October era, of advancing some rather anti-Marxist opinions in matters of art.

Even in his early writings one could already discern the markings of an inauspicious ideological bent, which later nurtured his erroneous views.

In his "Theatre in Contemporary and Future Society" (*v*. the collection *The Crisis of Theatre*, put out by Problemy Iskusstva, M., 1908) he paints a rather naïve picture of theatre in a socialist society:

"In a socialist society the stage must once more merge with the audience, and the theatrical spectacle, with its division into actors and spectators, will give way to collective celebrations, festive processions, mass choirs, etc." (p.185)

This is a clear conflation of an actual regression to bygone, obsolete formats—with a "quasi-return" to the past as a guiding principle of genuine progress.

We have already touched on the outright failure of such "restorations" in the very first years of existence of the socialist state. And, of course, Frietsche simply lacks the powers of insight to discern the significance of cinema for a socialist society.

Although he gives the "battlefield"—i.e., final victory in the contest between theatre and cinema—to the latter, instead of hailing it as the leading art form of the triumphant proletariat, he erroneously sees it as the ideal embodiment of the principles of bourgeois culture:

"The battlefield will belong to cinema, which is better suited than any theatre to the conditions of the bourgeois-capitalist society, marching down the path of advanced industrialization!" (p. 174).

Meanwhile, for some incomprehensible reason, the theatre of a socialist society—boasting a far more advanced industrial culture and might—ought to indulge, according to Frietsche, in bizarre revivals of the distinctly "bucolic" collective celebrations of antiquity!

It is not these assertions of Frietsche, however, that I would like to address here, but rather his ideas about the possibility of a synthesis of the principal trends of the "naturalistic" and the "conventional" (or "Impressionist," as Frietsche calls it) theatres, precisely through cinema.

Note that he frequently refers to cinema as "mechanical theatre."

This term, however, is evidently a reflection of the fact that in the pre-revolution years cinema had yet to work out much of the genuinely creative devices that would later comprise the arsenal of its expressive means, and was largely limited to mechanical reproductions of theatrical performances.

(We ought to keep in mind that it was not until the following year, 1909, that the young, fledging filmmaker... D.W. Griffith directed *The Lonely Villa*, his first effort to feature the sixteen-year old Gladys Smith, destined to achieve fame under the name... Mary Pickford! And *Intolerance* was still eight years away.)

"With the advent of the industrial age, theatre has ceded its place to—cinema.

However paradoxical it may seem at first glance, the way toward mechanical theatre had been paved, to a large extent, by naturalistic and Impressionist drama...

...Those that came to cinema from naturalistic or Impressionist theatre found only minor differences between these two types of spectacle. The mechanical theatre could deliver better and more efficiently what naturalistic and Impressionist theatres had struggled to impart to their audiences (an accurate reflection of reality and a series of impressions[11], respectively). In his quest to capture truth on the stage, the naturalistically-minded director invariably came up against technical limitations or prohibitive costs, and even the most scrupulously detailed scenery ultimately retained something of a symbolic quality. Meanwhile, cinema could reproduce on the screen virtually any scene: train wreck, flood, battle, city streets with their traffic and bustle. The mechanical theatre—better than any other—could quench that thirst for realism, which (Zola would have it) torments the modern European and cannot be wished away even by the adherents of the "minimal" stage.

A cinema-goer delighted not only in the near identity of reality and its representation, but also in the rapid succession of many distinct impressions, which, rather than fatiguing him, never failed to excite his curiosity. Thus, mechanical theatre was able to satisfy another need, characteristic of our "feverish and hurried" times: the unquenchable thirst for novel and fleeting images, sensations and moods.

Indeed, cinema has been able to reconcile within itself the essences of naturalism and Impressionism: it is, in every sense of the term, a 'théâtre moderne.'" (p. 172-173).

* * *

We have examined various efforts to unite the masses and the spectacle in a concentric-circular formation throughout theatrical history—from the deepest antiquity to the present times. We should add, however, that these efforts are everywhere matched along a wholly different trajectory—the tendency to "bridge the gap" (literally and figuratively) between stage and audience, wherever these are positioned opposite one another, divided by the curtain, the *rampe* or simply by the hard edge of the stage.

In the first place, these are instances of literal "bridges"—direct materializations of the tendency itself and its main objective—to connect, link, join what has been severed and dissociated!

From ancient times such a bridge existed in the kabuki theatre of Japan.

Here it is called *hanamichi*, which literally means "flower path" or—implicitly—the "path of gifts," since all along this bridge, extending from the stage across the auditorium, adoring spectators set out gifts for their favourite actors.

At a particularly dramatic moment of the play the action may spill out onto the *hanamichi*. And the actor, emerging onto the bridge, brings the "close-up" of his face into palpable proximity of the spectator and, at the same time, plunges "into the very thick" of an empathic audience. The so-called "proscenium"—coming into fashion and general use shortly before the first World War—is closely linked to this tradition in its dramatic function, and spatially may be thought of as something of a "truncated" flower path.

At the same time, Japan is not the only nation to boast a full-length "flower path."

It is also an essential feature of a certain kind of spectacle, extremely popular in America and known as *burlesque*.

Burlesque theatre is a slightly altered version of the kind of entertainment that in Europe goes under the general designation *variétés*. This is a mix of brief sketches, music-hall numbers, songs and "girls" routines.

Precisely for this last kind of attraction—the "girls"—the American *hanamichi* is simply indispensable.

Down this path they go—these rather less than "semi-clad" young women—sashaying in "Indian file," swaying their hips and cutting right through the audience in a single uninterrupted dance step.

At this moment, when the girls and their audience come face-to-face with one another, the "play"—designed to run the whole gamut of "friskiness" in plot and substance—reaches its climax.

To discover the very pitch of passions, roused by such communion, one ought to leave the relatively subdued dens of New York's 2nd St. and look into similar establishments of the more impetuous Mexico, like El Molino Verde in Mexico City, with its male-only audiences, largely made up of strapping lads, loud and mischievous labourers, taxi drivers, telegraph operators, postmen, apprenticed craftsmen and young vagrants, each eager to outdo his neighbour in displays of light-hearted lubricity and cynicism.

Evidently, the principle of *hanamichi*, whatever form it might take, embodies most vividly and immediately the principle of the spectacle "penetrating" into the very core of the audience.

At the same time, our examples have hardly exhausted all the possible manifestations of the "*hanamichi* tendency"—to bridge the gap between stage and audience.

So, in my own 1923 production of *Enough Stupidity in Every Wise Man*, the traditional *hanamichi* was transformed from a wide, horizontal platform into a steel cable, stretching diagonally across the auditorium, from the stage floor to the banisters of the balcony at the back of the theatre. Down this tightrope, balancing with a Chinese umbrella, entered—"through the audience"—G. Alexandrov (alive and well to this day, and staging his own productions), in the role of the mysterious villain Golutvin.

These are just some of the varieties of spatial manifestations of one and the same tendency toward a union and interpenetration of actor and audience.

There are, of course, countless other "unifying" devices that do not rely on such physical or spatial "immediacy."

An actor need not physically "enter" into the seating area.

Need not "leave" the stage, taking one of the empty seats in the front row, to chat from there with another actor, perched on the prompter's box.

That was how Pantalone and Brighella conducted their dialogue in the unforgettable production of *Princess Turandot* at Nezlobin's theatre in Riga, which I attended in 1914.

I still remember the absolute rapture of delight that I experienced all through that performance, reaching its climax precisely at such moments of "breaking the frame," which I had encountered there for the first time.

Incidentally, that play had been the initial impetus for my subsequent career in theatre.

And my particularly acute response at such moments in the production suggests that this device is more than a bit of clever gimmickry, that it appeals to a very basic, innate tendency (more on this—later).

In any case, as we have said above, there is certainly no need for an actor to leave the stage and enter the auditorium each time he wants to establish this sort of physical connection with the audience.

Does he not surrender himself to the audience with every performance, casting the gifts of his talent across the *rampe*?

But surely creative inspiration is not the only thing an actor can "toss" to his audience.

This same tendency may also manifest itself in any number of scenic devices, such as direct address—a single line, a tirade, a monologue, addressed directly to the spectator.

And here it is the word—thrown "in their faces"—that functions as a bridge to the audience.

Especially when this word is a call to arms or an invective.

So, in nearly every production of *The Young Guard*[k], the young heroes of the Red Army recite their solemn oath—directly to the audience; and we receive it as a nearly palpable bridge—not the illusory, multi-coloured rainbow, which the gods of Wagnerian Olympus use to climb down to earth from their heavenly meadows—but the bridge of the audience's steadfast communion with the exploits and the memory of those real-life fallen heroes, speaking to us at that moment through the lips of actors on the stage.

And when it comes to the invective, none had gone farther in this direction than... the Art Theatre—that staunch adept of the "fourth wall" (physically, if not emotionally, dividing the actor from the spectator)—when, in its production of *The Government Inspector*, the late Moskvin shouted into the audience: "Who are you laughing at? You're laughing at yourself!"

And not simply shouting it into the audience.

But hurling it at them, his foot planted on the prompter's box, and tilting the chandelier to shed its light onto the audience.

Sometimes it isn't a tirade, thundering over the spectators' heads.

Sometimes it is no more than a sly *a parte*[12] to the audience, delivered at the very moment when the illusionism of the action has reached its climax, "grounding" it by way of this direct contact with the audience, bringing closer together the staged and the actual reality just as the former is on the verge of veering off into speculative abstraction or naturalistic illusion.

Ultimately, any such "breaking of the frame"—favoured especially by the so-called "theatre of convention," and marking the individual acting style of the inimitable late Varlamov among our own actors, or Eddie Cantor and Ed Wynn in America—is always an attempt to restore the lost unity of actor and spectator, just as it is a "tying down" of theatrical illusion, soaring off into "high heaven," to the concrete reality of the scenic act.

This tradition of direct, live communication "across the *rampe*" had become so ingrained in us that it could even make the leap from theatre into cinema.

Now that we are no longer dealing with a live performer, but with his screen reflection, an *a parte* to the audience is doubly curious.

And yet this device figures here as well.

Nor is it limited to some such ideas as were expounded to me by Pirandello, when I saw him in Berlin sometime in the 1930s.

He wanted to write a screenplay, wherein actors on the screen carry on an argument with... the projection booth.

Unfortunately he was beaten to it, long before, by Chaplin, in one of his earliest comedies, when he was still playing bit parts opposite the once-celebrated Fatty Arbuckle.

In the course of the action there is a boxing match.

And in the course of the boxing match one of the boxers... loses his trunks.

Left in nothing but his jockstrap, the boxer winks at the projectionist and motions with his hand, asking him... to raise the frame.

The frame obligingly tilts up, cutting off the boxer at the waist and so preserving his modesty!

The whole business goes even farther in the much later film *Hellzapoppin'*: here we get lines spoken directly to the audience.

I can no longer recall all the details, but there is an episode that goes something like this:

a certain Mr. Brown is repeatedly paged from the screen (just as an actual audience member might be paged by an "usher"—ticket agent or collector, to take a phone call or receive a "message"—some communication from the outside).

After the third or fourth time it is finally revealed why this "Mr. Brown" is being summoned.

Turns out it's time for junior to go off to school.

And there is but a single pair of pants in the Brown household, shared between father and son!

At the dawn of the sound era audiences sang along to musical numbers, with lyrics provided in the form of on-screen titles.

These sing-alongs were conducted by—a white dot, jumping from one word to the next, syllable by syllable, musical phrase by musical phrase.

So the good old theatrical tradition of taking an aside, tossed at the audience, and turning it into a refrain, sung by the audience, is manifesting itself in cinema.

Moreover, words are not the only things that can be tossed from the stage into the audience, or vice versa.

Audiences have been known to toss flower bouquets.

While garlands of violets can sometimes fly from the music-hall stage during a singing number.

I remember very well the audiences at El Molino Verde roaring with excitement as bunches of flowers launched from the stage fell into their hands.

Then and there I witnessed a scene, the likes of which I have never seen since: a bronze-coloured fellow was lowered—head first!—from the balcony—to collect from the singer on stage a little bouquet that failed to clear the gallery!

Traditions of connecting with the audience—be it through flowers, birds, even... perfume, can be traced back to the deepest antiquity.

Moreover, they constitute a nearly indelible element of various triumphal entrances and urban festivities of the Renaissance.

In 1431, in honour of Henry VI, allegorical figures representing the Clergy, the University and the City, incorporated into the Parisian coat of arms, welcomed the procession by releasing flocks of birds from their gaping scarlet hearts, and showering the king and his retinue with violets and other flowers.[13]

In 1486 in Troyes maidens gathered roses before a backdrop of artificial mountains and twisted them into garlands to throw at the king's feet.

In the same fifteenth century festivities included "angels," wielding censors and wafting frankincense and other fine perfume over the crowds.

Fine fragrance likewise floated from the stage into the audience at the opening of the famed Teatro Olimpico in Vicenza on March 23, 1585, as attested in an ecstatic letter of Filippo Pigafetta—who was in the audience during that theatre's inaugural production of *Oedipus the King*.

And the tradition largely survives in "Battles of Flowers," still held in Nice and Los Angeles.

A new type of unifying principle of stage and audience appears in the eighteenth century—light.

This is noted, among others, by A. Hyatt Mayor in his monumental biography of the Bibiena family, which included four generations of architects and theatrical designers:

"Where our electricity isolates the stage like a picture framed in darkness, the candlelight ebbed and glowed more or less everywhere. The unity became complete when the same artist designed both scenery and auditorium, so that the intricate architecture of the wings continued in the same style out through the proscenium and pervaded the whole house."

The magical effect of such architectural and visual unity of scenery and auditorium might be attested by anyone who saw the production of *Masquerade* at the Alexandrinsky Theatre in Petrograd shortly after the revolution.

The play was still staged then by candlelight, and Golovin's astonishing portals and sets coalesced with the architectural decor of the auditorium into a uniform organic ensemble.

A different sort of "luminous" *hanamichi* was attempted in my own production of *Die Walküre* at the Bolshoi Theatre in 1940.

In the finale of the first act, as the lovers' ecstasy in the duet of Siegmund and Sieglinde swells to fill the whole of the universe, a battery of floodlights, positioned behind the foliage of the giant ash—spreading over much of the stage—are turned directly onto the audience, filling the enormous auditorium with their golden light and fluttering shadows.

These golden beams, actively bursting into the auditorium, actively completed—twenty years later!—a scenic design that could only be partly realized back in... 1921—in the production of *Lena* at the First Workers Theatre of the Proletkult.

The set for the prologue of that play featured a black and yellow (read—golden) cone, its base at the mirror plane of the stage and its apex pointed—inward.

The cone was in fact composed of a giant wedge-shaped canary-yellow conference table, running from the proscenium arch up the raked stage toward the figure of the chairman of the shareholders' association, seated downstage.

The top half of the cone was completed by a series of receding semi-circular borders, bearing the spheres of a giant chandelier, dissected into a system of planes.

And the whole thing represented a meeting of the financial overlords of the gold-works.

In those days no one was especially bothered by such scenic stylizations.

In the grand finale—the apotheosis of the moral victory of the martyrs of the Lena gold-works—the cone would make a return appearance, once more encompassing the whole of the stage.

This time, however, it is a rather different sort of cone—a cone of light—made up of revolving light beams of all the different colours of the spectrum, coalescing in their rotation into a uniform beam of white-gold.

In this case, however, the light does not burst into the auditorium to dazzle the audience, but, terminating at the proscenium arch, it draws the spectator's attention toward the point where the light rays converge, at their source.

Between these two theatrical conceits, there was another instance of direct incursion into the auditorium—this time not from the stage, but... from the screen.

These were the muzzles of the Potemkin cannons, as the battleship squared off against the tsarist fleet, its weapons pointed directly at the audience, prodding it with the question "Fire? Or..."

This was also the subsequent shot, as the victorious battleship advances head-on into the audience.

This was, finally, the grand finale of the film, proposed (and never staged, to be sure) for its premiere: at the very end the screen would be... rent in half[1], revealing the presidium of a council session, commemorating the heroes of the Potemkin mutiny.

Remarkably, soon after *Potemkin* was shown in Berlin, during the 1926 season—these "impaling" cannons were picked up for a production of a play by Bernard Shaw.

There, the shaft of a massive cannon was extended from the stage out into the auditorium, like some giant telescope—hanging over the spectators' heads.

As for *Die Walküre* at the Bolshoi, I had been hoping to enact yet another kind of "unity" of spectator and spectacle.

I envisioned an "aural embrace" of the auditorium, so that at the climactic moment Wagner's music would actually envelop the audience. We wanted to line the outer aisles with speakers, so that the "Ride of the Valkyries" might actually leap from one speaker to another and at different times emanate from different parts of the theatre, and at the end boom out from every place at once, wholly submerging the spectator in the sonic might of the Wagnerian orchestra.

We could not realize that idea, and I have regretted it ever since.

A similar experiment was later done by Disney and Stokowski, who presented a "stereophonic" version of their *Fantasia* in a small number of specially equipped theatres.

Here the spectator was similarly encircled by speakers.

Regrettably, this technique remained an isolated chance "attraction" and received no further development.[14]

While the stage tried every which way to "break into" the auditorium, the spectator was no less determined to penetrate the scenic action.

Once more, at first these were primitive, physical efforts.

And here, in the first place, we have the "inverse *hanamichi*"—where certain (privileged) members of the audience took their seats directly on the stage, to the right and left of the action—as it happened in Shakespeare's theatre or later in the French theatre.

Once more, the spectator's eye approaches the actor in a close-up.

There is the same physical proximity of actor and spectator, one practically stepping on the other's toes.

And also a nearly complete visual blending of these "emissaries" of the audience with the actors—if we recall that both parties were often dressed alike, not only in "contemporary" plays, but also in many of the historical ones.

Even after spectators had abandoned the stage, the tradition lived on in a comic convention: an audience might be "written into" the play.

So in Ludwig Tieck's comedy *Puss in Boots*, the action is at times interrupted and commented on by "members of the audience" expressly written into the text.

So in a circus, an "enraged" audience member, really a "planted" actor, might leap into the arena to chase after a clown.

Pirandello has gone even farther in this direction, pulling the story itself—not just the commentary—"out of the frame."

While the last word belongs to that infamous spectator, who was so outraged by a character's villainy that he elected to shoot the performer, pitching his fury—along with his murderous lead—across the *rampe*.[15]

But the same tendency may be manifest in the strictly visual elements of a production.

The craze for "perspective scenery," sweeping the theatres of the sixteenth, seventeenth, and eighteenth centuries, was born of the same desire—to "draw the spectator in."

It would suffice us to recall the classic examples of Baldassare Peruzzi or Sebastiano Serlio (1545), whose "tragic" and "comic" scenery alike feature architectural ensembles, dramatically converging toward the centre.[16]

Or Palladio's theatre in Vicenza, mentioned earlier, wafting sweet fragrance from the stage on the day of its opening, but also exerting a tremendous pull on the [spectator's] imagination with the diminishing perspective of three streetscapes, receding through three open portals in the back wall.

(These streets are actually constructed, rather than painted, in such a way as to give an exaggerated impression of perspective, with buildings rapidly diminishing as they move farther away from the portal.)

This tendency, however, achieves its ultimate triumph in the overwrought extravagance of the designs crafted by the aforementioned Bibienas.

The eye is at once drawn into the elaborate zigzags of soaring vaults and staircases of colossal, fantastic architectural ensembles;

and it plunges down into the depths, along a system of perfectly reduplicating arcades, mirrored on either side, and sharply diminishing as they move away from the edge of the stage.

Curiously, even actors may at times be charged with the task of creating the illusion of an exaggerated perspective, converging in the depths of the stage.

So, the great master of the ballet—Noverre writes that a line of dancers ought to be ordered by height, gradually diminishing toward the back of the stage.

To achieve the complete illusion of depth, it is even recommended that the last few couples ("by the water") be made up of... children.

Nor is this the only device used to emphasize depth.

To give the illusion of "aerial perspective" the colour intensity of the dancers' costumes ought to diminish according to their distance from the spectator. (Curiously, in this respect Noverre's recommendations are nearly coincident with standard practice in Japanese theatre!)

In time, however, these vertiginous creations of illusory perspective of artificial depth beyond the portals begin to vanish from the stage.

Does this mean that the tendency to pull the spectator into the world of the scenic action is dying out?

Of course not!

What takes place is merely another change of technique.

This change, moreover, is tied directly to changing social circumstances. But an analysis of social drivers is beyond the scope of our brief essay—we must merely acknowledge the change and say a few words about the new techniques and devices, wherein—about this time, on the eve of the French Revolution—the same old tendency that we have traced so far manifests anew its unflagging vitality.

The bacchanal exuberance of Bibiena's art, perpetuated by his followers and disciples, yields suddenly to its very antithesis.

No more wild fantasies, teeming with arches, colonnades, temples or soaring heavens, unfurling in concentric circles.

These are replaced by—four walls.

Not three, but four.

A mawkish domestic drama is playing out within the confines of a single room.

Audience?

An audience of—one.

But this spectator has little in common with Ludwig II of Bavaria, who also liked to be alone in the massive royal opera theatre for the performances of Wagner's musical dramas.

Unlike that king, presiding over an empty hall, our humble spectator is huddled in the very same room, somewhere in a corner, off to the side, so as not to disturb the proceedings on the stage, no longer an elevated platform but a simple, authentic room.

Naturally, this theatre and this spectator, with his peculiar way of taking part in the action—are an invention.

An invention—that all the more distinctly reveals the very essence of the tendencies and impulses possessing its author.

This author is—Denis Diderot.

And the imaginary set, wherein the spectator is physically embedded into the very intimate space of action is described in the dialogue-commentary on *Le Fils naturel* (1757).[m]

Some hundred plus years later, an outsider would be able to spy on the most intimate exchanges with the aid of the camera lens, unobtrusively penetrating the action—and so the fantasies of the dreamer Diderot would become reality, though before it reaches its ultimate realization this tendency will re-emerge once more in the guise of nostalgia for the fourth wall.

Remarkably, it blossoms forth as two wholly irreconcilable extremes.

On the one hand—naturalistic recreation of authentic settings, within which private lives may be spied on—as though "through a keyhole"—by a devotee of Stanislavsky's theatre.

On the other hand—ultra-conventional staging, along the lines of Everinov's monodrama, where the spectator is made to penetrate into the very soul of the actor, literally to "see the world through his eyes."

Even before he had arrived at the "monodrama"—i.e., during his "Antique Theatre" phase—Evreinov was always driven by this basic tendency.

Here it manifests itself in what was then called "reconstruction of the spectator."

To quote from B.V. Kazansky's slender book *The Method of Theatre: An Analysis of N.N. Everinov's System* (Leningrad: Academia, 1925, p. 104):

"Everinov's dramatization of the *Adoration of the Magi* (7 December, '07) had been a bold experiment in this regard: to help the audience transition to a medieval mindset the play is set in the midst of a crowd of medieval spectators, who might have assembled in their day to see this play enacted upon the portico of their church. This crowd created a peculiar 'medieval atmosphere,' initiating the modern spectator into a system of perception appropriate for the times, thus helping him see the events through contemporary eyes.

The same technique of a mediating environment emerges once more, this time at the dramatic level, in the re-creation of a fair theatre, written into the play *Fair at the Indiction of St. Denis*, composed especially for this purpose."

From this partial revival of the antique chorus—part-actor, part-spectator and always the intermediary between the two—from crowds of spectators, lining the edges of the proscenium—it is but a small step to the idea of a spectator's seeing the action, as much as possible, through the eyes of another—i.e., the hero, now brought infinitely close.

From here it is but a small step to expanding the "mediating environment" to the point where it can assume universal proportions.

Indeed, precisely one year later (16 December 1908) Evreinov delivers a lecture at the Moscow Literary Arts Club titled "Introduction to Monodrama," repeats it twice in the following year, and has it published, first in a journal, then as a monograph.

And finally, in his introduction to *Representation of Love*, included in the first volume of *Impressionists' Studio* (St.-P., 1910), he reiterates its basic principles.

"By monodrama I mean the sort of dramatic performance that seeks to impart to the spectator, to the greatest extent possible, the performer's inner state, by representing his environment as he might conceive it at any given moment of his scenic existence. I propose to replace the old, faulty architectonic of the drama with a new one, grounded in the principle of its scenic identity with the actor's performance.

The transformation of spectacle into drama demands an affective response, which, being infectious by nature, elicits in me a correlative affective response, and so transforms another's drama into 'my drama.' [...]

Monodrama compels every spectator to put himself in the actor's place, to live his life, i.e., to feel what he feels, to think what he thinks, as it were, and ultimately to see and to hear just what the actor sees and hears. The cornerstone of monodrama is—the actor's affective response, eliciting an identical affective response in the spectator, who by virtue of this identity becomes an actor in his own right. Thus the primary objective of monodrama is to transform the spectator into a virtual actor. [...]

...in a perfect drama, one that is transformed into 'my drama,' there is room only for a single actor in the proper sense of the word, a single subject of the action. With him alone I empathize, from his perspective alone I perceive the world and the people around him. Consequently, these latter must likewise be presented to us as refractions passing through the prism of his soul. [...]

The important thing here is not what they say or how they say it, but what the actor hears. What they really look like remains hidden; we will see them only inasmuch as they appear to the actor."

And so on, and so forth, down the line of all the components that make up a theatrical performance: "subjectively inflected" scenery, music, etc., shifting as the mood may shift.

The hopelessly Berkeleyan premise of such an endeavour is readily apparent.

But our intention here is not to attack Everinov or polemicize with him.

And although today the theory of monodrama is little more than an outdated curiosity, it is interesting to look at how one and the same basic tendency, practically inherent in any theatrical spectacle, manifests itself in different forms at different times.

And it is equally interesting to note how at one time this same tendency, summarized in the same few words, may take on two absolutely irreconcilable and mutually exclusive forms.

Because the Art Theatre of those days might have very eagerly signed on to the first half of this monodrama manifesto (the part about correlative affective response).

But you would be hard pressed to reconcile the "practical conclusions" drawn by Stanislavsky and Evreinov from the very same watchword, which equally reflected the ambitions of both men!

In the very same introduction Evreinov confirms that the primary motive behind monodrama had indeed been the "cursed" age-old divide between actor and spectator:

"Monodrama addresses one of the most burning problems in theatrical art today: to wit, the problem of neutralizing the chilling, corrosive effect of the *rampe*. Getting rid of it physically, as some have proposed, does not amount to eradicating it in the imagination: sooner or later bad habit will prevail, compelling us to recreate the imaginary divide. The trick is to render it invisible, even as it remains visible, to remove it—without moving it an inch. And once the director has succeeded through artifice to effect the fusion of the main actor's *I* with the spectator's *I*, the latter—finding himself on the stage, as it were, i.e., in the midst of the action—will lose sight of the *rampe*, leave it behind, and so annihilate it."

The other branch of the theatre sought the illusion, capable of eliciting the most intense affective response from the spectator, at the opposite extreme—wholly antithetical to Everinov's egregious subjectivism—namely, in the highly objective, historical or everyday naturalism of the scenery.

Of the two attempts at a solution, the naturalistic approach, advocated by the Art Theatre in its early days, proved far more resilient than the ephemeral passing phase of "monodrama."

But what makes it all especially interesting is that these two cardinally opposed methods strove at the very same time to resolve—albeit each in its own way—the very same problem.

And both tendencies could only find their resolution, their path to practical realization, in the leading species of the future art—cinema! We need only compare the principles and techniques employed by Evreinov in his *Representation of Love* (with its full battery of stage directions) with contemporary productions at the Art Theatre: *A Month in the Country* (1909), *The Brothers Karamazov* (1910) or *The Living Corpse* (1911).

Naturally, neither of the two methods, so opposed in their ambitions, could address the challenge adequately and fully: neither is able to break down completely the "psychological *rampe*," dividing the actor and the spectator.

The next step in solving this problem—a giant step, which has practically solved it at last—could only be made by a new species of art—cinema.

And here, on the eve of cinema's decisive victory, the tendency toward the fusion of the two collective bodies—the actors and the spectating masses—assumes wholly unique forms on the stages of October.

Here these two "partners" are understood as the embodiments of two fundamentally distinct realms, divided by the *rampe*: the realms of Fiction and Reality.

The theatre of those years is not content with merely allowing reality to "intrude upon" the realm of fiction.

This theatre is not satisfied with the idea that an invented situation may truly live, inasmuch as its every fibre is imbued and saturated with the sensation of real life.

This theatre would also "physically" plunge "factual reality" into invented scenes and situations.

Consequently, practically every innovative theatrical production of that period featured some element of the circus, characterized primarily by actual physical work, rather than mere acting.

Yielding to the same tendency, plays about the Civil War—still in progress at the time—might include actual reports from the frontlines, delivered from the stage in the intermissions.

This is the tendency that drove "real" motorcycles, trucks, seeders, and harvesters onto the stage.

Personally, I am especially partial to this kind of theatre—my own transition to cinema took place within its context—and much of my theatre work owes this tendency a considerable debt.

If the former ("conventional") theatre's polemic against naturalism might be summarized by Chekhov's indelible pronouncement on the aesthetically revolting "real nose, poking through a painted portrait," then, recalling my own theatrical works of 1920-24, I must admit that my ideas were directly opposed to Chekhov's.

In my own work, the "artificial portrait" of theatrical representation is increasingly and persistently split open by a... "material" nose. First in the form of what in my circus phase I referred to as "real doing," and later—in my film work—as elements of reality, fact and true-to-life *typage*, minimally distorted by the director's will and used above all in the juxtaposition of montage.

Early on this was an actual boxing match in *The Mexican*—albeit with a predetermined outcome, but we ought to remember that in America the vast majority of matches are fixed; a liberal use of the circus; elements of Grand Guignol, functioning extra-aesthetically, etc.

Passing over the transitional attractionist phase of the real-life combine harvesting painted sets (a device that I even parodied in one of my productions, bringing onstage a live camel!), I also used the inverse of this device: staging an invented incident about a gas explosion on the premises of an actual gasworks.

This, it would seem, is the final stage in the evolutionary development of the theatre species.

For here too we are witnessing what essentially amounts to a "commemorative act," i.e., a re-enactment of an actual tragic incident.

(Of course, the play focuses less on the incident itself and more on the heroism of certain individual workers, who sacrifice their lives in an effort to save the common good—the factory.)

Not only was this action simply commemorative—it was staged in a location that was in every way identical to the one where the actual tragedy took place: a different factory in a different city—but a factory nonetheless, an authentic gasworks.

Similarly, commemorative re-enactments of tragic episodes from the life of Dionysus—originally at their supposed mythological locations, and later at every place that emerged as a cult centre—were gradually transformed from tragic dithyrambs into dramatic spectacles.

Likewise, at the outset the mystery plays of the Middle Ages are purely commemorative.

At their earliest stages they are simply re-enactments of the "passions" of the central character of Christian mythology inside the very edifices that serve to perpetuate the propaganda of his earthly sacrifice: at first at the very heart of the cathedral, later out in the cathedral square, and only much later in public squares, with separate stages representing Paradise, Hell and the Universe.

Curiously, the theatrical fantasies of Diderot we mentioned earlier also belong on this list... since *Le Fils naturel* was conceived as an annual commemorative re-enactment of the tragedy that had at one time shaken the house of Dorval to its very foundation—in the very place where it transpired!

The history of our cinema has its origins in these same principles and premises. And it is cinema alone that could fulfill this tendency—and create the illusion of near perfect palpability—organically and with minimal effort.

Indeed, the unique history of Soviet cinema begins with a series of epic historical canvases.

Recall the "Odessa steps" or the storming of the actual Winter Palace (*October*), Viskovsky's *January 9th*, Barnet's *Moscow in October* or Pudovkin's *The End of St. Petersburg*.[n]

And it is readily apparent that by staging the action at an actual gasworks I had effectively slipped past the boundaries of "theatre proper"—into cinema.

Where the full battery of real ships and buildings, factory chimneys and bridges, working machinery and "untreated" *typage* erupted into the phantom web of fiction on an unprecedented scale, unavailable to the art forms of the past, effectively turning upside down (or right side up) the old Chekhovian "formula"—where it is no longer the real nose, poking through a fictitious painting that we find aesthetically revolting, but the last bit of the "false nose," i.e., theatrical anachronism, that on occasion might still be found clinging to a living cinematic image.[17]

Not only had cinema—that ultimate stage in the developmental history of the theatrical art—realized successfully the tendency to reunite spectator and performer, it was also able to merge the realm of Fiction with that of Reality, transformed by an artistic will. No monodrama, no theory of the "fourth wall" could ever accomplish this task to the same degree.

For cinema alone has the capacity to insinuate its eye and ear—its lens and microphone—into the most intimate of situations; to be that invisible spectator of a scene unfolding within four walls; to draw so close to an actor as to read in his eyes the slightest nuance of a nascent emotion; to register a barely audible sigh; to see a character as he appears to others, and to look at the world through his eyes; i.e., from his emotionally charged perspective.

These are the basic "artless" strategies made available by the new technology of cinema, but they are hardly indicative of its creative potential. Indeed, the art of cinema went much further when it attempted to penetrate into the thought processes and emotional states of its characters with the technique of "interior monologue."[o]

Moving swiftly—more theoretically than practically—through the representational phase of this tendency, our filmmakers soon recognized this kind of inner speech as the foundation of cinema's audio-visual syntax, in transition toward the cinema of audio-visual counterpoint.

Thus, in the course of its aesthetic development, cinema is able to effect a profound fusion and interpenetration of artwork and audience, artist and consumer.

But whereas here, in the subtle matters of structure and rhythm, the interconnection is never permitted to "hit you over the head," the same tendency may also manifest itself at the other end of the spectrum—in various devices and techniques tending toward the ostentation of gimmickry.

So in *Rebecca* Hitchcock deploys all manner of "trickery" to translate to the screen that sense of the narrator's "I" that pervades Daphne du Maurier's novel.

To be sure, in literature first-person narration is one of the best—albeit far from perfect—strategies for making the reader "see through the eyes" and "experiences the emotions" of a character in a novel.

There have been many attempts to bring to the screen the inner world of mental associations, subconscious symbolism and fantastic dream visions.

The year 1926 saw the release of *Secrets of a Soul*, a "psychoanalytical" film starring Werner Krauss and boasting some of the most outrageous interpretations of Freud's "teachings"—sufficiently outrageous in their own right.

Some twenty years later the stages of Broadway and American and British film studios are literally swarming with the same thing.

Once again, Hitchcock is leading the way with his *Spellbound*—with dream sequence scenery designed by Salvador Dalí.

The same is true of Moss Hart's *Lady in the Dark* or the delirium sequences in *Lost Weekend*, to say nothing of Elmer Rice's similarly themed and utterly derivative *Dream Girl*.

There are perennial efforts to wholly merge—directly and "materially"— the "eye" of the lens with the spectator's eye and so transform the spectator into the film's "hero" and narrator.

On the one hand—there is Vertov's *Kino-eye*, an elaborate showcase of whatever the filmmaker happens to see—or rather elects to see!—that succeeds in creating not so much an objective representation of reality, but a cinematic self-portrait of its maker.

On the other hand—there are the countless efforts to substitute the lens for—the actor.

This was done, among others, in the film about *Dr. Jackyll and Mr. Hyde*, where the camera initially moves and acts as though it were the "first-person perspective" of the main actor—Fredric March—whose face we see for the first time when the camera pauses... before a mirror.

And this is perfectly logical: when the spectator is posited directly inside the character's eyes, he could only see the latter in a mirror reflection!

This device was lately turned into a novelty and superficial gimmick spanning the entire picture.

That was *Lady in the Lake*.

In this detective drama the idea is taken to an extreme.

One American journal ([*Life*] 13 January 1947) reviewed the film under the subtitle "The camera becomes the hero in a Robert Montgomery murder picture."

This is not the best way of putting it.

It would be more accurate to say: the hero becomes... a camera, and through this camera the spectator is fused with the hero.

"Instead of watching the hero from a point of vantage, the audience sees all the action through his eyes (i.e., the camera's lens). When he sits, the camera dips appropriately; when he asks for a drink, a glass is thrust right at the camera. The actor himself (Robert Montgomery) is never visible except fragmentarily when he acts as narrator, extends his hand or fleetingly passes a looking glass. [...]

...shots like this meant moving huge camera boom around like a leading man, filming unusually long action sequences without interruption. [...]

Soon the onlooker unconsciously begins to identify himself with Marlowe."

To this end the hero's hand not only comes into view to twist a gun out of a girl's hand—a gun pointed directly at him (i.e., at the camera), but is also seen performing a series of basic actions: opening doors, reaching for cigarettes or drinks, handing a telegram from off-screen.

The close-up of "a brass-knuckled fist, crashing toward camera makes the audience jump."

We too were made to jump out of our seats, many years ago, when we felt the full impact of a train, shot from the tracks, crashing into the auditorium!

And in 1903, at the very dawn of cinema, the audiences that came to see the first ever "narrative" film—Porter's *The Great Train Robbery*—must have jumped out of their seats when at the very end they saw George Barnes, framed from the waist up, shooting point-blank into the lens—at the camera—at the audience.

Forty-two years later Hitchcock adopts this device, and takes it further.

He is not simply shooting at the audience.

He is making the audience... shoot itself!

In one of the final scenes of *Spellbound* Dr. Murchison's gun in the foreground is pointed menacingly at Constance, played by Ingrid Bergman.

She has just identified him as the murderer and outlined his rather grim prospects. Dr. Murchison threatens to shoot her.

But... (I quote from the screenplay):

"Slowly, deliberately, courageously, Constance turns her back to the gun in Murchison's hand, opens the door and passes out. The door closes behind her.

The gun in Murchison's hand remains silently aimed at the closed door for a moment. Then ever so slowly his hand turns round until the revolver is pointed directly into camera.

After a second's hesitation Murchison's finger presses the trigger and the screen is filled with the flash of the revolver's explosion."

Perhaps we should interpret this too as a "sign of the times."

This "shift" from an act of self-assertion with a gun to... suicide (both employing one and the same staging technique!) is consistent with the far more pervasive and increasingly obvious shift in Western cinema: from the early, practically documentary, "objective" (inasmuch as the West is capable of it) grasp of phenomena to a labyrinth of pathological subjectivism and introspection that has enveloped the art of capitalist nations like a thick and poisonous cloud.

In post-war France all this is associated with Sartre and Existentialism.

But it was the very same tendency that prompted René Daumal, shortly before the outbreak of the World War, to publish an essay in an issue of *Verve* (No. 5-6, 1939) devoted to the human face, under the title... "The Head Inside Out"—a description of the face from the "inside":

"*Head and face, described from the inside*. As I have just made my way into the centre of the head I will attempt to describe what I see here. In front of me is a part—mostly soft, with slits through which I am able to see, hear, smell, swallow, and which I call the front part or the face; the other part—hard and rigid, which cannot see or hear, and is deprived of the faculty of taste or the ability to swallow, I call the skull or the back of the head"—and so on, and so forth.

And the same tendency, once more, must have compelled the makers of the post-war British picture *A Matter of Life and Death* to take such carnal delight in the sequence of a patient "passing out" under anesthetic.

First we see the white sphere of a lamp, suspended from the ceiling—from below, the point of view of the patient, stretched out on an operating table.

Gradually the image grows dark and blurry.

All of a sudden two pink "shutters" enter the frame at the top and bottom, blocking our view.

These are... drooping eyelids!

And just in case there is any doubt, these pink shutters are fringed with... lashes!

Incidentally, here the director is borrowing a device that was used many years earlier in a silent picture. The point is not so much who came first, but that contemporary Western cinema has become acutely susceptible precisely to this sort of trick.

At one time such devices were understood as playful experiments, testing the technical possibilities of the film camera; today, however, they are increasingly symptomatic of pathological introspection, as Western "artists" break away from healthy realism, incompatible with their reactionary dogma, and turn their gazes "inward."

But all such effects simply pale in comparison with the finale of the already mentioned *Lady in the Lake*.

...Eyes half-closed, slowly and languidly, as though fallen under a spell, the young heroine moves directly toward the camera—toward the spectator—offering to the audience (by then fully merged with the camera) her half-parted, juicy, scarlet... lips, "fixed for kissing."

"...making male members of the audience squirm in their seats"—coolly notes the American journal.

Almost... stereocinema?!

I cannot help thinking about those passages in Huxley's utopian satire—*Brave New World* (London, 1932)—where he envisions the future of bourgeois cinema!

In this exposé of a future bourgeois society—amusing at first, and ultimately tragic—the author tracks with magnificent irony certain tendencies, inherent in bourgeois science, culture and civilization—to their logical, i.e., utterly absurd extreme!

This book is perhaps at its satirical best when it touches on the arts.

So, in this "bright future" bourgeois cinema is stripped of its last shreds of sanctimony and pretense, which in our own times are still deployed in certain quarters to cover up its true tendencies: in Huxley's utopia cinema serves—openly and unambiguously—one end and one end only: "sex" and nothing but "sex."

These "coloured and stereoscopic feelies[18] with synchronized scent-organ accompaniment," set to... "sexophone" music (which is what we will be calling saxophones in the future!)—are strictly limited in scope, offering nothing but erotic adventures.

Huxley describes a screening of one such "feely"—*Three Weeks in a Helicopter*.

"'Take hold of those metal knobs on the arms of your chair,' whispered [Lenina.] 'Otherwise you won't get any of the feely effects.'

The Savage[19] did as he was told.

Those fiery letters, meanwhile, had disappeared; there were ten seconds of complete darkness; then suddenly, dazzling and incomparably more solid-looking than they would have seemed in actual flesh and blood, far more real than reality, there stood the stereoscopic images, locked in one another's arms, of a gigantic negro and a golden-haired young brachycephalic Beta-Plus female.[20]

The Savage started. That sensation on his lips! He lifted a hand to his mouth; the titillation ceased; let his hand fall back on the metal knob; it began again. The scent organ, meanwhile, breathed pure musk."

After a series of adventures in a helicopter, the rescued blonde becomes the mistress of all three of her rescuers—handsome young Alpha-males—simultaneously.

The sound of sexophones swells from the screen; the audience is dowsed in the scent of gardenias, and as the last stereoscopic kiss fades into darkness—"the last electric titillations died on the lips like a dying moth."

We might top it all off with an image from one of Disney's latest cartoons, about a whale that wanted to sing at the Metropolitan Opera.

This little picture owes its irresistible comicry to the fact that it is able to give a buffoonish—i.e., concrete or literal—form to a psychological need that ordinarily manifests itself as "subtext" in every one of the countless efforts at the "interpenetration" of actor and sensor, performer and audience, spectator and scenic reality.

This perspective yields a curious "interpretation" of Hitchcock's famous "idiosyncrasy"—his insistence on inserting a fleeting glimpse of himself into every one of his films.

Be it in a crowd, in a theatre, on the street—any place where his rotund figure might conceivably make its cameo.

Even in such a seemingly inopportune setting as a crowded lifeboat, adrift in a boundless ocean—the sole location of the film *Lifeboat*—and offering positively no room for the spherical voluminosity of the greatest master of cinematic "suspense"—even there he manages to wedge himself into the plane of the screen.

This time—in the form of a self-portrait on a scrap of newspaper, clutched by one of the survivors.

This amusing tendency—tinged, perhaps, with a kind of superstition!—seems to be an ironic objectification of Hitchcock's tireless efforts to connect the spectator and the screen by means of every conceivable and inconceivable compositional trick.

And this persisting projection of oneself onto the screen reads as yet another literal expression of this impulse, alongside... Disney's whale, protruding from the stage over the audience at the Metropolitan Opera.

In general, the principle of convergence of spectator and main actor—is at the very basis of Hitchcock's uncompromising method.

"Any story, including an ideal story, based on "suspense," must be structured around a character with whom we could easily identify." So Hitchcock in the introduction to a collection of short stories titled *Suspense Stories*, selected and edited by the director himself and published by Dell in New York in 1945. (*Suspense Stories*, edited by Alfred Hitchcock, Dell Publishing Company, N.Y., 1945).

As you have seen, at different times throughout the history of theatre, this impulse may assume rather peculiar and unexpected forms.

The cannons of *Potemkin* and the Japanese *hanamichi*; the circular arrangement of multiple stages in Furttenbach's design and Moskvin's "challenge" to the audience; Varlamov's peculiar acting style and the vanishing perspective of Bibiena's and Serlio's scenery; the naturalistic traits in the Art Theatre's early days and the ultra-conventionalism of Evreinov's "monodrama"; a bunch of violets, pitched into the audience and a bullet, pitched out of the audience to kill an especially convincing stage villain—all of these, as we have seen, are working along one and the same tendency.

In the face of this ubiquitous and universal presence we cannot help but inquire after the roots and origins of a tendency that has for centuries persisted in the theatre in its quest for a more perfect, more thorough expression.

And the answer to our query practically suggests itself when we recall that this tendency has been especially prominent in the most recent times.

Specifically—in the final stages of theatre's development, coming just before our own times and even partly overlapping the first years of the revolution.

And these feverish attempts at "unification" or establishing "unity" in the theatrical art are hardly accidental.

In the first place all these efforts reflect a vision of reintegration of the individual and society, the social-public and the individual-private principles—the breakdown of which had marked so radically and irrevocably society's transition toward the ultimate stage of capitalism: naked, unabashedly predatory imperialism.

This stage is closely associated with the rise of boundless egotism, egocentrism and ultra-individualism that had marked the passage from the nineteenth century to our own.

And the sermons of return to a "primal fellowship" preached at the time by all manner of sologubs and vyacheslavivanovs[p]—mouthpieces of the most reactionary elements within the intellectual class, which had consciously rejected the progressive-action revolutionary path, renounced the historical destiny of their people and refused to join the ascending proletariat, the only vital social class—were but doomed and desperate efforts to find in art (understood as surrogate reality) a panacea against social isolation, which ultimately spelled the demise of these individualists and their entire social stratum.

Hence the vaguely mystic tinge of these "dionysian" and "proto-dionysian" exhortations—all that remains to these ultra-individualists, who had surrendered once and for all their place in living history beside the ascending proletariat, the true master of the destiny of its people.

Hence also the failures of all those that tried to turn these hysterical rallying cries into stylized versions of mass celebrations in the early years of the revolution.

From this perspective, the tendency toward fusion manifest through the ages appears no longer as an aesthetic whim, but as a reflection of a fundamental urge—the urge to overcome that far more substantial schism of original collective unity, that far more tragic division, which had triumphed at the moment of the stratification and dissociation of the primordial society, not yet partitioned into classes—the exploited and the exploiting classes, the producing and the consuming classes.

The division of the original theatrical action into "consuming" spectators and "producing" performers offers a striking parallel.

And it is especially striking that at the time when one sixth of the whole world is moving to eradicate the very institution of class society, when the notion of consumer is reintegrated in a whole new way into the notion of producer in the person of the equal-part consuming-producing citizen of the Soviet workers' state, and for the first time in history the individual is genuinely integrated into the collective mass within the framework of a socialist society, moving toward communism—the creative genius of this very nation is evolving a wholly new species of art—stereoscopic cinema, which comprises, even within its basic technological features, the ultimate figurative realization of that drive toward unification, which we have traced to its roots—not in biology or psychology—but in social practice.

Above we have outlined a few general ideas that seem to support our assertions about the "viability" of stereoscopic cinema, which we have shown to be—strictly on account of its unique technical properties—an aesthetic reflection of one of the deepest and most powerful drives of humanity, in its transition toward the annihilation of class society and its transformation into a classless society.

No wonder then that the bourgeois West has responded with either indifference or hostile irony to the stereoproblem in cinema, a problem to which the research-and-development genius of the Land of the Soviets, along with its government and the leaders of its film industry have devoted so much attention.

And what shall we say of the musty conservatism detectable in the Western attitudes toward new developments on the stereofrontlines, other than that it is absurd and, to an extent, insulting to the ever-evolving tendencies of a genuinely living art form?

And how could we regard Louis Chavance's thoughts on stereocinema, written in July 1946(!), as anything other than willful obscurantism?

"Is this technological discovery able in some way to heighten the dramatic tension of a scene?

Does an actor, represented in three dimensions, find there some additional expressive means?

A physical plumpness?...

Will this be the triumph of the fat?

What is gained when wrath, jealousy or hatred unfold in three dimensions?

And laughter... I cannot imagine that one can elicit any more laughter than when a pie flies in the face of one of Mack Sennett's flat characters. And what of intrigue?.. Comedy?..

Is any further proof needed that stereocinema is a barren instrument, a sterile weapon?

Certainly we might advance other hypotheses, and I might focus on strictly visual aspects. But we must not be fooled by an analogy with the plastic arts and point to sculptors, who come after painters. Certainly we could film a three-dimensional life of Michelangelo, just as we might do a colour life of Titian... Great! But does it give us any special visual pleasure? Sculpture invokes the idea of tactility, and we do not get to touch the screen."

So Chavance in the first issue of *Le Magasin du spectacle* (July 1946).

Chavance, so dismissive of analogies, is entirely in their thrall. Entirely boxed in by a framework of traditional notions in aesthetics: the norms of "theatrical" drama, traditional acting style, "flat" humour and sculpture "invoking the idea of tactility."

Surely Chavance must think as we do that the time has come for an explosion and thorough re-evaluation of the fellowship of traditional arts in the face of new ideologies, new opportunities for new men and women—with their new means of mastering nature?

What of the eye that can see in the dark with the aid of "night vision" infrared goggles?

what of the hand that can launch missiles and pilot planes in faraway skies by means of radio signals?

what of the brain that, with the aid of an electronic machine, instantly carries out calculations, which at one time would have kept an army of accountants busy for many months?

what of consciousness, struggling tirelessly in these post-war years to forge a concrete model of a genuinely democratic international ideal?

are they not clamoring for artistic expression of wholly new, never-before-seen forms and dimensions, far beyond the limits of the palliatives proffered by traditional theatre, traditional sculpture, traditional... cinema?

To be sure, the new, dynamic stereosculpture will toss traditional, static sculpture—with its yardstick, still wielded by the likes of Chavance—beyond the limits of dimensions and unique qualities.

We must not fear the advent of a new era in art.

We must make room in our minds for new themes, consistent with and enhanced by technological advances, which will require a new aesthetic to incarnate them in the astonishing artworks of the future.

To lay the groundwork for these—is the great and sacred duty of any individual that would presume to call himself an artist.

While those that refuse to accept the ultimate triumph of the technology of tomorrow, might as well deny the very coming of tomorrow—and indeed it will never come for those that obstinately reject the advances of social evolution of the people, those that actively oppose it, or those that are now desperately hanging on to everything that is regressive, reactionary, conservative in the face of an impending future that spells their doom.

But we, our nation, have no part among them!

We are ceaselessly moving forward on ever evolving quests.

Mastering new spheres of technology.

Perfecting the technology of the expressive means of tomorrow.

Because the glorious, triumphant, shimmering tomorrow—belongs to us.

Only to us, and to those that stand with us in our quest to advance humanity into a bright future.

EISENSTEIN'S NOTES

1 The same picture also featured a personification of the "bureaucratic machine"—a colossal, monstrous and terrifying industrial apparatus that took up the entire screen, practically spilling out of the frame. In reality, this was none other than the carriage of an ordinary typewriter, distorted by the "28" lens, "in the best traditions" of foreground composition!

2 We might wish to note here that foreground composition is not only associated with the transition toward stereocinema, but is also fundamentally linked to montage. Many years ago I wrote that montage is a leap into a new dimension with respect to shot composition. In other words, that the internal conflict within the frame can at times reach such a degree of dramatic tension that the frame will "break apart," making a cut—a clash of two adjacent independent images. A shot composed according to the principles of foreground composition, as I understand it, is precisely at that extreme degree of dramatic tension, beyond which the frame can only "shatter" into two newly independent images, clashing at the cut. If we wished to intensify the expressiveness of the shot, the drum—in one of the examples above—would break off into an independent shot of a drum in close-up, which would be crosscut with the marching soldiers. While the distant view—in the other example—would separate from the original image into an independent landscape, to follow, according to the rules of montage, directly after the close-up view of the general looking off into the distance. Somewhat more interesting is another "historical" function of this type of composition. It had been a great help—to me personally, at any rate—in mastering the principles of... audiovisual counterpoint. Indeed, it was rather natural to transition from the two-plane composition, involving two distinct spatial dimensions, to a similarly two-plane composition, with the planes now belonging to two distinct realms or "spheres": i.e., the realms of image and sound.

I believe that my labourious efforts in search of the "commensurability" of sound and image and its eventual discovery in the form of primal "gesture," equally fundamental to both, are rooted wholly in my usual practice of crafting the image in accordance with the principles of two-plane composition—i.e., combining in a single frame two elements of different dimensions, different scales, different types of visual expressiveness.

Ultimately, the audiovisual image (a strip of film overlaid with a soundtrack) is a distinct new stage in the evolution of the concept of foreground—or, more precisely, two-plane—composition. Quite remarkably, only this line of thinking will eventually lead us to a proper under standing of the relationship between the object and its colouration, such that could lay the foundation for an aesthetic of colour cinema. But of this—separately and elsewhere.

3 Although these principles enter into the general conception of the Chinese cosmos as one of the binary pairs, alongside light and darkness, cold and heat, hardness and softness, mobility and stasis, etc., etc.

4 The Russian *рампа*—a direct borrowing of the French *rampe*—denotes not so much the "footlights" of the theatrical stage (its usual translation), as the barrier, shielding these lights from the audience. Because here and throughout this barrier is evoked as evidence of the separation of actor and spectator, the porous, none-too-imposing "footlights" are inadequate and the original French term is recruited in its place [translator's note].

5 Much later, this type of staging was used by the American Norman Bel-Geddes for one of his theatrical projects.

6 Peerless Theatre (Fr.)

7 *Periaktoi* were revolving prisms, used in the ancient Greek theatre as scenery, which could quickly transport the action to a different setting, depending on which face of the prism was turned to the audience.

Many years ago, in 1921, eager to recreate the whirlwind tempo of a bustling fair for a production of Ben Jonson's *Bartholomew Fair*, I wanted to construct a system of *periaktoi*, each made up of three booths or stalls fitted together and set, moreover, on a revolving stage: the sheer number of possible locations, and the speed with which the action could be made to "jump" from one location to another, would have been simply astonishing! Moreover, this setup could create a "carousel" effect during a chase scene or climactic moment, when "the whole world" would be set spinning all at once. Thus, within the "cramped" confines of scenography, I was already dreaming about—and agonizing over—something that would later be easily accomplished with montage.

8 I had seen this design only once, in G. Lukomsky's *Theatres of Antiquity*, vol. 1, p. 273. Curiously, no mention of this project is to be found in the [theatrical] histories of Allardyce Nicoll, Joseph Gregor or Freedley and Reeves.

9 Much later, when I had already transitioned fully to cinema, interesting work in this same vein was being done by Okhlopov at his Realistic Theatre in Mayakovsky Sq.

10 The "close-up" in cinema constitutes to a large extent a continuation—no longer "conventional," but realistic—of the same tendency.

11 It would be more accurate to say: in contrast [to the] "accurate" and exhaustive "reflection of reality" offered by naturalistic theatre, Impressionist ("conventional") theatre could offer nothing but "suggestions," from which the spectator might then extrapolate the whole, to which this detail, this suggestion, belongs.

12 "aside" (*Ital.*)

13 These same birds, flying out of the auditorium into the screen or vice versa—are among the high points of early stereofilms.

14 In stereoscopic cinema the problem of stereo sound will emerge as a cardinal necessity.

15 The more benign exponents of this tradition are still firing their slingshots at the advancing *kappelevtsy* in screenings of *Chapaev*.

16 Similarly converging interiors are commonly found on the backdrops of kabuki productions.

17 To be sure, our cinema has evolved beyond this sort of "extremism" of its early turbulent years. Everything changes, everything flows, and the dozens of pounds of make-up putty expended in the making of part I of *Ivan the Terrible* can attest that the aesthetic principles of cinema have undergone some major, even radical shifts.

18 A slang terms for "moving picture" in the language of the Anglo-Saxon people is—"movie." Huxley invents a new term—"feely"—more appropriate to his novel's fictitious future, wherein the cinematic image is no longer merely visible, but also palpable!

19 This Savage is her suitor and a first-time cinema-goer. He is one of those "savages," whom this society will confine to special "reservations," away from the comforts of civilization, in the interest of preserving something of its exotic past.

In that sense the novel is hardly "utopian," since this is precisely what the United States is doing to the last remnants of its Indian tribes. Today, the surviving members of the Hopi, Haida, Pomo, Mandan, Ojibwe and other native people are forced to reside on specially allotted "zones" in Arizona or some such desolate place, while their legal and economical status keeps them living in packed earth pueblos, practically as savages, surviving largely by amusing tourists with their handicrafts and ritual dances. Of all the forms and varieties of racial oppression, inevitable in a bourgeois society, this is perhaps the most demeaning and opprobrious, and I still shudder to recall those giant "zoos"—where thousands of men and women are kept at an artificially arrested developmental stage: scant descendants of those, whose vast lands were at one time seized and appropriated by their captors.

20 Naturally, all citizens of this future paradise are classified according to the physical and psychological attributes, with which they were endowed at their embryonic incubational stage, a practice aimed at producing members of society most perfectly suited to their predetermined future occupations.

NOTES

An abridged version of this essay was published posthumously in the journal *Iskusstvo kino* (#2, 1948), and the full article was later included in the six-volume edition of Eisenstein's *Selected Works* vol. 3 (Moscow: Iskusstvo, 1964): 433-484. A fully revised, annotated version appeared in vol. 1 of *Neravnodushnaia Priroda*—part of a monumental reconstruction project of Eisenstein's unfinished books, led by Naum Kleiman (Moscow: Musei Kino, Eisenstein Centre 2004). A small fragment of the essay in English translation was printed in *The Penguin Film Review* #8 (London: Penguin Books, 1948). A complete English translation of "On Stereocinema" appears here for the first time. It is based on Kleiman's edition, and has borrowed liberally from his annotations for the following notes:

a *Robinson Crusoe* (1947, dir. Aleksandr Andrievsky), the first live-action feature-length stereoscopic film produced in the Soviet Union, was made using autostereoscopic—or "glasses-free"—technology, developed a decade earlier by the Soviet inventor Semyon P. Ivanov (1900-1972).

b Eisenstein and his cameraman E. Tisse had experimented extensively with the 28mm or wide-angle lens on the films *The General Line* and *¡Que viva México!*, and continued to explore its expressive possibilities with later films. In time lenses with even shorter focal length—and, consequently, greater depth of field—came to be used in cinema.

c The American film director William Wyler was well known for his use of "deep focus" composition. His cinematographer and creative partner Gregg Toland went on to work on the early films of Orson Welles, including *Citizen Kane*.

d Eisenstein had spoken on various occasions about the "cinematicity" and "depth of the mise-en-scène" in the art of Degas and Toulouse-Lautrec, as well as in Japanese woodblock prints of the eighteenth and nineteenth centuries.

e The term "theatre of convention" (Rus. *uslovnyi teatr*) is principally associated with Vsevolod Meyerhold, prominent theatre director and theorist, and one-time teacher of Eisenstein. In its emphasis on the artifice or the "conventional" nature of the scenic presentation, the doctrine constitutes a break with the aesthetic of psychological realism in theatre. Among the exponents of "conventional theatre" Eisenstein also counted N.N. Evreinov, whose interest in reviving the conventions of "antique theatre" and evolving doctrine of "personal theatre" (or monodrama) are examined below.

f Anna Leonowens (Anglo-Indian, rather than American) was for a time employed as a tutor to the wives and children of Mongkut, King of Siam. Her experiences at the Siamese court were fictionalized in Margaret Landon's novel *Anna and the King of Siam*, later adapted as the popular musical *The King and I*.

g The annual festival of Wagner's work in Bayreuth and the Salzburg festival of music and theatre, established and directed by Max Reinhardt, along with Richard Strauss and Hugo von Hofmannsthal, have historically drawn mass audiences to mass-scale productions.

h Max Reinhardt had staged von Hofmannstahl's adaptation of the Sophoklean drama at the Schumann circus arena in Berlin (1910), followed by Georg Büchner's drama *Danton's Death* at the Großes Schauspielhaus (1916). Both productions broke with the proscenium convention, and are regarded as significant moments in theatrical history.

i Mass spectacles *Hymn to the Liberation of Labour* (1 May 1920) and *The Storming of the Winter Palace* (7 November 1920) were staged in Petrograd under the direction of K.A. Mardzhanov, N.V. Petrov, A.I. Piotrovsky, N.N. Evreinov, Yu.P. Annenkov, and others.

j Vladimir Frietsche (1870-1929), historian of art and literature, a long-time adherent of the Social-Democratic movement, was among the first in Russia to apply Marxist principles to the study of art history. Frietshce's views were grounded in the idea that an artist's socio-economic status and background were principally responsible for all aspects of his artistic production. By the mid-1930s Frietsche's ideas were discredited as "vulgar sociologism."

k The stage adaptation of the novel of the same name by Aleksandr Fadeev depicted the heroic acts of a group of young men and women during the Nazi occupation of Krasnodar (1942-1943).

l Evidently the final shot of the film anticipated this unrealized finale: the prow of the ship advancing toward the audience, "slicing" the screen in half. The audience was certainly expected to make the connection to the biblical passage, depicting the moment of Christ's death: "Jesus, when he had cried again with a loud voice, yielded up the ghost. And, behold, the veil of the temple was rent in twain from the top to the bottom; and the earth did quake, and the rocks rent." (Matthew, 27: 50-51)

m In his *Entretiens sur le fils naturel*, published alongside the play, Diderot laid out a program of theatrical reform, rejecting classicist conventions and anticipating many of the discoveries of the scenic art of the nineteenth and twentieth centuries.

n Eisenstein regarded the practice of re-enacting historical events in their authentic locations to be a distinctive characteristic of early Soviet cinema, in contrast with the norms of Hollywood or European cinema with its elaborate constructed sets.

o Eisenstein had envisioned a film structured according to the principles of "interior monologue," along the lines of *Ulysses*, for his (unrealized) 1930 screen adaptation of Theodore Dreiser's *An American Tragedy*.

p Eisenstein was certainly aware that the notion of "*sobornost*" or "spiritual fellowship" of the arts, propagated by the Symbolist writer Vyacheslav Ivanov—and especially the idea of the theatrical "mysteries," through which the spectator may be initiated into the mythopoetic worldview, thus becoming an actor in his own right—had been crucial to the development of his own aesthetic principles. The crude attack is unfortunately typical for the tragic era of the ideological "witch hunt," which Eisenstein had to negotiate even while discussing such benign matters as stereocinema.

FIG. 1 "London Moving Circles" (© Nicholas Wade). The central figure is Charles Wheatstone (1802-1875), who was both the youngest and most instrumental of the London scientists involved in the experimental investigations of space and time in the early nineteenth century. The others are shown in clockwise chronological sequence from Thomas Young (1773-1829) at the top to Peter Mark Roget (1779-1869), John Ayrton Paris (1785-1856), Michael Faraday (1791-1867), Charles Babbage (1792-1871), and William Henry Fox Talbot (1800-1877). They are enclosed with a phenakistiscope disc of Scotsmen dancing, produced in 1833 by the London firm of Ackermann.

NICHOLAS J. WADE

THE EXPERIMENTAL ORIGINS OF CINEMA, STEREO, AND THEIR COMBINATION

THE RECENT RAPID RISE of stereoscopic films and television programs occasions reflection on the origins of moving stereoscopic images. Attempts at combining stereoscopic depth with apparent motion were made soon after these two phenomena were examined experimentally with the aid of newly invented instruments. Until the early nineteenth century most studies of visual phenomena were confined to observations of naturally occurring events. Motion perception involved viewing moving objects, although certain motion illusions (like induced motion and motion aftereffects) dissociated apparent from real motion. Binocular vision was considered remarkable because of the singleness of vision with two eyes rather than the depth that could be seen. All this was to change with the invention of instruments that could simulate motion and depth.

It is rare for fundamental advances in two areas of visual science to be closely located in space and time. London was the space and the decade from 1825 was the time. It is even rarer for those fundamental advances to involve the perception of space and time. Studies of these dimensions were transformed there and then. The instruments (often called philosophical toys) for the synthesis of motion and depth were invented and applied in the decade from 1825 to 1835, often by the same people or acquaintances in the scientific society of London. Portraits of the main participants in the early developments of apparent motion stereoscopy can be seen in the figure (FIG. 1). Wheatstone is shown as the central figure because he invented instruments involving both space and time and he was a catalyst in forging the alliance between stereo and moving images. All were or were to become Fellows of the Royal Society of London and they were scientific and social acquaintances. All were involved in studies of visual persistence devising different ways of expressing its operation and Wheatstone invented the instrument that revolutionized the understanding of space perception—the stereoscope. The studies of visual persistence resulted in the invention of the first instruments to synthesize visual motion from still images and the stereoscope synthesized depth perception from two flat images.

The majority of optical instruments relating to pre-cinema and stereo which were invented in the early nineteenth century are listed in Table 1, together with their inventors and the dates of invention and publication.

TABLE 1. Optical instruments invented or developed in the early nineteenth century.

Instrument	Inventor	Year	Published account
Kaleidoscope	David Brewster	1816	1818
Thaumatrope	John Ayrton Paris	1825	1827
Kaleidophone	Charles Wheatstone	1827	1827
Anorthoscope	Joseph Plateau	1829	1836
Phantasmascope	Peter Mark Roget	1831	1834
Stereoscope	Charles Wheatstone	1832	1838
Phenakistiscope	Joseph Plateau	1832	1833
Stroboscopic disc	Simon Stampfer	1832	1833
Dædaleum/zoetrope	William Horner	1834	1834
Daguerreotype	Louis Daguerre	1839	1839
Calotype/Talbotype	W H Fox Talbot	1839	1839
Lenticular stereoscope	David Brewster	1849	1849
Binocular camera	David Brewster	1849	1851
Pseudoscope	Charles Wheatstone	1852	1852
Bioscope	Jules Duboscq	1852	1852
Fantascopic stereoscope	Antoine Claudet	1852	1852
Red/blue anaglyph	Wilhelm Rollmann	1853	185
Telestereoscope	Hermann Helmholtz	1857	1857

The optical instruments either captured images (as in photography) or presented them in novel ways. The principal manipulations of space and time involved simulations of depth or motion. Paired pictures (with small horizontal disparities and presented to different eyes) could be seen in depth or sequences of still images could appear to move. Despite the fact that stereoscopic vision was the near universal experience of using two eyes in the natural environment, its basis had remained mysterious for centuries. The stereoscope rendered the normal conditions for seeing depth from disparity open to experiment. By contrast, until that time, the experience of motion was almost always a consequence of object or observer movement: apparent motion was a novelty. Most of those engaged in the experimental enquiries were what we would now call physicists, and the investigations were initially driven by the need for stimulus control so that the methods of physics could be applied to the study of perceptual phenomena. However, interpretations of the novel phenomena often took the physicists into the realms of psychology, and they added considerably to the understanding of the psychology of vision. In the following survey consideration will be directed first to visual persistence and its links to apparent motion and then to the stereoscope. A year after the stereoscope had been exposed to public eyes a new method of capturing light—photography—was invented by Daguerre (with metal-based positive daguerreotypes) and Talbot (with paper negative calotypes or talbotypes).

The union between photography and stereoscopy was soon sealed and it did much to hasten the popularity of the latter. Photography also lightened the load of the stereoscopist in producing paired pictures with defined disparities. Finally, the combination of sequences of stereoscopic photographs with instruments inducing apparent motion will be described. Almost every step in this stairway to cinematic stereo is fraught with controversy. These were mostly concerned with priorities of invention, although personal animosities also played a significant role.

Apparent Motion

Apparent motion refers to the experience of movement when a sequence of static but slightly different images are presented in rapid succession. The initial instruments displaying this were based on a long known phenomenon—persisting visual images. Aristotle described persisting visual effects like afterimages, and in the first century Seneca gave an account of the trailing tails following shooting stars, comets, and lightning, and appreciated that this was due to the inability of vision to resolve very brief intervals of time.[1] These common examples of visual persistence were frequently referred to as "the duration of visual impressions" because the effects of a brief stimulus were visible for a short but sensible period beyond its extinction. Visual persistence was one of the first spatio-temporal phenomena to be subjected to quantification.

At the beginning of the nineteenth century, Young demonstrated how complex paths of a moving light could be rendered visible: he attached silvered wire to a piano string so that its paths of oscillation could be observed with the aid of a magnifying glass. This basic principle of visual persistence was enlisted to produce a bewildering variety of philosophical toys, but those we will describe initially synthesized motion. Paris' thaumatrope or wonder-turner was displayed to scientific audiences in London in 1825, and he described it in print two years later. As with most of the instruments invented at that time, arguments about priority were commonplace. The origins of the thaumatrope were described by Babbage in his autobiographical sketch, and it was not attributed to Paris.[2] Another impetus for inventing these devices derived from observations made of the motions of the spokes of carriage wheels behind or in front of railings. Roget, better known for his *Thesaurus* than for his experiments on vision, was fascinated by this phenomenon. In 1825 he provided illustrations and a mathematical analysis of the phenomenon, relating it to persisting visual images.[3] London scientific society was intrigued by the phenomena as well as by the instruments, and the fashion ensnared many whose names are not normally associated with toys. For example, Faraday cast his scientific eye over the effects and wrote a very influential article on optical deceptions.[4] He was disparaging about Paris' thaumatrope, referring to it as a schoolboy trick, but he was attracted by Roget's analysis of rotating spokes, and by his own observation of counter-rotating cogwheels. He constructed a simple arrangement of cut-out sectored-discs to examine the effects further.

Phenakistiscope and Stroboscopic Disc

The paradox of these early studies of visual persistence is that it was employed to render moving stimuli apparently still; the breakthrough came when the sequence of stills was made to appear in motion. The germ of this idea was implanted by Faraday: "The eye has the power, as is well known, of retaining visual impressions for a sensible period of time; and in this way, recurring actions, made

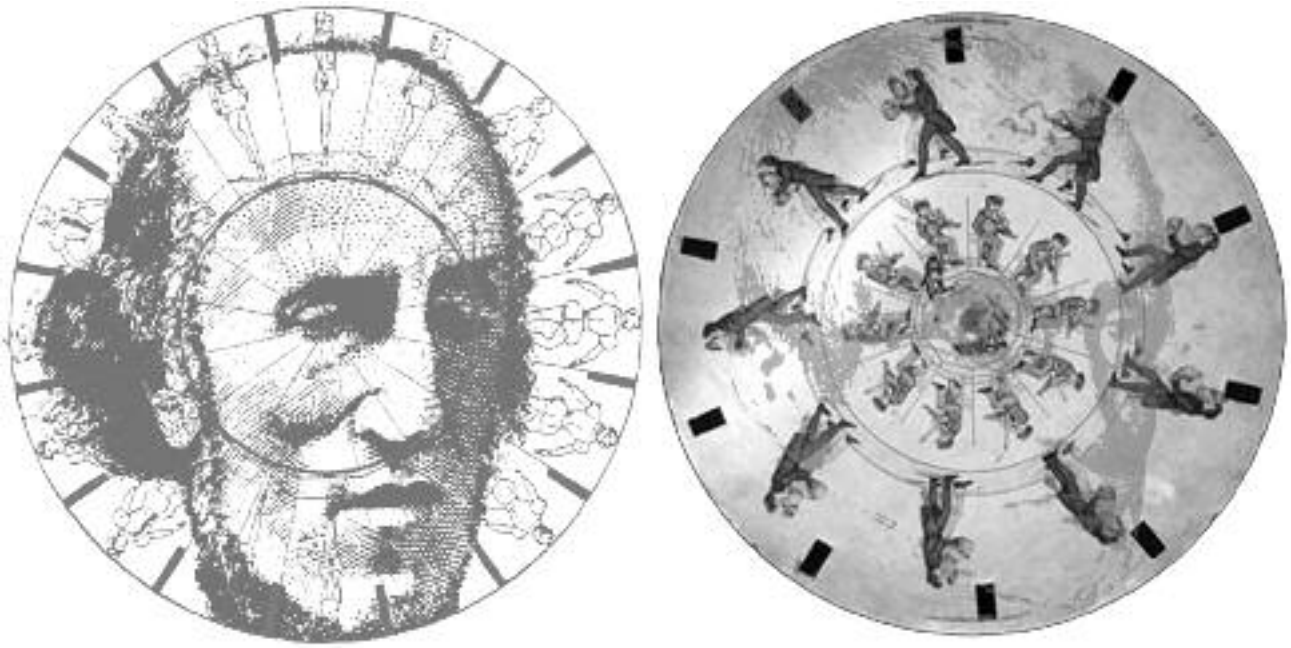
sufficiently near to each other, are perceptibly connected, and made to appear as a continuous impression."[5] This statement excited the interests of others to construct instruments that could synthesize motion from a sequence of discrete images. In 1833, both Plateau[6], with his phenakistiscope or fantascope, and Stampfer[7], with his stroboscopic disc, developed similar instruments for presenting a series of still pictures in rapid succession (FIG. 2). Stampfer's stroboscopic disc was very similar to Plateau's phenakistiscope, and both acknowledge the stimulus provided by Faraday's article. The issue of priority of invention inevitably ensued, and it is generally accorded to Plateau. The instruments were commercialized soon after their invention. The London instrument maker, Ackermann, produced phenakistiscopes for sale in 1833, and Trentsensky and Vieweg were selling stroboscopic discs in Vienna in the same year. There followed a veritable craze for spinning discs, which were sold widely throughout Europe.

However, Roget suggested in his *Bridgewater Treatise* that he had made such a device even earlier and his interests in visual persistence had also been rekindled by Faraday's article. Roget wrote: "This again directed my attention to the subject, and led me to the invention of the instrument which has since been introduced into notice under the name of the *Phantasmascope* or *Phenakistiscope*. I constructed several of these at that period (in the spring of 1831), which I showed to my friends; but in consequence of occupations and cares of a more serious kind, I did not publish any account of this invention, which was reproduced on the continent in the year 1833."[8] There was an understanding of the critical velocity required of the discs in order to create an impression of visual motion. Plateau appreciated that if the rotation was too slow then each individual figure was seen; if it was too fast then they were all seen together in a confusion. The instruments of Roget, Plateau, and Stampfer could be used by just one person at a time, whereas William Horner developed a variant for group viewing: it consisted of a cylinder mounted on a vertical axis, with slits at regular intervals, and a sequence of drawings on the opposite inside surface of the cylinder. The apparent motion could be seen by several observers at the same time. Horner called it the dædaleum, but it became widely used in the latter half of the nineteenth century under the name of zoetrope.[9]

Stroboscopic discs presented stimuli discretely, briefly, and in succession; that is, a sequence of drawings differing slightly from one another were viewed successively through slits in a rotating disc. To the astonishment of observers a single figure appeared in motion: perceived movement was synthesized from a sequence of still pictures. Stroboscopic discs were used to study visual persistence and apparent motion, and Purkinje made a variant of one in 1840; he called it the phorolyt or kinesiskop, and it was sold commercially as a magic disc (FIG. 3).[10] Purkinje used his phorolyt to produce dynamic images of a range of natural movements generated from a sequence of static drawings and photographs. These varied from the pumping action of the heart to the walking movements of newts. He also used it to display photographs of his own rotating posture, which was particularly appropriate because he had previously investigated the effects of body rotation on balance.

Stereoscopy

The philosophical toys described above manipulated both space and time, so that an object presented successively could be seen simultaneously and in motion. Wheatstone, who was involved in developing instruments for the manipulations of visual persistence, was also a close acquaintance of Faraday. However, it was in the context of space perception that Wheatstone was to have the



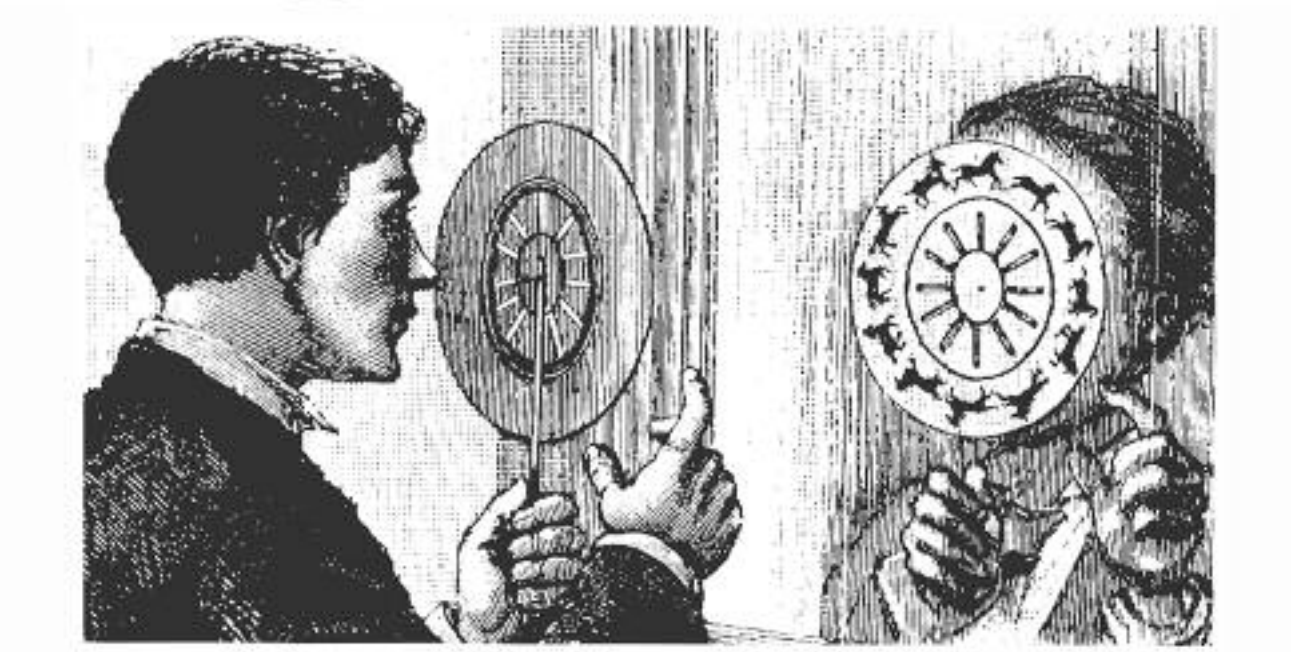


FIG. 2 Upper left, "Plateau's Phenakistiscope" and upper right, "Stampfer's Stroboscopic Disc" (both © Nicholas Wade). Lower, an illustration of the phenakistiscope or stroboscopic disc of the type described by Joseph Plateau (1801-1883) and by Simon Stampfer (1792-1864).

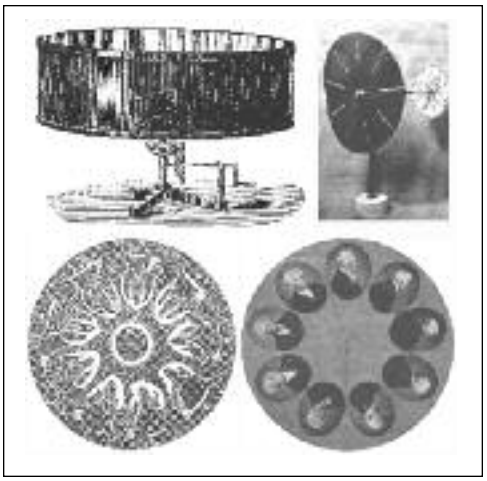


FIG. 3 Upper left, William Horner's daedaleum and upper right, Purkinje's phorolyt or kinesiskop. Lower left, Purkinje's drawings of a pumping heart and lower right, a series of photographs of Purkinje himself rotating, both for use with the phorolyt.

FIG. 4 "Stereoscopic Wheatstone" (© Nicholas Wade). Wheatstone is shown in his diagram of the mirror stereoscope derived from his original article[11].

greatest impact on the development of visual science and on visual art. The stereoscope, perhaps more than any other instrument, ushered in the era of experimentation to vision. It is a simple optical device that presents slightly different figures to each eye; if these figures have appropriate horizontal disparities then depth is seen. Whereas the stroboscopic disc simulated motion, the stereoscope simulated depth. The stereoscope transformed not only our picture of vision, providing an instrument to bolster inferential theories of vision, but also the vision of pictures. Paired photographic images of distant scenes could be seen in depth, and this intrigued a public eager for enhancement of the senses.

Wheatstone's Stereoscope

Wheatstone made mirror and prism stereoscopes as early as 1832, but he only described the mirror version in his classic memoir of 1838 (FIG. 4).[11] His first stereoscopes were made by the London optical instrument firm of Murray and Heath.[12]

Wheatstone encountered the link between disparity and depth perception as a consequence of a fortuitous observation—the reflections from a lathe appeared in depth with two eyes but not with one. On the basis of this he constructed the stereoscope for presenting slightly different images to each eye. With suitably drawn stereo-pairs, Wheatstone was able to demonstrate that apparent depth could be synthesized. The sign of the depth, whether nearer or farther than the fixation point, was dependent upon the direction of disparity; reversing the disparity reversed the direction of depth seen. There were limits to the extent of disparity that yielded depth perception, and radically different figures, like letters of the alphabet, when placed appropriately in the stereoscope engaged in binocular rivalry. That is, rather than the two monocular stimuli combining, they compete with one another and alternate in visibility.

Brewster's Stereoscope

The most popular model of stereoscope was one Brewster[13] constructed in 1849 from lenses and was referred to as a lenticular stereoscope. In fact it was made from half-lenses so that they acted as prisms and magnifiers. A virtue of splitting a single lens in half was that the two optical components were essentially the same. The optical manipulation of disparities was also achieved with Wheatstone's pseudoscope, which reversed them, and with Helmholtz's telestereoscope, which exaggerated them. The anaglyph method, enabling overprinted red and blue images to be combined through similarly coloured filters was introduced at about the same time by Rollmann (see Table 1).

Brewster's first stereoscope was made in 1849 by George Lowdon, an optical instrument maker in Dundee (FIG. 5). He had earlier made acquaintance with Brewster:

> who had at this period (1849) invented his stereoscope, and I got the making of the first one, and the sending of copies of it to many scientific men all over Europe. Later on I also improved on them, and made a great number for many years afterwards. The fault of Brewster's stereoscope was that the lenses were too small, being, in fact, only the two halves of a spectacle glass. This did not suit every eye, and in experimenting I discovered that larger lenses were an advantage. I pointed this out to Sir David, but he was wedded to his own opinion, and as I feared that the idea might be taken up by another, I took out a patent for my improvement—which experience has since amply justified—but my action was, unfortunately, resented by Sir David, and gave rise to considerable friction, for which I did not consider I was to blame, seeing I had pointed out the improvement, and he had refused it.[14]

Lowdon's disagreement with Brewster led the latter to seek another optical instrument maker to produce it. None in Britain would accept the proposal because of Brewster's reputation. In 1850 he travelled to Paris where Abbé François Moigno introduced him to the optical instrument maker Duboscq, who made the stereoscopes thereafter. It was one of Duboscq's models that was presented to Queen Victoria at the Great Exhibition of 1851. Brewster's description of Duboscq's "beautiful stereoscope" (from his book on the stereoscope[15]) carries the latter's portrait in the illustration. Duboscq made many stereoscopes which sold widely throughout Europe. However, he was less than honest in his commercial dealings as he claimed to have invented the stereoscope and filed a patent to that effect in 1852; it was not revoked until 1857. Despite Duboscq's dubious patent, his optical workshop in Paris added many innovations to stereoscopy.

The Stereoscope and Photography

Wheatstone and Brewster were well aware of Talbot's early research on capturing images on light sensitive paper. In 1836, both were guests of Talbot at Laycock Abbey, prior to the Bristol meeting of the British Association for the Advancement of Science, and they corresponded about the process thereafter. Talbot's paper negative process was made public in 1839, the year after Wheatstone's first article on the stereoscope appeared. In fact the term "photographic" was first used by Wheatstone who immediately grasped the significance of photographing scenes from two positions, so that they would

be seen in depth when mounted in the stereoscope. In 1840, he enlisted Talbot's assistance to take stereo-photographs for him; when they were sent the angular separation of the camera positions used to capture the two views, it was too large (47.5°) and Wheatstone suggested that 25° would be more appropriate. Klooswijk[16] has reprinted a section of Wheatstone's letter to Talbot, and has himself taken stereo-photographs of the bust Talbot probably employed from camera angles of 47.5°, 25°, and 1.75°. Wheatstone also requested the assistance of Henry Collen to take stereoscopic photographs of Babbage; a single camera was used to take photographs from different positions because it was difficult to find two cameras that were optically equivalent. Wheatstone showed how the photographic camera, in combination with the stereoscope, could be employed to reintroduce the dimension of depth to the perception of pictures.

Brewster announced his binocular camera for taking stereoscopic photographs at the same meeting of the British Association for the Advancement of Science as the description of his lenticular stereoscope (in 1849); a fuller account was presented two years later and in his book on the stereoscope.[13] The camera had the lenses at a fixed separation. Added to the many dimensions of disagreement between Brewster and Wheatstone was the camera separations required for stereo-photographs. Brewster argued that the lens separations should always correspond to those of the eyes, despite the fact that the paired images of distant objects would be virtually identical. Wheatstone was much more pragmatic and provided a table of camera separations for objects at different distances. Thus the union of the stereoscope and photography was forged, and both Wheatstone and Brewster were captured in stereo.[17] Wheatstone's stereodaguerreotype was taken by Claudet and Wheatstone was a catalyst in encouraging both Claudet and Duboscq to combine stereo and motion. Claudet was born in Lyon and moved to London in 1829. He was a student and then partner of Daguerre and improved the daguerreotype process. He opened the first daguerreotype studio in London and became recognized as a scientist as well as a photographer. He advocated Wheatstone's procedures for taking stereoscopic photographs of objects and had earlier made an instrument called a stereoscopometer which calculated the angle required to take stereoscopic photographs of objects or groups.

Stereoscopic Motion

Wheatstone had seen the advantages that photographic images could provide for stereoscopy, and his ideas were widely followed. In 1849 Wheatstone suggested the possibility of combining stereo with apparent motion to Plateau who passed on the suggestion to Duboscq. By 1852, both Claudet and Duboscq were attempting to add stereo to apparent motion, and their names are often given together in reports of the instruments they constructed (FIG. 6). The first report announced the stereofantascope made by Duboscq along similar principles to one constructed by Claudet. Later that year Duboscq also referred to it as a bioscope.[18] It consisted of twelve stereopairs that could be combined by mirrors; when the slits and bioscope card rotated the stereopairs were presented to each eye. The fact that Duboscq's bioscope did not catch the public mood, like the stereoscope and phenakistiscope had done, suggests that these early combinations of stereo with apparent motion were less than successful. This is evident from the comments and experiments of Claudet. He also combined stereo and motion in a shuttering device that was rather like Duboscq's. Claudet took out a patent for his instrument in 1853, but Wheatstone appears to have abandoned his attempts and

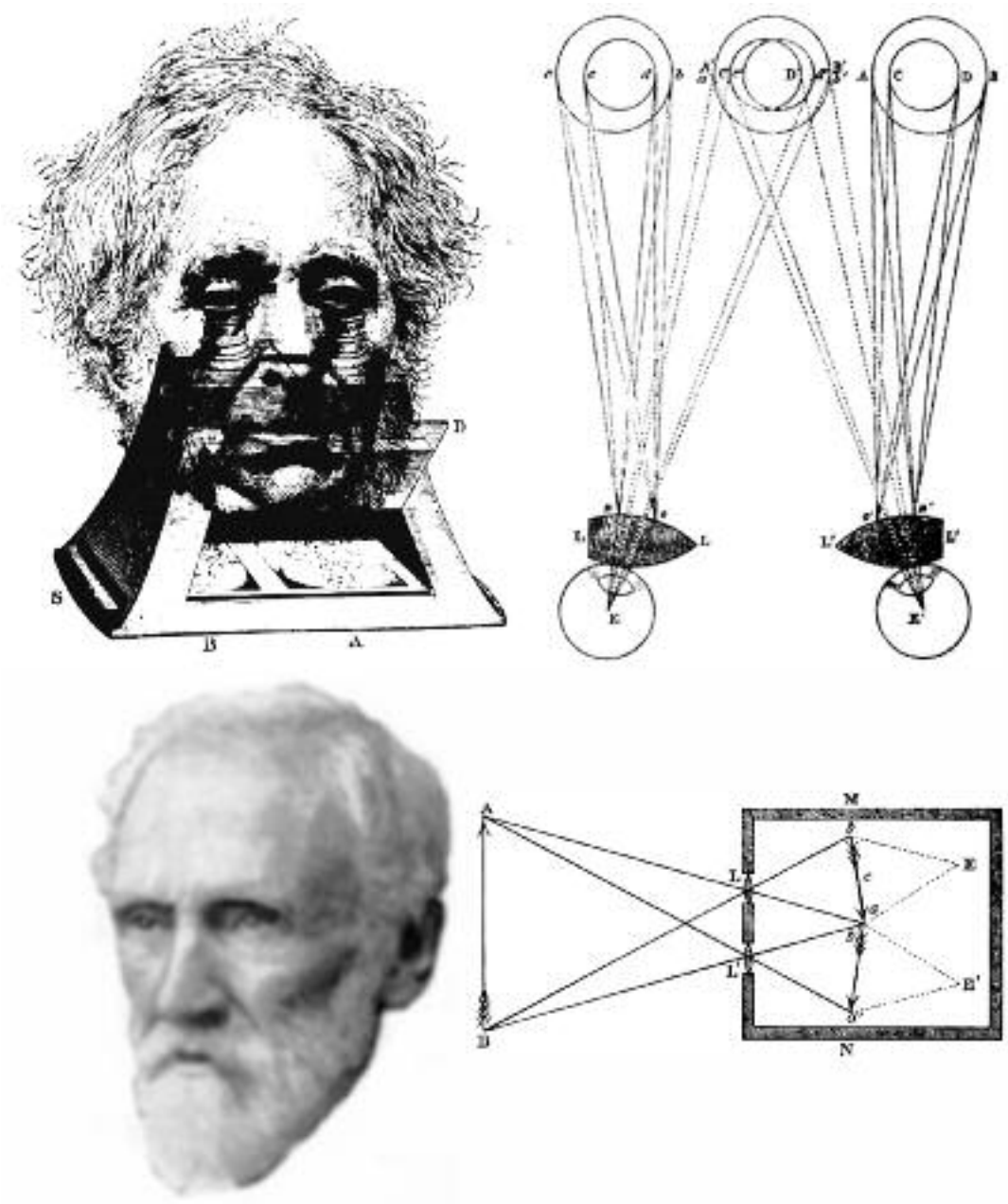
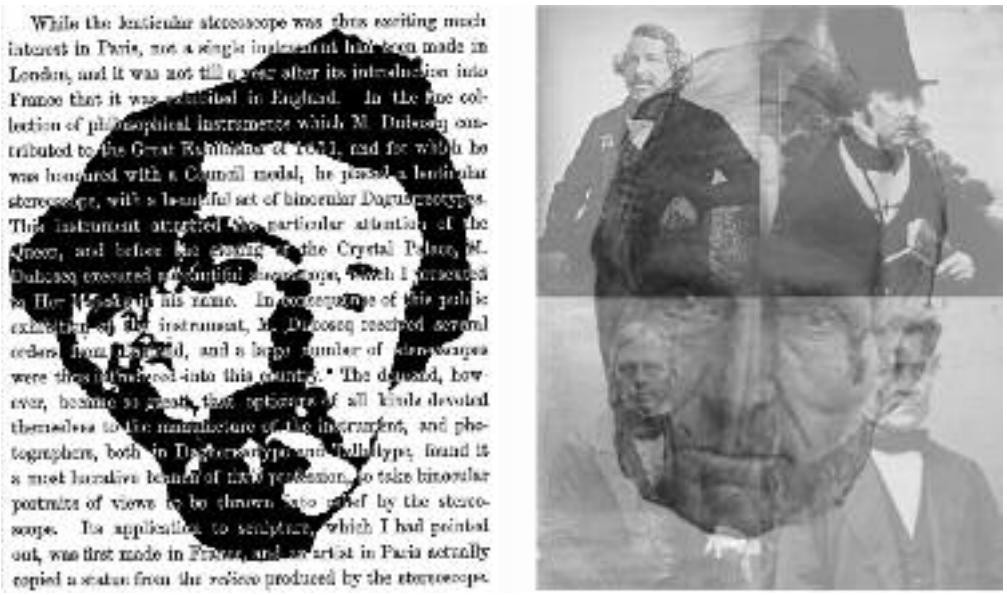


FIG. 5 Upper left, "Brewster's Stereoscope" (© Nicholas Wade). The stereoscope was made from a single lens which was divided and turned so that the half-lenses worked as both prisms and magnifiers; the optics of the lenticular stereoscope is shown on the upper right. Lower left, George Lowdon who made Brewster's first stereoscope. Lower right, Brewster's binocular camera.



While the lenticular stereoscope was thus exciting much interest in Paris, not a single instrument had been made in London, and it was not till a year after its introduction into France that it was exhibited in England. In the fine collection of philosophical instruments which M. Duboscq contributed to the Great Exhibition of 1851, and for which he was honoured with a Council medal, he placed a lenticular stereoscope, with a beautiful set of binocular Daguerreotypes. This instrument attracted the particular attention of the Queen, and before the opening of the Crystal Palace, M. Duboscq executed a beautiful stereoscope, which I presented to Her Majesty in his name. In consequence of this public exhibition of the instrument, M. Duboscq received several orders from Ireland, and a large number of stereoscopes were then introduced into this country.* The demand, however, became so great, that opticians of all kinds devoted themselves to the manufacture of the instrument, and photographers, both in Daguerreotype and Talbotype, found it a most lucrative branch of their profession, to take binocular portraits of views to be thrown into relief by the stereoscope. Its application to sculpture, which I had pointed out, was first made in France, and an artist in Paris actually copied a statue from the relieve produced by the stereoscope.

FIG. 6 Left, "Duboscq's Beautiful Stereoscope" (© Nicholas Wade). A portrait of Louis Jules Duboscq (1817-1886) is shown in text (from Brewster[13]) describing his lenticular stereoscope, which was presented to Queen Victoria. Right, "Claudet's Clients" (© Nicholas Wade). Antoine François Jean Claudet (1797-1867) can be seen combined with photographs he took of Jacques Louis Mandé Daguerre (1787-1851), Talbot, Wheatstone and Faraday (clockwise from the top left). The portrait of Claudet is derived from a photograph taken by Thomas Rodger of St. Andrews around 1860.

did not return to them for over a decade. However, Claudet was not convinced that depth was seen although motion certainly was. He did not present the stereoscopic pairs simultaneously, as Duboscq did, but presented them in rapid succession. Claudet's method was a precursor of the electronic shuttering systems that have been employed more recently. He did not produce the instrument commercially, and described his endeavours at a meeting of the British Association, and more fully in *The British Journal of Photography*. He commented favourably but cautiously on Duboscq's system: "M. Duboscq made some ingenious attempts in this direction, but not entirely satisfactory."[19] Claudet seems to have been a more astute observer than Duboscq as well as a more honest inventor. Many novelties were added to the instruments for combining depth and motion in the following decades[20], but Duboscq and Claudet were the pioneers. They might not have been successful but they did whet the appetites of both scientists and the public for seeing synthesized motion stereoscopically.

Wheatstone did return to moving stereo images in the late 1860s. He had an instrument constructed which was called the Wheatstone Stereo Photographic Viewer; it presented the viewer with a sequence of stereoscopic photographs that were mounted on a continuous band, but it does not appear to have been produced commercially. The problem with the early instruments was the contrast between the ease of inducing apparent motion and the difficulty of seeing depth in sequences of briefly presented stereopairs.

Throughout this tangled history, one figure has woven the disparate threads together: Charles Wheatstone devised the kaleidophone for demonstrating persisting images, he invented the stereoscope, he gave directions for the first stereoscopic photographs and he proposed how motion and depth could be combined. Wheatstone was involved with all those who made the novel developments, and his own contributions followed the sequence of discovery. First instruments were devised which simulated motion from a sequence of briefly presented but slightly different pictures. Second, the stereoscope simulated objects in depth by presenting slightly different pictures to each eye. The slight spatial differences proved easier to capture photographically. Wheatstone suggested that sequences of stereoscopic photographs could be presented to simulate motion in depth. However, then as now, the motion component was easier to simulate than the briefly presented stereoscopic effects.

NOTES

1 Nicholas J. Wade, *A Natural History of Vision* (Cambridge, MA: MIT Press, 1998).

2 Charles Babbage, *Passages from the Life of a Philosopher* (London: Longman, Green, Longman, Roberts & Green, 1864).

3 The various devices invented to manipulate visual persistence, including Roget's studies of rotating spoked wheels, can be found in Nicholas J. Wade, "Philosophical Instruments and Toys: Optical Devices Extending the Art of Seeing," *Journal of the History of the Neurosciences* 13 (2004): 102-124.

4 Michael Faraday, "On a Peculiar Class of Optical Deception," *Journal of the Royal Institution* 1 (1831): 205-223.

5 Ibid., 210.

6 Joseph Plateau, "Des illusions sur lesquelles se fonde le petit appareil appelé récemment Phénakisticope," *Annales de Chimie et de Physique de Paris* 53 (1833): 304-308.

7 Simon Stampfer, *Die stroboskopischen Scheiben oder optische Zauberscheiben, deren Theorie und wissenschaftliche Anwendung* (Vienna: Trentsensky & Vieweg, 1833).

8 Peter Mark Roget, *Animal and Vegetable Physiology considered with reference to Natural Theology. Bridgewater Treatise V. Volume 2* (London: Pickering, 1834), 416.

9 William Carpenter, "The Zoetrope and its Antecedents," *The Student and Intellectual Observer of Science, Literature and Art* 2 (1868), 24-31.

10 An account of Purkinje's many studies of vision can be found in: Nicholas J. Wade and Josef Brožek, *Purkinje's Vision. The Dawning of Neuroscience* (Mahwah, NJ: Lawrence Erlbaum Associates, 2001).

11 Charles Wheatstone, "Contributions to the Physiology of Vision - Part the First. On Some Remarkable, and Hitherto Unobserved, Phenomena of Binocular Vision," *Philosophical Transactions of the Royal Society* 128 (1838): 371-394.

12 The full texts of the papers by Wheatstone and Brewster on stereoscopes, as well as their acrimonious correspondence regarding its originality, can be found in: Nicholas J. Wade, *Brewster and Wheatstone on Vision* (London: Academic Press, 1983). Their stereoscopic portraits are also shown in the book.

13 David Brewster, *The Stereoscope. Its History, Theory, and Construction* (London: Murray, 1856).

14 George Lowdon, *George Lowdon, Optician and Scientist, Dundee. Sketch of his Reminiscences and Career* (Dundee: Dundee Advertiser, 1906), 7-8.

15 Brewster, *The Stereoscope.*

16 Abram I. J. Klooswijk, "The First Stereo Photograph," *Stereo World* (May/June 1991): 6-11.

17 Wade, *Brewster and Wheastone.*

18 Laurent Mannoni, *The Great Art of Light and Shadow. Archaeology of the Cinema.* Trans. and ed. R. Crangle (Exeter: University of Exeter Press, 2000).

19 Antoine Claudet, "On Moving Photographic Figures, Illustrating Some Phenomena of Vision Connected with the Combination of the Stereoscope and the Phenakistoscope by Means of Photography," *Report of the British Association for the Advancement of Science. Transactions of the Sections* (1865): 9.

20 H. Mark Gosser, *Selected Attempts at Stereoscopic Moving Pictures and their Relationship to Moving Picture Technology, 1852-1903* (New York: Arno Press, 1977); Mannoni, op. cit.; Stephen Herbert, *A History of Pre-Cinema* (London: Routledge, 2000); See Ray Zone, *Stereoscopic Cinema and the Origins of 3-D Film, 1838-1952* (Lexington: University of Kentucky Press, 2007).

RAY ZONE

AVANT-3D
Notes on Experimental Stereoscopic Cinema and its Relation to the Other Arts

EXPERIMENTAL CINEMA and modern art have been extensively documented and studied. That has not been the case, however, with stereographic films and other forms of visual art that are experimental. This historical overview is an initial, highly cursory, attempt to identify individual artists working within the precincts of a neglected "canon" of visual culture. It is a highly diverse canon of works that incorporates 3D films and images created with a richly varied array of technologies and artistic strategies. But all of the works considered here make use of the z-axis, the third dimension, as an integral part of their full creative expression.

Also at issue is a slight matter of definition. "Experimental" cinema has also been referred to as "avant-garde," "amateur," "personal," and "underground" film. Such films are generally produced more as a matter of artistic expression and frequently are viewed and experienced in venues such as art galleries and museums rather than a conventional motion picture theatre.

Experimental stereoscopic artworks, similarly, have enjoyed an expanded scope of public presentation because they are 3D. Stereographic films and images, for example, have been used in theatrical settings with live performance. This expanded field of stereoscopic endeavour, however, does complicate the question of inclusion. Holograms, for example, have had wide exposure in art galleries worldwide and multiplex holograms are produced using frame interleaved techniques in combination with motion picture film, shot either with a 16mm or 35mm movie camera. For present purposes, no attempt will be made in this essay to enumerate the large body of work with multiplex holograms even though they might fall within the canon under consideration. An exception has been made for discussion of the holographic motion pictures of the British-born artist known as Alexander, whose films have been produced with a different method using the direct pulse laser.

I believe it is also important and useful to consider experimental stereoscopic films and other avant-garde art within a single canon primarily because such abstract work may be considered as a single aesthetic tradition. With the amplification of motion and depth, Oskar Fischinger's work (FIG. 1), as well as that of Norman McLaren, Hy Hirsch and others, may be considered as a form of "kinetic painting" on the z-axis. And the role of abstraction, created for the third dimension, serves

FIG. 1 "Triangular Planes," a 1949 stereo painting by Oskar Fischinger, was painted to be viewed with cross-eye freevision. Courtesy: Jack Rutberg Fine Arts and Fischinger Estate.

as a cogent means of liberating stereography from its conventional, historical model enchained to replication of the so-called "real world" as a technological mirror of reality. By liberating stereoscopic practice from the service of the "real" and its depiction, experimental artists have drawn attention to the z-axis as a form of visual music in space and as a unique modality of expressiveness.

Science and technology were important concepts to the modernist artists of the early twentieth century. Marcel Duchamp, as a premiere Dadaist and associate of the Surrealists, became interested in stereographic drawing and anaglyphs after he had found a copy of a 1912 French book titled, *Les Anaglyphes Geometriques*, by H. Vuibert. Primarily a scientific treatise about descriptive geometry, the book was printed in red and green inks and included a lorgnette pair of spectacles for viewing the geometric shapes in 3D.

In 1918, while in Buenos Aires, Duchamp manipulated a stereoview card with a rather prosaic photograph of the ocean by hand-drawing with a pencil an octohedron as a stereo pair of images on the card. In New York in 1920, working with fellow artist and photographer Man Ray, Duchamp made a stereoscopic motion picture of his rotating motorized construction *Rotative Demisphere* using two motion picture cameras. Man Ray was shooting stereoscopic still photographs at the time and made a stereo view of the physical set-up showing the rotational glass plates. In his autobiography, published in 1963, Man Ray recalled that Duchamp "had conceived an idea for making three-

dimensional movies" joining two movie cameras together "with gears and a common axis so that a double, stereoscopic film could be made of a globe with a spiral painted on it."[1]

After the films had been shot, unfortunately, Duchamp decided to develop the film himself but turned the film into "a mass of tangled seaweed. It had swelled and the film was stuck together."[2] Saving some of the film, Duchamp and Man Ray examined two matching strips in an old stereoscope and saw the effect of relief. No funding was available to them at the time, however, so the project was abandoned. In 1968, near the end of his life, Duchamp was still experimenting with stereography by making a drawing with red and blue crayons that was titled "Cheminée Anaglyphe" ("Anaglyphic Chimney").

In the 1960s and 1970s surrealist painter Salvador Dali produced hyper-realistic stereoscopic pairs of paintings by copying images photographed with a stereo camera onto canvas. For viewing the large pairs of paintings Dali created a reflecting mirror stereoscope after the invention of a similar device by Sir Charles Wheatstone in 1852. With stereoscopic paintings such as "The Chair," a 1976 oil on canvas, "Christ of Gala" (1978) and "Battle in the Clouds" (1979), Dali incorporated retinal rivalry, anomalous disparities between left- and right-eye images, that combine with great depth to produce a startling effect. Dali considered that stereoscopic vision was a form of Holy Trinity. Since the left and right eye (planar) images are combined in the brain to form the third cyclopean image with depth, Dali saw the configuration as a form of Father, Son, and Holy Ghost.

William Moritz was an avant-garde filmmaker who also experimented with retinal rivalry in two of his short 3D films. *Allee* and *Hot Flashes*, both completed in 1970, were colour 16mm dual-band 3-minute films, made to be shown with two interlocked projectors. "I originally made these two films as conceptual pieces when a local theatre was screening experimental films at midnight while a stereo porno movie was on the regular day shift," wrote Moritz. "The theatre was using a projector that superimposed two adjacent frames by using a special prism, so I figured that any tracking shot with quick lateral movement would produce illusions of depth or "counter-depth" depending on the direction of movement."[3] Moritz's *Hot Flashes* was conceptually a binocular, rather than stereoscopic, film in which different colours or images were presented simultaneously to each eye. William Moritz was also a film historian and a great champion of the films of Oskar Fischinger, authoring a number of publications about his work. Oskar Fischinger was a pioneering filmmaker of the twentieth century who created visual music on film with abstract paintings in motion that were accompanied with sound and music. Fischinger began to produce abstract films in 1922 and in a few years was synchronizing non-objective imagery to popular records with a series he called *Studies*. These films were shown in theatres as advertisements for the recordings. Sixty years before MTV, they were the first music videos. Each of these studies ran three minutes, and included approximately 5,000 drawings coordinated to the music. By 1935, Fischinger had made colour films with works titled *Circles* and *Composition in Blue*.

In 1947, after immigrating to America from Germany to work for Paramount Studios and Walt Disney, Fischinger began to create stereo paintings. These were side-by-side oil paintings on masonite panels, usually hinged together. After completing the film titled *Motion Painting No. 1* in 1947, Fischinger launched into his experiments in stereo painting. His biographer Moritz wrote that Fischinger

> …worked first analyzing a set of old stereoscope slides and pairs of photos he took of himself. Then he carefully prepared a dozen canvases in which complex and varied types of abstract shapes and surfaces are seen from right eye and left eye perspectives in parallel panels.[4]

FIG. 2 "Stereo Film" stereo pairs from the 3D film by Oskar Fischinger (1952). Courtesy: Jack Rutberg Fine Arts and Fischinger Estate.

After producing a number of stereo paintings over a four-year period, Fischinger felt prepared enough to produce the half-minute *Stereo Film* in a dual 35mm format to be projected on a silver screen and viewed through polarizing filters (FIG. 2). "The technique is basically that of *Motion Painting No. 1*," noted Moritz, "except that Fischinger had built a special apparatus to accommodate two side-by-side paintings, and by now he could freely paint from his head 3D images—this square would sit here, and this here—for he had completely mastered the mathematics, the formulas, the calligraphy of depth."[5]

Moritz observed that Fischinger's short 3D film vividly depicted a "succession of a dozen colored squares which form a perfect and astounding perspective alignment from near the viewer to the far distance."[6] Unfortunately, the artist had no luck in seeking completion funds from various foundations and prospective backers, so the project was abandoned. The 30 second stereoscopic film was screened in dual 35mm at the first World 3D Expo in Hollywood on 20 September 2003.

In 1953, Fischinger had a one-man exhibit of his paintings at the San Francisco Museum of Modern Art. Prominently placed on the title wall of the exhibit were three stereo paintings which greeted patrons as they entered the museum.

"Fischinger was one of the great formative influences in my life," declared experimental 3D filmmaker and animator Norman McLaren.

> In the early 1950s, I had the opportunity and great pleasure of visiting Fischinger and his wife at their home in California… I discovered that Oskar was interested not just in filmmaking, but was into all kinds of other experiments, the most intriguing of which for me was his stereoscopic paintings, for I myself had been dabbling in binocular drawings.[7]

McLaren more than dabbled in stereography. While working at Canada's National Film Board (NFB), he made the pioneering dual 35mm animated 3D films *Around is Around* (FIG. 3) and *Now*

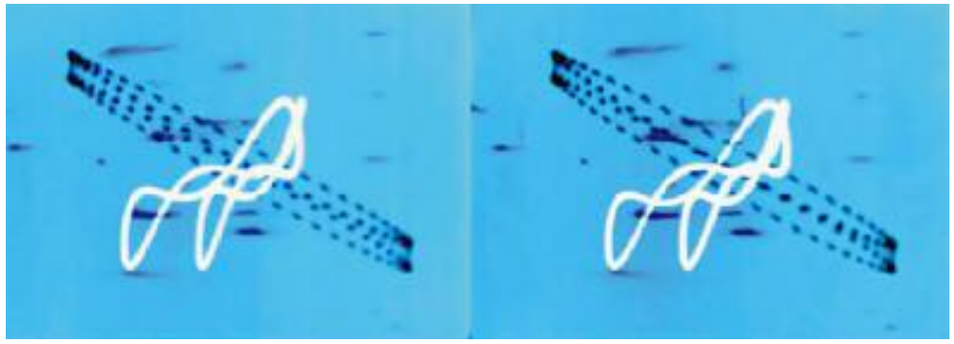


FIG. 3 "Around is Around" (1951) stereo pairs from the 3D film by Norman McLaren. Courtesy: National Film Board of Canada.

Is the Time (To Put On Your Glasses) in 1951 for the Festival of Britain. After visiting with Fischinger, McLaren said that "I felt I had met someone with a truly inventive and exploratory spirit, and an artist who had pioneered a new path in the history of cinema"[8]

The program of stereoscopic films at the Festival of Britain began with Norman McLaren's *Now is the Time (To Put On Your Glasses)* about which reviewer Norman Jenkins wrote that "[t]here is nothing quite like this in the average cinemagoer's experience," and that it has "the added unfamiliarity of synthetic sound—photographed patterns."[9] The sound track for this film, to use McLaren's term, was a "stereophonic animated sound track." McLaren wrote an invaluable *SMPTE* paper describing the production of both *Now is the Time* and *Around Is Around*. To make both these films, McLaren had to "synthesize three-dimensional space, from two-dimensional subject matter."[10]

A conventional camera, optical set-up and animation stand were used for *Now is the Time*. Parallax for left and right eye views was created with movable cutouts in the artwork. The cutouts were moved left or right according to calculations based upon screen size which, at the Telecinema, was fifteen feet. Parallax by lens shift was also created with optical prints made from the hand-drawn negatives to produce left and right-eye optical negatives. Colour separation negatives (yellow, cyan, and magenta) were made from the combined elements for release colour printing by Technicolor in England. The synthetic sound for *Now Is the Time* was produced by photographing patterns of black and white sound waveforms on to the sound track area of 35mm film using standard animation techniques. Lou Applebaum composed a special stereophonic musical score for *Around Is Around,* and created a 4-channel stereophonic recording which made use of different instruments, and also the spatial location in the auditorium of the Telecinema.

Around Is Around used both standard cel animation double-punch techniques and frame-stagger photography of oscillograph patterns in motion. The oscillograph patterns were controlled manually with a knob and the Bell & Howell camera ran at eight to twelve frames per second for greater control of pattern modulation. The black and white stereo pairs were optically printed as yellow, cyan, and magenta colour separation negatives for release printing in Technicolor.

Gerald Pratley, reviewing McLaren's stereoscopic creations for *Films in Review,* called *Around Is Around* "a ballet of lines, ever-changing in circular motion," and gave it the highest praise, calling it "an exciting revelation."[11]

McLaren's influence can be seen in Hy Hirsch's abstract 1952 dual 16mm 3D film *Come Closer* which was produced by photographing patterns on an oscilloscope screen. Hirsch was a resident of San Francisco at the time and *Come Closer*, with a lively sound track of Caribbean music, was first shown at the experimentally-oriented Art in Cinema series at the San Francisco Museum of Art.

Hirsch built an optical printer to produce his own special effects and colour printing processes. Along with McLaren and experimental filmmaker Mary Ellen Bute, Hirsch was one of the first to use the oscilloscope as a source for non-objective abstract figures which were subsequently coloured and repeated with multiple exposures through the use of the optical printer.

Prior to the stereoscopic films of Fischinger and McLaren, Dwinell Grant in 1945, with funding from a Guggenheim grant, produced an abstract stereoscopic film, *Composition #4,* as one in a series of non-objective works. Lenny Lipton noted that "the animated image pairs were printed, or shot, side by side on a single band of film to be projected with a prismatic attachment."[12] Harry Smith's *Film #6* (1952), produced in single-strip anaglyph 3D, like Hirsch's stereoscopic effort grew out of the Art in Cinema screenings in San Francisco.

In 1997 a site-specific installation by Japanese artist Mariko Mori at the Los Angeles County Museum of Art highlighted *Nirvana*, a unique 3D video playing on a ten-minute loop, viewable with polarizing glasses and projected on a wall in the gallery painted silver. *Nirvana* also included four billboard-sized, digitally composited photographs encased in glass that used images from the stereoscopic video along with an acrylic sculpture in the shape of a lotus titled "Enlightenment Capsule."

Shot in the arid landscape of the Dead Sea, *Nirvana* was a deftly-realized sequence of stereoscopic moving images that floated gracefully out into the confines of the gallery space with computer-generated cartoon sprites, wisps of light, and floating spheres as gentle music lulled the viewer.

Scottish choreographer and filmmaker Billy Cowie in 2007 produced imaginative stereoscopic video installations for art galleries that he has titled *Ghosts in the Machine*. Conflating the site-specific reality of the gallery wall with the apparent reality of stereoscopic projection, Cowie's *Men in the Wall* depicts full-size human figures moving slowly within virtual alcoves in the gallery. A second piece called *In the Flesh* is a life size phantogram of a nude woman shifting her body weight on the floor. Phantograms are made to be viewed at a 45-degree oblique angle looking down so that the imagery seems to stand up from a flat surface like a table or floor, a visual conflation of virtuality and environment. Both of Cowie's installations were viewed using anaglyph glasses.

Exhibition of stereoscopic videos in museum spaces has been an ongoing effort of German-born avant-garde 3D filmmaker, now often working in Canada and the US, Al Razutis who has exhibited work at the Louvre in Paris with such short films as *Meditations* (1996*), Dean Fogal: Corporeal Art* (1996-1997), *Virtual Flesh* (1996), *France – 1997* (1997-1998), *Statues* (1997-1998) and *Nagual* (1998). As a part of his inquiry into the paradox of "the real" and the virtual, Razutis has exhibited installation art that combines assemblage, *objets trouvé* with holograms. With both his critical writings and 3D films, Razutis has examined and questioned the aesthetic nature of avant-garde cinema. His short 3D video *Statues* is a time lapse *tour-de-force* that explores the relationship between temporality and spatiality.

Technology and virtual reality have been enduring concerns for Perry Hoberman as an artist and he has used stereoscopic images and movies with great ingenuity and humour in nearly every museum and gallery installation and performance that he has created. With an essay in the catalogue for a 1997 retrospective of Hoberman's works at the Gallery Otso in Finland, media archaeologist

Erkki Huhtamo writes that,

> With its built-in visual traps, its potential for excess, its ability to freeze time and transform it into "living sculptures," in short, with all its virtual corporeality, 3D is a perfect vehicle for Hoberman's explorations of a world in which the border between graspable reality and industrially manufactured phantoms is getting more and more obscure. Such phantoms have become our regular companions in the audiovisual media, yet they are beyond our reach.[13]

Huhtamo is writing specifically about an interactive 3D installation of Hoberman's from 1994 in Los Angeles titled *Bar Code Hotel* in which spectators wore 3D glasses and manipulated stereoscopic images of their own creation but the statement applies quite nicely to all of Hoberman's work with 3D. More specifically, what Hoberman repeatedly works to achieve is a means of placing the stereoscopic "phantoms" within reach of the viewer to enlist participation in their creation.

The influence of popular culture is obvious in Hoberman's 1982 installation titled *Out of the Picture* that he characterized as a "remake" of the 1933 film *The Invisible Man*. In this work, the relationship between viewer and cinema is reversed. It is a situation whereby the Invisible Man addresses the audience directly as clothing, shadows, texts and test tubes "float through real space as the Invisible Man attempts to implicate you the viewer in his mad schemes of world conquest."[14] Gallery patrons literally walked inside the stereoscopic projections to see their own shadows mingling with silhouetted characters on the screen.

Similarly, the 1983 performance/installation of *Smaller Than Life (Bigger Than the Both of Us)* was inspired by the 1957 science fiction film *The Incredible Shrinking Man*. In performance, Hoberman would wander through stereoscopic projections that were "a landscape of unstable 3D living rooms, whirling atomic particles and overblown household objects that hover hallucinogenically in the air."[15]

Other performance/installation works of Hoberman's that used stereoscopic projection include *Dead Space/Living Rooms* from 1985, and *Return to Sender (A Dead Letter at the Speed of Light)*, also from 1985. Both these works and a 1991 piece titled *Interstate* created stereoscopic environments projected onstage in conjunction with live performance. *Revenge of Debris* in 1988 was Hoberman's cinematic launch into the use of stereoscopic CG (computer graphics) for such forms of presentation.

Other theatrical presentations which have incorporated stereoscopic films and animations include the Robert Wilson chamber opera *Monsters of Grace* from 1998 with music by Philip Glass. The CG stereoscopic animations projected onstage for *Monsters of Grace* were created by the Kleiser-Walczak Construction Company. In 2000, Los Angeles 3D filmmaker Sean Isroelit created a series of short anaglyphic movies depicting the subjective landscapes of characters in the play titled *The Party Show*, produced and mounted in Hollywood by the Burglars of Hamm theatrical ensemble. Stereographer Paul Taylor photographed the actors over green screen for this production with CG 3D backgrounds that Isroelit composited in. The audience was provided anaglyph glasses and instructed when to wear them at the proper time during the play.

A somewhat early use of stereoscopic computer animation was made by Vibeke Sorensen with the short film *Maya* in 1989. Working with computer scientist Phil Mercurio and molecular biologist Lynn Teneyck, Sorensen built a stereoscopic animation system enabling the spectator to see the movement of molecules in real time. Part of the *Maya* project involved creation of an Interactive Stereoscopic Animation System at the San Diego Supercomputer Centre.

The holographic motion pictures of the artist known as Alexander have been shown exclusively in art galleries. In 1986 the artist was invited to France to create motion pictures using direct holography with a pulse laser. This form of laser would pulse at twenty-four frames a second and created the action of an interrupted or "intermittent" camera. Up to that time the only holographic movies that had been made were laboratory experiments. Alexander made two holographic motion pictures in the process. The 4-minute 1987 film *Masks* is a continuously moving vertical integram comprised of ten-inch wide holographic film. Alexander's second holographic film, *The Dream* (1988), at eight minutes long, is a visual flux of superimposed spatial conglomerates intended to convey images one might experience in a dream state. The influence of the classic 1919 German expressionist film, *The Cabinet of Dr. Caligari* upon the imagery created for *The Dream* is clear. Viewable by only a single person at a time, Alexander acknowledged the primordial simplicity of his holographic movies and compared them to viewing films in Edison's Kinetoscope "peep box" of 1895.

With a 2011 video installation in Santa Monica, California titled *The Dark Lining*, video artist and filmmaker Marco Brambilla made an epic, if bombastic, use of stereoscopic motion images. Two separate 3-minute loops, each with a separate title, ran continuously in the gallery space on opposite, facing walls. Gallery patrons used linear polarizing 3D glasses to view the high definition videos. The first piece, *Civilization (Megaplex)*, featured a vertically scrolling montage exploring the concepts of heaven and hell. The highly florid montage, weaving together images of divinity and the afterlife, was built from clips and visual elements from hundreds of Hollywood films.

The second piece, *Evolution (Megaplex)*, with a horizontal scroll composited wars, monsters, science fiction and Armageddon from Hollywood films in a baroque display of frenetic *kitsch*. Brambilla's two 3D composites simultaneously exploited the entertainment appeal of the appropriated subject matter yet, by virtue of emplacement in a gallery setting, offered up their bombastic grandeur with a sly distancing, at a psychic remove, despite the dazzling visuals presented in 3D to gallery patrons.

Stereoscopic vision and cinematic perception have long fascinated experimental filmmaker Ken Jacobs. Since the 1960s, Jacobs has been active in the U.S. East Coast world of avant-garde film. Beginning with the hallucinatory *Blonde Cobra*, a baffling cinematic portrait of underground filmmaker Jack Smith, shot between 1958 and 1963, Jacobs has expressed his fascination with the ecstatic and subliminal nature of the film experience. With *Tom, Tom, the Piper's Son* (1969-1971) he optically printed and repurposed footage originally shot by Billy Bitzer, D.W. Griffith's cameraman, in 1905 to scrutinize the perceptual vocabulary of primitive cinema. By step printing and colour-channeling left- and right-eye views from the same film, Jacobs was able to extract an anaglyphic 3D version in 2008 which he titled *Anaglyph Tom (Tom With Puffy Cheeks)*.

With his recycling of Lumière brothers' footage shot out the window of a train as a continuously moving "tracking" shot in the piece titled *Opening the 19th Century: 1896*, Jacobs provides the viewing audience with a neutral density filter on a chopstick to place over one eye while watching to experience the "deep space" of Pulfrich 3D. Midway through the film, the train reverses direction and the audience is told to switch the filter over to the other eye to continue the experience of motive depth. The audience members thus become performers in the interactive experience of cinematic space.

FIG. 4 The unique handcut shutter blade on Ken Jacobs's Nervous Magic Lantern is shown. Photo: Ray Zone.

FIG. 5 Ken Jacobs displays an essential component of his "Nervous System" to admirers after a 2009 performance with his Nervous Magic Lantern. Photo: Ray Zone.

A significant part of Jacobs' cinematic repertoire is a hallucinatory visual performance of what he calls his "Nervous System" which uses a rotating shutter wheel and two still projectors to create an extended perceptual inquiry into the relationship between time and motion. This is Jacobs's "Nervous Magic Lantern"(FIGS. 4 & 5), a cinematic exploration of spatial and temporal perception in which Jacobs manipulates the alternating film frames into a swirling visual mantra.

Jacobs has on occasion produced stereoscopic shadow shows as with the one that took place in 1999 at the Modular Theatre at Cal Arts with the performance of a 3D work titled *Slow is Beauty, Rodin (An Audio-Optical Vaudeville)*. There have been numerous anaglyphic shadow plays, using red and blue back lights projected on a scrim, but this extended piece used polarizing projection and the audience was given a pair of polarizing glasses to view the play.

The back-lit material appeared to be a silverized fabric that was translucent and with a series of 18 vignettes Jacobs created an array of 3D effects that were surprising, poetic and sometimes quite humorous. The vignette titled *La Mer*, for example, opened with the shadow of a man to the right and a woman to the left unraveling a translucent material. The material was stretched out and waved gracefully in the air to float gently down as the man and woman disappeared completely from the stage and only the transparent material remained gently waving at and away from the audience. Debussy's symphony *La Mer* began to play as the translucent material rendered waves of dimensional light as if it were the sea.

FIG. 6 "Abstract" (1999) a stereo painting by Abe Fagenson made to be viewed with cross-eye freevision. Courtesy: Abe Fagenson.

After short audience-pleasing vignettes featuring a crawling baby, a bicycling couple, and a curious puppy wandering in shadow space, Jacobs closed his series of spatial poems with a gradually evolving symphony of bubbles produced by the entire company both behind and in front of the 3D scrim. This finale climaxed with real balloons floating down onto the audience in darkness creating tactility in blindness and a haptic reality.

More recent stereoscopic digital movies of Jacobs' include the feature-length *America at War, The Home Front: Film Opening* (2011) and the short film *Berkeley to San Francisco* (2011). Both these videos were shot with the Fuji W3 Finepix 3D camera and shown in anaglyphic 3D. In a February 2011 email to me, Ken Jacobs acknowledged that he was "depth-conscious from my painting studies with Hans Hofmann."[16] In the same email he wrote that "[t]he Nervous System began with a shuttle between projectors and then switched to the exterior shutter when Alphons Schilling discovered and urged me to incorporate it. The effect went from 2D forms placed in depth to voluptuous rounded forms in a delirious and drunken space."

Stereographic painting continues to fascinate artists, who increasingly in the twenty-first century have taken to digital toolsets to realize their 3D visions. The New York artist and educator Alphons Schilling was active in this unique modality and in 1975 contributed stereoscopic art to a program titled *Binocular Works*, working with Ken Jacobs, at the Collective for Living Cinema.

Schilling was also an influence on students such as 3D filmmaker Gerald Marks, who has produced a number of experimental stereoscopic films, using Pulfrich techniques with horizontal motion of either subject or camera. Roger Ferragallo, for example, has produced numerous abstract stereoscopic paintings. Initially painted by hand using paints and brushes, more recently Ferragallo has created numerous 3D works using digital technology, which valorize the use and importance of z-space through the employment of abstraction. Another notable example would be Abe Fagenson of Woodland Hills, California, who paints both abstract and representational imagery in 3D, where both images are painted on the same canvas, so that they can be viewed without glasses, with a technique called cross-eye free vision (FIG. 6). The work of independent American artists such as Jerry Oldaker, Kerry Laitala, Chris Casady, and others provides further examples of experimental stereoscopic art.

The above is a merely cursory sketch of experimental artworks that incorporate 3D imagery, all of which are remarkably varied in terms of materials, motivations, and technologies. They are rooted in historical avant-garde traditions, such as those of Dada and Surrealism, that were truly experimental in their bold openness to technological innovation, display formats, and unconventional techniques which were meant to provoke performative viewing experiences. While the range of examples mentioned is remarkably wide—in terms of the varied geographical and cultural contexts of live musical performance, theatre, film, and painting—I hope that my account serves the purpose of encouraging further articulation of unconventional connections between artists utilizing stereoscopic imagery, both past and present.

NOTES

1 Man Ray, *Self-Portrait* (New York: Little, Brown, 1979), 101-102.

1 Ibid.

3 "William Moritz - Selected Filmography," Center for Visual Music, accessed 12 June, 2012, http://www.centerforvisualmusic.org/Moritzfilmo.htm.

4 William Moritz, *Optical Poetry, The Life and Work of Oskar Fischinger* (London: John Libbey Publishing, 2004), 236.

5 Ibid.

6 Ibid.

7 Ibid., 166-167.

8 Ibid., 167.

9 Norman Jenkins, "The Cash Customers at the Festival of Britain's Telecina," *Society of Motion Picture Engineers Journal* 58 (April 1952): 307.

10 Norman McLaren, "Stereographic Animation: The Synthesis of Stereoscopic Depth from Flat Drawings and Art Work," *Society of Motion Picture Engineers Journal* 57 (December 1951): 317, 313.

11 Gerald Pratley, "The Latest 3Dimensional Films Prove That the Movies Still Have an Ace up Their Sleeve," *Films in Review* (May 1952): 171.

12 Lenny Lipton, *Foundations of the Stereoscopic Cinema: A Study in Depth* (New York: Van Nostrand Reinhold, 1982), 51.

13 Erkki Huhtamo, "Hoberman vs. Junkman," *Unexpected Obstacles: The Work of Perry Hoberman*, exhibition catalogue (Finland: Galeria OTSO, 1997), 23.

14 Ibid.

15 Ibid.

16 Ken Jacobs, email to the author, 12 February, 2011.

LEON GUREVITCH + MIRIAM ROSS

STEREOSCOPIC MEDIA
Scholarship Beyond Booms and Busts

WITH THE RECENT RISE of digital stereoscopy (cinematic, televisual, mobile gaming) there has been a resurgence of scholarly interest in the historical status of the form. Invariably questions over its likely relevance to the wider fields of film, media, and visual culture turn at some point to its checkered history as a commercial medium. Stereoscopic media, it is pointed out, has seen many hyperbolic claims made of its transformational effect. Sergei Eisenstein said "it is as naïve to doubt that stereoscopic film is the tomorrow of the cinema as it is to doubt that tomorrow will come"[1] while more recently in 2011, James Cameron predicted that in as few as two years, "everything will be produced in 3D and 2D versions will be extracted from that."[2] Echoing these sentiments in gaming production Mick Hocking of Sony London has stated that, "looking at the future of 3D, I think we've really only just begun to realize its potential as a creative medium [we are] just scratching the surface of what's possible… we're living in one of the most thrilling eras to be a gamer." [3] Regardless of these claims, it is expected that 3D media will, following past trends, peter out and disappear from commercial consumption. Leaving aside legitimate questions of what exactly constitutes success in terms of stereoscopy's media-specific longevity, we propose here to briefly layout an alternative approach to the academic consideration of stereoscopic media. Rather than examine stereoscopy only in light of a series of boom periods, we suggest 3D media's history has a more complex, multi-layered trajectory that intersects with audiovisual cultures in divergent ways. In particular, we question the way stereoscopy is often treated as a media form in its own right and not as a technique generally applied to many media at different times in history and according to different commercial imperatives. The consequence of the former conceptualization of stereoscopy is that success (the moment at which grand claims are made for stereoscopy's likely replacement of traditional photography/cinema/television/gaming), and often subsequent failure, is treated as the result of brief market popularity. The waning of interest in whichever particular form is the moment at which commercial and scholarly interest in the form is held up to have been misjudged, naive and entirely predictable. In this article we will seek to move beyond the determinism of the boom and bust mentality that has long been the narrative of stereoscopic media. After all, stereoscopy, in all its

forms, has been a part of our media culture for nearly two centuries. We will pay particular attention to the interstices between these boom and bust periods with an understanding of the way stereoscopy is maintained across different media forms. Our aim is thus not to perpetuate long worn out and unproductive assertions of stereoscopy's past failures or coming dominance. Instead, we intend here to address stereoscopy's varying fortunes in order to take into account the technological determinants that have allowed it to exist across multiple media platforms while foregrounding the role that popular imagination has played in retaining sites for it to persist.

In 1838 Charles Wheatstone announced a breakthrough in understanding the principles of binocular vision.[4] Wheatstone did not, however, seek to bring the resulting viewing device, the stereoscope, to market, and the story of its eventual development by David Brewster and Louis Jules Duboscq is now well documented as one of the many tales of entrepreneurs commercializing the discoverer's work.[5] While Wheatstone developed hand-drawn stereo images for a reflecting stereoscope, Brewster, working with Duboscq in Paris, utilized photographic image production in order to mass market a lenticular stereoscope. It was showcased at London's Great Exhibition of 1851 where claims that it delighted Queen Victoria drew immediate popular attention.[6] Stereoscopic imagery's convergence with the mechanical reproduction of the Victorian visual world provoked a global means for envisioning daily experience. Preceding cinema's global enterprise by almost half a century, tens of millions of stereographic cards were sold annually and hundreds of millions were in circulation by the end of the century.[7] They were not confined to a singular technological development and were instead produced across daguerreotypes, ambrotypes, paper and glass negatives and transparencies.[8] Nor were they limited to standardized specifications meaning that stereographic images were produced in circular, oval, square, rectangular and arch form as well as existing in a mixture of individual viewing devices (table top and hand held stereoscopes, the photobioscope—FIG. 1) and communal exhibition technologies such as the Kaiser Panorama (FIG. 2). They were projected as moving images before the consolidation of cinema through experimentation with stereopticon (Magic Lantern) stereo slides and stereo versions of the Phenakistoscope.[9] Stereoscopy's relationship with cinema and its inception was not limited to trans-technological experimentation however, but extended to the content of spectacular subjects contained within its early commercial output.

The subject of the stereocards that came to predominate the stereoviewing market (trains, ships, cars, industries, military machines, natural wonders made accessible by modern transportation and manmade disasters often caused by them) bare uncanny resemblance to the cinematic topics that they preceded.[10] This resemblance was no accident but a consequence of an emergent visual culture that triangulated industry, spectacle and the commodity in a new relationship that still pervades contemporary audiovisual culture. When Brewster and Dubosq's stereoscope was introduced at the 1851 exhibition and unleashed the ensuing storm of publicity, they would have witnessed what subsequent cinematographers were later to see for themselves—that spectacular imaging and emerging forms of industrial promotional culture were mutually reinforcing. Brewster, Duboscq, and subsequent stereoscopic companies that emerged, like their cinematic successors, benefited from a developing promotional matrix premised upon the industrialization of spectacle and the spectacle of industrialization. It is not simply that they caused a promotional clamor for their stereoscope by indicating the interest of Queen Victoria, it is that stereoscopy developed the language of the self-promotional attraction across a number of interlinked technological viewing

FIG. 1.
The Stereoscope
(example retrieved from shop.showcase antiques.com/)
and the
Photobioscope
(authors' own image).

platforms. With the industrialization of spectacle that photographic technology brought to stereoviewing, a multi-faceted industry emerged to satisfy the demands of a public eager to lay their eyes on new visual attractions. Long before the Lumière brothers filmed their now iconic attraction *L'arrivée d'un train en gare de La Ciotat* (1895), many thousands of stereocards were produced that initiated the special effect of a train rushing toward the viewer (FIG. 3). Of course the "train effect" that functions as one of cinemas founding myths was premised explicitly upon the motion of the moving image and therefore demands that we do not reductively equate stereoscopic content unproblematically to its cinematic predecessor.[11] Nevertheless, it is striking that so many oncoming trains were represented in both stereoscopy and cinema and that they became such important emblems for both formats. If nothing else it suggests a considerable overlap in the aesthetic and technological experimentation taking place to develop an arresting spectacle across both forms, not to mention the shared basis of commercial demand for such images amongst consumers in their relevant markets. This was, as we shall see, something that was to be repeated again in the following century in the View-Master.

While cinema's consolidation at the end of the nineteenth century captured public attention, the stereoscope remained a popular viewing technology into the 1930s.[12] Its unique form of visuality enthralled the pioneers of visual technology to the extent that various experiments concerning the way it might be incorporated into cinematic form took place at the turn of the twentieth century. Although the realization of stereoscopic cinema was not achieved until later, the potential for stereoscopic moving images was working its way through the filmmaker's imagination at the same time as cinema was developing into a substantial art form. The predominance of cinema may have forced stereoscopy into its first interstitial phase yet it was not forgotten. Rather, its potential was such that notable artists such as Abel Gance in the 1920s, Marcel Duchamp and Man Ray, also in the 1920s, and Norman McLaren in the 1950s, each experimented with moving images in the stereoscopic format.[13]

As an optical regime that could be transferred across technological formats, stereoscopy offered

FIG. 2 The Kaiser Panorama (example retrieved from www.stereo.canonia.pl)

multiple possibilities for the expansion of the visual spectacular in the twentieth century. The emergence of television was equally bound up in dreams of a stereoscopic future. Moving from photography and cinema to television, it turns out that stereoscopic television was not simply conceptualized as early as the late 1920s it was prototyped too.[14] Given the economic and technological challenges of launching standard television and the effect that the Second World War had on delaying its ultimate commercial deployment, the fact that Loggie Baird's stereo-television[15] did not see the commercial light of day is less surprising than the fact that it was mooted and developed so early in the new medium's history. As William Boddy points out, the deployment of television (more than many other media) has long been intimately connected to the peculiarities of the popular imagination.[16] The desire on Loggie Baird's part to go beyond the technological marvel of broadcast television (as it was frequently presented in the popular press) and expand its exhibitive capacities to stereoscopy before it had even forged a functional market in its own right says much about the sustained hold that stereoscopy had on the developers of audiovisual technology and culture.

Stereoscopy's hold was such that the stereocard format went through a second commercial revitalization even before stereoscopic cinema's first major commercial wave took off in earnest. Designed in the 1930s to renew the photographic stereocard, the View-Master was showcased at the 1939 World's Fair in New York as an improvement of the stereoscope in a number of ways.[17] First, the View-Master introduced a disk based image storage system in which the pictures contained were considerably smaller than the stereo-photographs that had preceded them. Made from

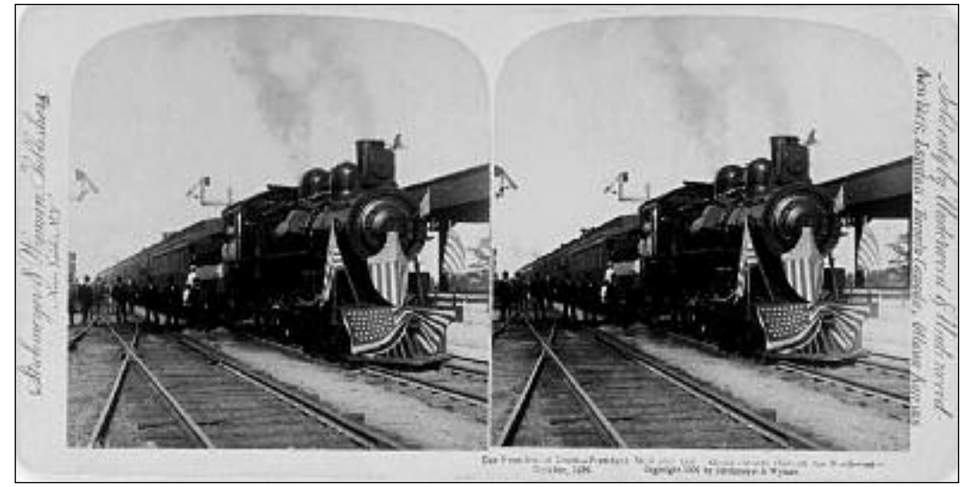


FIG. 3 The stereoscopic train effect.

16mm positive film technology, the View-Master created a device that was both miniaturized and optically improved: presenting the viewer with glowing images that utilized light passing through celluloid rather than bouncing off a paper print. Similarly, this allowed the design of the View-Master (reminiscent as it was of the microscope) and subsequent marketing to play upon notions of futurism and progress.[18] The disk also allowed far more images to be consumed without the need to swap content: effectively allowing multiple stereo-scenes to be viewed in succession before the viewer had to surface from their binocular apparatus to load a new disk. Interestingly, the View-Master was initially intended as an alternative to the postcard, and as such was sold at photography shops, stationers, and gift shops. Thus the main subjects of the early View-Master disks were spectacular landscapes of the US such as the Carlsbad Caverns and the Grand Canyon. In this sense, early View-Master disks sustained the preoccupation with spectacular landscapes found in earlier stereocards and cinematic travelogues and foreshadowed the latter return of such a preoccupation in cinema with landscape in the 1950s.[19] The View-Master did not replace the postcard, however, and it did not continue to be sold on this basis, demonstrating Lisa Gitelman's point that, the history of "new" media is awash with examples of devices "unveiled to public acclaim" that ultimately fail "to presage anything like the functions that subsequent, related devices eventually serve."[20] After the outbreak of the Second World War the US military made use of View-Master reels as a means of educating service men in enemy warplane identification.[21] As such, the View-Master renovated the promotional claims made of the original stereoscope: that it could figure as an educative device with multiple potential functions. Perhaps most intriguing about the View-Master, however, is the fact that despite the significant numbers of units sold throughout the 1950s, 1960s and 1970s, its existence has so far gone almost entirely unnoticed in scholarship that has tended to pronounce the death of stereo-photography around the turn of the twentieth century. This omission is most likely a result of the fact that the View-Master found a niche after the war as a children's toy and has therefore gone unnoticed by much scholarship of visual culture.

Additionally, the View-Master's stereoscopy was eclipsed by the spectacular nature of 3D moving images when stereoscopic cinema finally reached mass commercial distribution in the 1950s. While Hayes, is in his extensive account of the history of 3D cinema, acknowledges the lengthy work on 3D cinema prior to the 1950s—particularly stereoscopic filming experiments in the teens, feature film production in the 1920s, the development of the polarized encoding-decoding method devised by Edwin H. Land in 1936, and the innovation of the 3D British Telecinema in 1951—he nonetheless terms the success period of US films between 1952 and 1954 "the first boom."[22] This perspective coincides with public opinion that often believes the runaway success of *Bwana Devil* (Arch Obler, 1952) and the box-office record breaking global achievement of *House of Wax* (Andre de Toth, 1953) to mark the beginning of stereoscopic cinema. And even though this boom was complemented by a surge of 3D films in other countries during the same period—feature production took place in Italy, West-Germany, Mexico, Spain, Japan, the Soviet Union and other locations[23]—it is often thought of as an entirely US affair. While the commercial demise of this stereoscopic cinema period is well documented and has provoked much debate about its causes (poor projection, poor quality films, poor stereoscopic filmmaking techniques, the superiority of other formats such as Cinerama and Cinemascope, the extra expense associated with 3D equipment)[24] the focus on this feature-film boom eclipses the other uses that were developed and maintained. In the same way that the View-Master found early implementation as a military tool, preceding the 1950s cinema boom, the Vectograph single print polarization system was used by the US military during WWII for aerial reconnaissance.[25] Later, in 1952 the United States Air Force paid attention to the possibilities of 3D films and a number of government shorts were produced in the Natural Vision stereoscopic formats.[26] While, military expenditure has often been at the forefront of developments in visualizing technology (see especially Lev Manovich's analysis of television's relationship to radar[27]), the health industry has also played its part (x-rays, ultrasound, fibre optics). In 1953, a 16mm stereoscopic medical documentary of a stomach operation made it into commercial exhibition[28] and 3D imaging has long been considered an appropriate method for displaying anatomical models: in the 1950s over 1500 photographic images and accompanying drawings were compiled for the 24-volume *Stereoscopic Atlas of Human Anatomy*.[29]

While these developments demonstrate stereoscopy's use value across a range of imaging processes, critical perception is more inclined to see 3D as a gimmick and, as Keith Johnston notes, often within the language of juvenile and childish forms.[30] It is not surprising, then, that the View-Master's status as a children's toy allowed it to slip past most studies of popular cultural production and consumption. As recent scholarship of early and pre-cinema has demonstrated however, it is reductive at best to ignore the considerable relevance of toys in the history of audiovisual culture simply because they do not appear to function within the adult domain that many were initially intended for.[31] In a similar way, another interstitial moment in 3D cinema history is overlooked because it does not conform to the development of cinema as a serious art form. In the early 1960s, a number of X-rated films were produced in stereoscopic format, including Francis Ford Coppola's *The Bellboy and the Playgirls* (1962) which opened in pornographic movie-theatres.[32] When one of these so called "skin flicks," *The Stewardesses*, played from 1970 to 1972 it was one of the top grossing films of this period as well as the most successful independent feature to date.[33] These films have their contemporary counterparts in the digital era's *Piranha 3D* (2010) and *3D Sex and Zen: Extreme Ecstasy* (2011), films that, while commercially successful, counter the attempts by James Cameron, George Lucas and Martin Scorsese to give stereoscopic cinema a respectable new beginning. This respectability relies on the presentation of their films as pioneering works that renew and regenerate a lost format that was prematurely halted, rather than the acknowledgment that their works are part of a much longer, continuous trajectory of 3D imaging.

By ignoring the lengthy history of other stereoscopic forms such as the View-Master, content producers and scholars underplay the intermedial potential of stereoscopy. For most of its history, the View-Master functioned as a promotional vehicle for other media texts, existing as Andrew Wernick would say in the "indeterminate circle" of the promotional intertext that entered (and therefore exited) anywhere.[34] Aptly, the shape of the View-Master disks that carried their promotional content physically resembled the "indeterminate circle" that Wernick describes more metaphorically (FIG. 4). These disks could rotate chronologically from one scene to another at the click of a button, allowing for rudimentary narratives showcasing the latest Hollywood blockbuster or the newest television series. The content of View-Master disks ranged from the "showtime" series covering television shows such as *Batman* to the "travel" series offering scenes of spectacular places around the United States and the rest of the world. Similarly, many film companies produced View-Master tie-ins ranging from *ET* (1982) to *Dick Tracy* (1990) and *Jurassic Park* (1993). Notably View-Master bought up its rival company Tru-Vue, not only to extinguish competition but also to secure exclusive rights to Disney content.[35] While the View-Master may be seen as functioning within one of the interstices of stereography's many booms, its existence was not only sustained for several generations of spectators but was also profound in its function as a pre-YouTube technology that allowed viewers to consume visual material (often promotional) relating to cinema and television productions both before and after their exhibition run. As a medium that offered both a pre-and-post cinema/television/radio/story book access to content, the View-Master was as profoundly intertextual as it was inherently cross-promotional, presenting marketers and advertisers alike with a ready-made, low tech, and widely distributed technology for an audience of children desperate to consume the stereoscopic spectacle of their favorite popular cultural zeitgeist of the time. In many cases, the draw of the stereoscopic attraction offered by the View-Master made up for the lack of audiovisual sophistication it offered when compared with the televisual or cinematic originals.

In their intertextual capacity, the View-Master disks also preceded the next major 3D cinema boom in the 1980s, so that when *Jaws 3D* (1983) was released, there were View-Master programmes available as a promotional tie in with the film. Similarly, a stereoscopic 3D, battery powered, video game based on the film was produced by Tomy and released in Japan as *Jaws 3D Graphic Game* and the US as *Tomytronic 3D: Shark Attack*. With a molded plastic design and duo-eye pieces not dissimilar to the View-Master, it provides an interesting parallel with the range of view piece add-ons that have recently started to emerge to turn smart phones into stereo photo/game/video viewers. There were thus a range of platforms to engage in *Jaws 3D*'s stereoscopic effect. However, in a similar manner to the prior 3D boom of the 1950s, the commercial sensation of the 1980s 3D cinema obscured a continuing relationship with stereoscopy across other technological formats. In 1982 "[e]very major studio began offering new prints of their old fifties features and shorts for 3D film festivals in many major cities."[36] The rhetoric of return was implemented to suggest that this was the next installment of a fledgling 3D history and the technological developments in the field of exhibition—such as single strip up and over processes—would allow its long awaited consolidation. In this context, the 1980s were seen as stereoscopy's next major boom and discussions of its

FIG. 4 The View-Master and Disk in its most common recent incarnation

cinematic demise ignored the continuing production of stereoscopic images in other forms such as the View-Master, and new developments in the theme park.

Much has been written about the way in which early cinema's spectacular attractions provided a perceptual and sensational link to the thrills that were on offer in the funfair.[37] It is apt, then, that the spectacular excitement of moving images was returned to the theme park in stereoscopic form, to the point that William Paul claims "if 3-D has never left the fairground, then the fairground never quite left 3-D, even in feature-length films."[38] Stereoscopy in the theme park is best known for taking place in 1985 when *Captain Eo*, the most expensive short ever made and one of the most costly 3D films, debuted at the EPCOT centre in Disney World and *The Sensorium* was filmed for Six Flags.[39] Less well known is that a colour short 3D film, *Jamboree*, opened at Disneyland as early as 1956 and ran until 1959.[40] Between *Jamboree* and *Captain Eo*, the Magic Journeys short that debuted in 1982 was also a popular installment in Disney's 3D spectaculars.[41] While headlines concerning the exorbitant budgets spent on audiovisual forms are usually reserved for Hollywood action films, *Terminator 2 3D* (1996), a 12-minute short for the Universal Studios Florida theme park in Orlando, cost over $60 million to produce, making it the most expensive production per minute in film history.[42] When its director, James Cameron, went on to produce feature film 3D productions, it demonstrated the capacity for artists working in stereoscopy to work in various contexts.

In the same way that View-Master tie-ins provided stereoscopic versions of cinematic works, this trend continues in the current day with *Transformers The Ride 3D* at Universal Studios operating as an intertext between the stereoscopic Transformers film *Transformers: Dark of the Moon* (2011), earlier 2D incarnations in film and television (*Transformers* (1984-1987) *The Transformers: The Movie* (1986) *Transformers* (2007) *Transformers: Revenge of the Fallen* (2009), video games, the original Hasbro children's toys and the various spin-off merchandise that accompanied them. However, as with the View-Master, theme-park entertainment have often been ignored, perhaps because they are seen as childish amusement with little cultural value.[43]

In a similar way, the journey of stereoscopic media into the realm of educational enterprise is often overlooked for its lack of artistic merit. The tendency to ignore the continuation of the stereoscope into the twentieth century can be attributed to the way in which dogmatic attempts to use it as an education tool[44] were far less fascinating than the early experiments with cinema in the first two decades. When 3D moving images were produced in large format through initial IMAX trials in the 1960s[45] to later consolidation in 1986 with the film *Transitions* (1986)[46] they announced a particularly immersive era of stereoscopic film, yet their placement within the museum context in which the IMAX existed meant that they were not given the same high-attention "boom" status as the works exhibited in commercial movie-theatres. Nonetheless, the educational potential inherent in an audiovisual format that can display depth in unique ways continues to be realized in museums across the world. Recent exhibitions, such as PLACE: Hampi (which uses life-size stereoscopic panoramic images to depict the UNESCO-designated World Heritage site of Hampi in southern India)[47] display the many possibilities for stereoscopy to function as a visual regime that is distinct from 2D yet equally transferable to varied audio-visual contexts.

In the contemporary digital era during which the convergence of different media platforms for the exhibition of similar audio-visual texts has been celebrated as the determining factor in current cultural production[48], it is no surprise that shortly after 3D cinema found a new commercial peak, attempts to utilize this upswing in stereoscopy's fortunes were put into place for the television market. More, interestingly, at the same time as discussions of how and when 3D television will become a serious market contender, stereoscopy steadily assumed a role across all other major media platforms. The Nintendo 3DS not only provides the opportunity for hand-held stereoscopic gaming opportunities but also showcases a number of short 3D films. Equally notable, it provides stereoscopic virtual reality tours of theme parks, retaining the prior links between stereoscopic audiovisual formats and the fairground. YouTube has also assigned space for 3D specific works, an increasing number of manufacturers have started to produce stereoscopic advertisements, and consumer phones and digital cameras have been increasingly sold with 3D enabled technology. As Thomas Elsaesser has noted, 3D cinema is just one avenue for a deeply rooted commercialization of stereoscopic works across as many money-making avenues as possible.[49] While these developments may be indebted to the multiple possibilities offered by contemporary digital technology, the situation is not dissimilar from the spread of stereoscopic images across different imaging devices in the Victorian era. Contemporary analysis of the current stereoscopic renaissance runs the risk of reduction if its growth is put down only to a digital "revolution" that supposedly washes away all other industrial, economic and technological interests in the process.

If we treat stereoscopy as a technique applicable across many media—rather than a continually redeveloped but ultimately failing technology that is resurrected and killed in each new medium that it briefly appears in—then we can reconfigure our scholarly approach to stereoscopic media. While academic skepticism toward stereoscopic media has long been a defining, and frequently obstructive road block in its study, the sheer frequency of stereoscopy's resurrections over the past century poses two questions increasingly difficult to ignore: firstly why, after all its commercial failures has stereoscopy as a concept never died and therefore secondly why, after all its commercial failures has it kept recurring in the popular imagination from View-Master slides and

commercial 3D cinema to theme-park attractions and 3D gaming?

The suggestion that the technology simply keeps failing to live up to its promise is deterministically reductive as is the frequently implied claim that a new future of stereoscopic media dominance is just around the corner. Both suggestions raise the question of why stereoscopy has to necessarily achieve dominance to be a valid topic of scholarly attention. A more productive approach, in line with the brief account we have given, might be to see stereoscopy as a mode of attraction as much as a technology of vision and, as such, bound by its nature to be just one of many potential forms of visuality. Elsewhere we have described stereoscopy's spectacular attraction[50] as well as the intimate relationship between the spectacular attraction (be it early cinematic or contemporary digital) and the promotional imperatives of audiovisual culture[51]. In this sense stereoscopy slots into a model by which it can multiply the visceral capacities of whatever media form it coexists with: photographic, cinematic, televisual, video game, and theme park rides.

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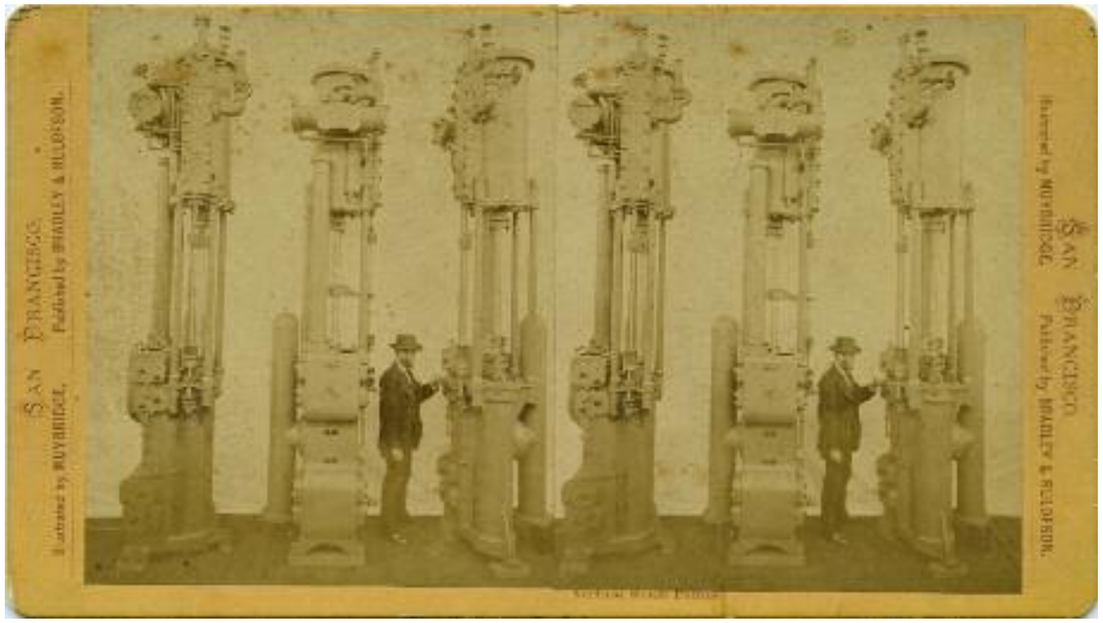

FIG. 1. Eadweard Muybridge. "Vertical Steam Pumps." Stereo. No date (ca. 1873). Courtesy: Special Collections and University Archives, Stanford University Libraries.

KENNETH WHITE

MUYBRIDGE'S ENTHALPY

EADWEARD MUYBRIDGE'S 1873 stereograph of David Stoddart's new vertical steam pumps would seem to warrant little attention (FIG. 1). In the previous year, Muybridge had produced his first photograph of Leland Stanford's horse, Occident, suspended in mid-gallop, all hoofs aloft; the work launched the next turn of his fame. His subsequent motion studies remain privileged subjects of scrutiny. Such is not the case for his work in stereography. But "Vertical Steam Pumps," an apparently minor work, a contract job, places the photographer in a new context. Examined alongside Muybridge's related patent filings for innovations in rapid shutter photography and his composite image entitled "Volcan Queszaltenango – Guatemala" (1875) (FIG. 2), the stereograph provides a new view into a career that might appear exhausted of revelations. The stereograph and the composite image are a peculiar piece of merchandise among the thousands Muybridge produced for galleries and benefactors. Each is comprised of two images, each presents the solidification of gaseous matter, and each exposure is materially linked to new technologies of steam power. This article describes how, in the formative years between 1873 and 1875, Muybridge produced by stereoscopic means his own kind of graphical model of thermodynamics.

Muybridge's stereographs are regularly but uncritically noted, passed over in favour of his uncompromising command of the most difficult photographic processes of his time such as the wet-plate collodion process. As Jonathan Crary notes, "It is easily forgotten now how pervasive was the experience of the stereoscope and how for decades it defined a major mode of experiencing photographically produced images."[1] Following the absence of sustained analysis given to Muybridge's stereographs, one would presume these mass-produced commodities to be but means of advertisement and income highly prized by neither their maker nor by those who collected them. The photographer made stereographs for reproduction and distribution by his representative studios, a required excursion into popular enterprise. The implication is that the stereographs were minor complements to his landscapes and his ultimate obsession, instantaneous photography. His true aspirations, his "erotic fiction," to follow the great phrase by Marta Braun, were realized at Stanford's Palo Alto horse farm and at the University of Pennsylvania.[2] There seems little need to

FIG. 2. Eadweard Muybridge. "Volcan Queszaltenango – Guatemala." *The Pacific Coast of Central America and Mexico, The Isthmus of Panama; Guatemala; and the Cultivation and Shipment of Coffee*. 1876. Courtesy: Special Collections and University Archives, Stanford University Libraries.

consider the fleeting entertainment, the cheap thrill, of his stereographs: lesser copies of grander work or simply commodities.[3] However, as Hollis Frampton astutely wrote in 1973 in his classic essay "Eadweard Muybridge: Fragments of a Tesseract," Muybridge was "an indefatigueable stereoscopist; his stereo images, committing him by definition to the most thoroughgoing photographic illusionism this side of full color, function as a curious palimpsest to the mature sequences, from which very many of the illusionist strategies available to photography have been rigorously evacuated."[4] From that palimpsest I examine two objects and the historical conditions of their production.

"Vertical Steam Pumps" was commissioned by Stoddart Iron Works, a San Francisco foundry. "Volcan Queszaltenango – Guatemala" circulated in Muybridge's album *The Pacific Coast of Central America and Mexico, The Isthmus of Panama; Guatemala; and the Cultivation and Shipment of Coffee*, published in 1876; Muybridge created the album upon his return to San Francisco from Central America. The stereograph presents three vertical steam pumps and a suited gentleman standing among them, all against a plain drop cloth. The composite merges a volcano crater with voluminous clouds. By definition, two images constitute each object: two distinct frames in the stereograph, and two exposures superimposed in the composite. In the first object, the couplet merges through use of a stereoscope. The device aligns the slightly different exposures; this creates an exaggerated illusion of depth. In the second object, the exposures were forcibly joined by the photographer through his laborious printing experiments. Each object presents water vapour and its

compression, namely steam power. In the first, Muybridge produced a depiction of technological innovations in its containment and instrumentalization. In the second, he created a synthetic, implacable landscape for a promotional album. The composite is a conspicuous abstraction in a book that is otherwise still celebrated for its documentary value. Through his composite, Muybridge presses the ostensible veracity of the album into confusion. The "landscape," and the material of the photograph itself, seems to disintegrate. The image is a sublime contrivance. Its frame is a defence and a threat, a tenuous border, a fragile container against volatile substances under pressure, barely confined. The stereograph and the composite celebrate industrial capitalism, notions of technological progress, and expansionist enterprise. But the photographs trouble any easy self-congratulatory rhetoric: capitalism's material basis is exposed as immaterial, even imaginary.[5]

I argue that the stereograph is a key work early in the formative period between Muybridge's cessation of landscape photography and his turn to locomotion studies; the composite is a fraught bookend to those crucial years. The patents that Muybridge filed a few years after making the stereographs complicate his position among picturesque traditions of early American landscape photography and histories of cinematographic apparatuses. They provide material evidence of his circulation within another burgeoning field of the time: thermodynamical theory. In studies of the interrelated history of chronophotography and thermodynamics, such as Anson Rabinbach's classic *The Human Motor: Energy, Fatigue, and the Origins of Modernity*, Muybridge is a tangential player, a foil cast against luminaries more pure in mission, in particular Etienne-Jules Marey.[6] In *Picturing Time: The Work of Etienne-Jules Marey (1830 – 1904)*, Braun warns, "Muybridge's *Animal Locomotion* is a good example of how vulnerable are our assumptions about the very nature of photography; it demonstrates the dangers of believing what we see."[7] Muybridge is an opportunist, a pretender, who falls to traditional photographic practice, scientism, regressive self-interest, and error, contra Marey's altruistic, avant-garde investigations.

> Compared with Muybridge's *Animal Locomotion*, Marey's studies of human and animal movements are everything that Muybridge's are not: disinterested, accurate, analytic, and systematic. Although they both used the camera, Marey's chronophotographic analyses of movement reflect little of traditional photographic practice: Marey sought not to represent nature but to discover the laws that governed it. For him the real and the visible were not synonymous—in fact, quite the opposite. Rather than insisting on the camera's ability to duplicate human vision, Marey used it to create a new, superhuman eye: vision, like all sense perception, was for him subject to error.[8]

However, I would posit that for Muybridge, rather than a naive belief in what we see, the works trouble the relation between the real and the visible. For Muybridge, it was in the distortive, not the superhuman, capacities of the camera's lens determined by and determining those laws of physical and economic force that the real might be momentarily contained, and glimpsed. Tom Gunning writes, "The image of Eadweard Muybridge haunts us, beckoning to us from the space between things, the interstices and gaps that appear."[9] It is within the interstices of thermodynamical theory, instantaneous photography, and North and Central American capitalism, that Muybridge offers another view. Close analysis of the historical documents asserts Muybidge as an integral participant within the commodification of heat energy in the late nineteenth century.

I make the link by way of the physicist Josiah Willard Gibbs. Gibbs' articles on "Graphical Methods in the Thermodynamics of Fluids" and "A Method of Geometrical Representation of the Thermodynamic Properties of Substances by Means of Surfaces" were published in 1873, the same year Muybridge made his stereograph of Stoddart's machines.[10] The notion of *enthalpy*, or "warming in," following the Greek *ἐνθάλπειν*, finds some of its original derivation in Gibbs' articles. Gibbs described the measure of the change of heat in a thermodynamic system. He produced an equation mapped in three dimensions. It accounted for values of volume, energy, and entropy in a body. Following the work of Heike Kamerlingh Onnes and Alfred W. Porter, this equation would be used to compute enthalpy.[11] Enthalpy is symbolized as

$$H = E + PV \text{ or } H = U + PV$$

In "A Method of Geometrical Representation of the Thermodynamic Properties of Substances by Means of Surfaces," Gibbs writes,

> Now the relation between the volume, entropy, and energy may be represented by a surface, most simply if the rectangular coordinates of the various points of the surface are made equal to the volume, entropy, and energy of the body in its various states. It may be interesting to examine the properties of such a surface, which we will call the thermodynamic surface of the body for which it is formed.[12]

Gibbs' work was a radical contribution to the physical sciences. In his diagram, thermodynamic state variables are graphically plotted in a closed system. This literal cube of forces may be expanded into a field of theoretical and physical dynamism. Muriel Rukeyser writes of Gibbs' innovation:

> This surface, so accurately delicate, as beautiful as a piece of fine abstract sculpture, shares with the sculpture of stone, the sculpture of mountains, the nuances of a perfectly created object. The play of light and shadow on the surface is like the shadow-play on the mountains Gibbs knew well. But the line of shadow signifies directly, it is a history; every wavering of the line gives information.[13]

Gibbs' revolution in direct signification of volume-energy-entropy cannot be overestimated. James Clerk Maxwell, physicist and theorist of colour photography, recognized the value of Gibbs' work. Maxwell crafted a model using Gibbs' formulas, a "statue of water," which he sent to Gibbs shortly before his death."[14] Muybridge, in his own way, crafted statues of water in "Vertical Steam Pumps" and "Volcan Queszaltenango – Guatemala."

Enthalpy, historically linked to Muybridge by way of Stoddart's machines, is a means to describe the accumulation of energy that the photographer aspired to enact within his work of the period. Muybridge's stereoscopic images, Stoddart's innovations in steam technology, and Gibbs' revolutionary "method of geometrical representation of the thermodynamic properties," are catalytic systems. For these three men, literal forces churned, and perhaps attained some momentary containment, in their constructions. The energetics at work in Muybridge's images comes into relief through this constellation. Muybridge's stereoscopic manipulation of steam pumps and a volcano crater suggest a kind of "enthalpic drive," a libidinal "warming in," within the bodies of their viewers through the process of contorting their vision. By triangulating Muybridge, Stoddart, and Gibbs, we see that the triumph of Muybridge's career was his experiments in stereoscopic technology. It is through literal and figurative stereoscopic vision that we must scrutinize the anxious, enthalpic drives at work in these materials.

Each frame of the stereograph displays three vertical steam pumps. The blank drop cloth suspended behind the pumps encourages continuity between the frames. Three pumps might become six if not for a thin vertical seam. Even without the use of a stereoscope, an optical instability is induced. The orderly placement of the machines effects an anxious sensation: their seriality generates a sense of optical momentum from one to the next and back again. The pumps stand on wooden blocks as if they were pedestals, not attached to any steam-generating boilers. They are identical, three of a kind, and brand new. Each is positioned to display a unique side of its workings for Muybridge's double camera. His almost-twin exposures meet the machines' precision with their own precise detail. Piston shafts and slide valves are crisply rendered. They are erect, at the ready. Rivets gleam. Hand wheels, bristling at heights that would require ladders or scaffolding to contact, seem to anticipate our grip. It is an array of phallic apparatuses. Long, smooth, domed exhaust pipes, half the height and affixed parallel to each pump, make the association still more explicit. And explicit the pumps would certainly be if one were to behold the card in a stereoscope: against the uniform, depthless field behind them, the pumps advance into our vision. They are their own context.

Our appreciation of the pumps' grandeur is assisted by the (doubled) presence of a gentleman in a trim suit and coachman's hat, seen in profile facing right. He is included for scale. His left hand rests on a lever of the third steam pump, connecting him to the machine. The gentleman does not gaze upward in reverence to the industrial totem. Rather he considers a vital juncture of the pistons and steam ports. Perhaps he is occupied by a detail beyond the capture of even this finely staged exposure. With this composition, Muybridge equates the freshly-built vertical steam pumps and the gentleman, thoughtfully poised. Formal majesty meets intellectual rigour. Man and machine alike contain awesome potential force. They are dynamism, held firm.

The gentleman is most probably the pumps' inventor. An imprint is faintly visible on the shaft of the pump at far left: "David Stoddart San Francisco 1873." Stoddart Iron Works occupied 114 and 116 Beale Street in San Francisco. The foundry was located one-half mile from Muybridge's current gallery representation, Bradley & Rulofson at 429 Montgomery Street. H. W. Bradley and William H. Rulofson found enormous success in the business of mass producing photographic materials. Muybridge was a prized contractor, one of their most profitable. The stereograph was a one-off promotional job arranged by the gallery, an advertisement for Stoddart's invention. The card connects two enterprises of burgeoning industrial production. In 1859, Oliver Wendell Holmes wrote, "A stereoscope is an instrument which makes surfaces look solid. All pictures in which perspective and light and shade are properly managed, have more or less of the effect of solidity; but by this instrument that effect is so heightened as to produce an appearance of reality which cheats the senses with its seeming truth."[15] The tenuousness of this stereograph's truth would have been further heightened, so to speak, by the fact that a vertical position for steam pumps was a novel proposal in 1873.

Between 1859 and 1873, David Stoddart filed several patents for improved management of

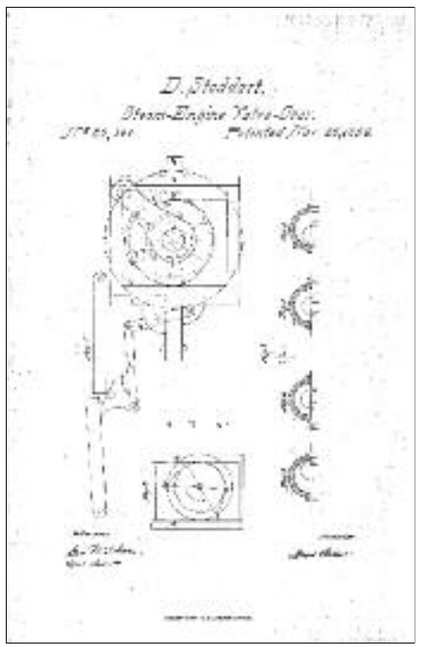

FIG. 3. David Stoddart. "Steam-Engine Valve-Gear." United States patent number 26,301. November 25, 1859.

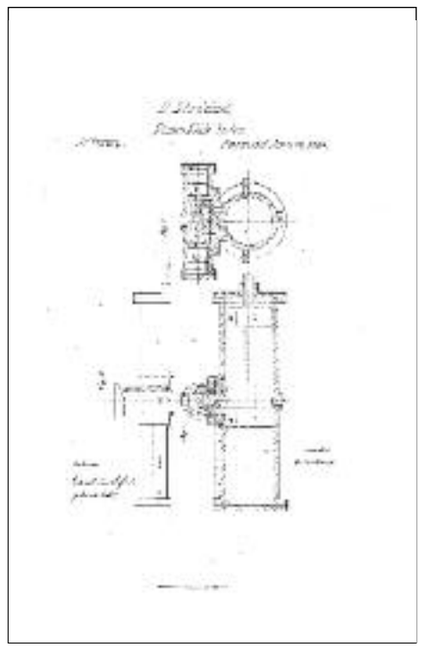

FIG. 4. David Stoddart. "Steam Slide Valve." United States Patent number 79,274. June 23, 1868.

steam pumps. I will focus on two: patent number 26,301, November 25, 1859: "Steam-Engine Valve-Gear" (FIG. 3); and patent number 79,274 filed on June 23, 1868: "Steam Slide Valve, improvement in reciprocating steam-engines" (FIG. 4). Muybridge's 1873 stereograph shows three Steam Slide Valves..

In steam engines of that period, the pistons could seal the exhaust releases. If the releases for both the piston chamber and the steam cylinder were blocked for too long—that is, if the piston were to seize in place over those releases—the result could be a disastrous concentration of steam. The pressure could overwhelm the boiler. It could explode. Stoddart's improvements mitigated this danger. "The purpose of my invention is the usual office of a steam-engine cut-off, to open the steam valve at the commencement of a stroke, and afterward close it again at some required period of the stroke, and thus permit the steam to work expansively." With his "Steam-Engine Valve-Gear," Stoddart claimed to modulate the opening and closing of a steam valve through a novel arrangement of a fixed cam and an adjustable cam with a rocking bar. He writes:

> The engine will work 'full-stroke'; and again the cut-off will take place according to any relative position of the cams between [its] limits. With the full-stroke cam, the smaller the throw in proportion to the diameter, the smaller will be the angle... and quicker will be the action of the cam. I employ this principle to obtain the quickest possible closing action for the valve.[16]

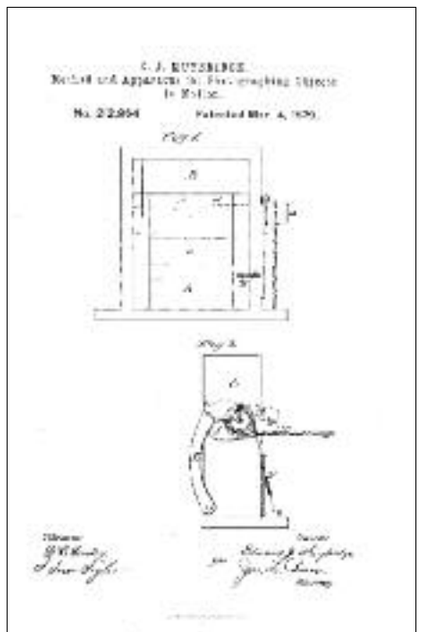

FIG. 5. Edward (Eadweard) J. Muybridge. "Method and Apparatus for Photographing Objects in Motion." United States Patent number 212,864. March 4, 1879.

Stoddart claimed that his cams alternated to allow for continuous displacement. The cams performed simultaneous intake and exhaust actions. The accumulated steam triggered its own release while replenishing its supply. Together, the cams produced a revolving cyclical motion that maximized work while propelling the valve away from the potential hazard of a stationary position. An engine modified with Stoddart's mechanism could perform a full-stroke from any combination of positions by the fixed and adjustable cams. More work with greater power could be accomplished, and that with constant, automatic modulation of the valves. In his "Steam Slide Valve" patent of 1868, the machinist claimed his elimination of interference by gravitational force in the piston's stroke. Stoddart writes, in reference to his patent drawings, that his new valves kept the pistons in constant motion by facilitating "a communication open to the exhaust up to the last instant for the main piston will just blank the second opening K^1 or K^2 as it opens the first H^1 or H^2. This is an important feature, as a liberal depth of piston may thus be used, and also allow a slow speed of engine, when required, without affecting the length of the engine stroke."[17] He concluded, "Thus, I am enabled to produce a positive motion, either slow or fast, and also to obviate any pernicious effects of either natural or undue leakage of any of the pistons or valve."[18]

"Vertical Steam Pumps" is a mature example of Muybridge's commercial photographs, which were commonly accessible as stereographs. He produced hundreds of cards between 1867 and 1874; their number rivals his enormous animal locomotion sequences begun in 1877. According to Anita Ventura Mozley, "There was probably hardly a parlor in the West that did not have some stereo views by Muybridge."[19] In the year that he made the Stoddart stereograph, he received the Medal of Progress at the Vienna Exposition for his Yosemite photographs. His Yosemite work was the last he made under the pseudonym "Helios," the name of the Greek Sun god.

The steam valves depicted in the stereograph bear striking resemblance to the electric shutter that the photographer would patent in 1879. Key elements of "Steam Engine Valve Gear," patent number 26,301, and its improvement "Steam Slide Valve," patent number 79,274, reappears in Muybridge's "Method and Apparatus for Photographing Objects in Motion," patent number 212,864. The historical record suggests that Muybridge re-engineered Stoddart's "improvement in reciprocating steam engines" so to improve his production of instantaneous photography. In his patents Muybridge described a moving object (a horse) that would activate the opening of a slide arrangement. Muybridge writes, "My present invention relates to an arrangement whereby the moving object is made to operate the slide simply by mechanical means."

Muybridge's releasing and trigger mechanism, his photographic shutter, delineated in his patent "Method and Apparatus for Photographing Objects in Motion" resembles Stoddart's steam engine valve gear. He described a moving object (a horse) that would activate the opening of a slide arrangement. Muybridge writes, "My present invention relates to an arrangement whereby the moving object is made to operate the slide simply by mechanical means." He continues with reference to his patent drawing:

> A B represent the two parallel slides, which are mounted in a frame, C, and which are provided with the openings *d d*, through which the exposure is made when the slides are drawn suddenly in opposite directions, so that the openings pass each other in in front of the camera. I have made an improvement in these slides, which consists in arranging a sliding plate, Z, above and another below the opening in each slide, so that I can diminish the width of the openings when desired, and thus obtain a more instantaneous exposure.[20]

The slide arrangement mentioned above appeared in Muybridge's patent 212,865.[21] In that patent, under the same title "Method and Apparatus for Photographing Objects in Motion," Muybridge claims a "double-acting slide" consisting of an electric trigger and spring-plates, working in coordination with electro-magnets. Here the evidence suggests that Muybridge recognized the use value of Stoddart's invention in its obverse form: Muybridge routed a consistent power source (electricity) to a mechanism to produce the most rapid reaction to a moving object, rather than a cam arrangement modulating the output of a power source (steam). Stoddart's instants of change are transposed, commodified, into photochemical media..

The exact nature of the relations between Stoddart and Muybridge is uncertain. There is no mention of Stoddart in any Muybridge literature. The stereograph that links them has never before been published and, to my knowledge, the only extant copy is cared for by the Department of Special Collections at Stanford University. Histories of industrialization in Northern California yield few specifics on Stoddart and his Iron Works. A San Francisco directory from 1862 gives Stoddart's home address as 16 Pine Street. In an 1863 directory, Stoddart advertises himself as an "Engineer & Machinist, General Agent for the Pacific Coast for the supplying BOILERS with FEED WATER by direct force of STEAM without using a PUMP." Considering Muybridge's well-documented entrepreneurial character, it seems reasonable to presume that he and Stoddart conversed at the time of the stereo's making. Perhaps I can venture further still and imagine Muybridge inquiring, with his legendary intensity, at the invention he was dispatched to photograph. And perhaps, in the course of their conversation, Muybridge learned of Stoddart's new combination of rapid-response cams reminiscent of his own aspiration to devise a mechanism for photographing objects in motion.[22]

What *can* be asserted is that the applications of Gibbs' equation, if not the equation itself, would have been intimately familiar to the machinist. Stoddart's "improvement in reciprocating steam-engines" was, in a way, his own model of Gibbs' equation. And Muybridge explored similar models of energy accumulation. His photographs of the mid-1870s contain such power, hold such heat, that they explode. The stilled, clean pressure of Stoddart's vertical steam pumps detonated into the perverse clarity of composite photographs such as "Volcan Queszaltenango – Guatemala." The stereograph and the composite are two pairs of exquisite wreckage, first promised then executed. In 1875, three years after making the steam pump stereo, Muybridge produced a composite photograph that renders a similar instant of change. From the photographer's stereographic container of containers, consider his depiction of water vapour unrestrained, blasted, into decidedly unfrozen, gorgeous desolation. Consider Muybridge's photographic induction of a volcano, where, as Marx and Engels would have it, all that is solid melts into air.

Solidity of volcanic rock gives way to dissonant solidity of atmospheric phenomena. A jerking horizontal line demarcates the top quarter of the photograph. It swoops downward from the top left frame edge then exits at the same edge at top right. Tonal shifts that define rocks throughout the photograph's lower majority here constitute clouds. Through the screen of clouds to the line we see a division of space. Above the line the light grey clouds dominate against a dark field. Below the line the clouds appear against a field of rock. Through their comparatively lighter tonality, the clouds assert themselves as tangible forms in near distance of abstracted space. But the division is a horizon line: it is the far ridge of a crater. Muybridge aimed his camera upward but it is an unnatural sky that pours into what might be near distance. In figural space, the atmospheric formations are at once furthest from our viewing position and among the boulders at apparent near distance. The figure of rocks against an indeterminate ground shifts to ground against which clouds appear as figure. The "depth" at the photograph's centre recedes to open sky until the crater edge registers as the divide between what is still rock and the "true" sky above. The crater edge becomes an arbitrary division between two fields of comparable tonal value. At the photograph's centre the gaseous effects reassert as form, competitive with the volcanic rock among which they slide.

Shards of dark, cool magma phase into billowing silver. The sharp focus of the exposure accentuates the violence of the brittle forms. Fragments collect among slabs of chipped and broken matter. A relatively larger boulder occupies the bottom right corner of the frame. The rocks seem to have fallen by the expected natural paths of weighted objects. But our presence among those rocks is insecure. Gravity is unknown. The objects commingle not in a definitive pile but in a hard wave, in savage, elemental churning. Scale and position are indiscernible. Perspectival positioning is uninformative. Our view rejects our presence; the privilege of seeing these rocks seems concomitant with danger to ourselves; our recognition of the picture's subject matter comes at the price of presumed corporeal relation. Seeing means not clarity, but hazard: we see a precise rendering, but of a vexed site. In the clarity of line and tonality there is no secure depth of field. At its centre, the photograph holds grey forms lined in white against a dark, indeterminate space. Delicate, curvaceous shapes ooze from sterling-black rubble. Sharp focus dissolves to mists roiling over the rocks. Unfathomable shadows in the photograph's bottom left corner register stark contrast against the white tendrils commingling at the photograph's centre. Muybridge apparently aimed his camera downward to an uneven surface of jagged slag, broken and piled around him. Clouds stream across crumbled lava ostensibly at our feet.

In 1875, Muybridge made two wet-plate collodion exposures. He combined them to create the present image. The composite is a bizarre stereograph in one frame, two exposures forced into simultaneity, and split horizontally. It is a synthesis that reports the radical irreconcilability of its pieces. His cloud effects are more than dressing. They hold a force of their own. The image is all the more curious, for it appeared in albums ostensibly intended to affirm the credulity and value of Guatemalan coffee plantations to international venture capitalists. In 1876 Muybridge's *Central America* album won the gold medal at the Eleventh Industrial Exhibition of San

Francisco. The Exhibition jurors stated, "These last productions of his camera surpass all his previous efforts, and their examination renders it difficult to believe, that with our present knowledge and taste, photography can make much further progress toward absolute perfection."[23] The composite is not a fluke supplement. Muybridge routinely added skies to his compositions, a common and accepted practice. His contemporaries celebrated his "cloud effects." Mozley writes that Muybridge was the "most sought-after photographic artist on the West Coast."[24] The *Central America* album earned him over $20,000. "From then onward, he was the acknowledged leader of his profession in San Francisco."[25]

"Eduardo Santiago Muybridge," as he introduced himself, arrived in Guatemala just prior to Justo Rufino Barrios's consolidation of power and his pacts with foreign capital. "Mesmerized by Europe,"[26] Barrios displaced the indigenous majority population from their agrarian communities and forced them into institutionalized servitude to the massive coffee plantations of primarily German investors. By 1880, coffee comprised 92 percent of the value of Guatemala's export, and by 1883 the United States received almost two-thirds of the exported beans. In 1875, Muybridge was at a devastating juncture in a larger culture of calamitous restructuring. Guatemala's economy was an enormous bubble. It would burst. Muybridge's photographs bear witness to an interstitial moment just before the Guatemala that Muybridge saw was lost to the evanescence of history. In the *Grundrisse*, Marx writes, "The violent destruction of capital not by relations external to it, but rather as a condition of its self-preservation, is the most striking form in which advice is given it to be gone and to give room to a higher state of social production." The inherent contradictions of capital leads to so-called creative destruction: to "explosions, crises, in which momentary suspension of all labor and annihilation of a great part of the capital violently lead it back to the point where it is enabled (to go on) fully employing its productive powers without committing suicide."[27] "Volcan Queszaltenango – Guatemala" is an attempt at the sublime, amongst an album full of more prosaic documents of capitalist restructuring. The image generates in its viewer the technical-libidinal effect of that annihilation at the edge of capital's newest crater.

The poignancy of Muybridge's albums results not simply from his entrepreneurial compulsion to display the industrial potential of the Paris of Central America, but from his aspiration to "gratify the tourist and lovers of the picturesque with a glimpse of the wonderfully beautiful scenes that have hitherto remained unexplored."[28] In *Eadweard Muybridge in Guatemala, 1875: The Photographer as Social Recorder*, E. Bradford Burns notes that Muybridge provides perhaps the only photographic record of Guatemala's landscape between 1860 and 1885.[29] Muybridge created nine copies of the album.[30] The original negatives used for the albums were destroyed by fire a few weeks after the completion of the copies. Two copies are held by the Stanford University Department of Special Collections. A third copy was given to Jane Stanford, Leland's wife, but was lost to fire at the Stanford home in San Francisco following the 1906 earthquake. Stanford was co-founder of the Central Pacific Railroad, governor of California, and later senator. In 1878-79, Muybridge made his first motion studies on the Stanford horse farm in Palo Alto. On those grounds in 1891 Leland and Jane established Leland Stanford Junior University as a memorial to their deceased son.

The two copies held by Stanford University are significantly different. Muybridge gave one album to Frank Shay, who served from 1879 to 1882 as the private secretary to Leland Stanford. The Shay album contains 143 images. It has no exterior text. The inside front cover is inscribed, "Presented by Frank Shay – Alameda Calif." H.C. Peterson, Curator of the Stanford Museum when the album was acquired from Shay in 1915, made the inscription. In the Shay album alone there are at least five instances in which the same cloud exposure was used in a second photograph within the same album. In one instance, the duplicate appears on the immediately following leaf. Muybridge's clouds enhance diverse locations on pages 48 and 56; 54 and 73; 77 and 85; 91 and 92; and 136 and 138. The second Stanford album presents on its cover, below its embossed title, an inscription to "F.E. Johnston, Napa." Johnston defended Muybridge in his trial for the murder of Harry Larkyns, his wife's lover.[31] It has 59 total images, including many obvious composite photographs of cloud exposures added to compositions depicting Guatemala's wilderness and its built environments.[32] Muybridge's titles are descriptive: "Panama – from the water gate" (page one), "Falls of the Michaloya – Guatemala" (page 21), "Coffee Hacienda at Naranja" (page 43).[33]

Muybridge's Central America photographs were produced while he was supposedly employed by the Pacific Mail and Steam Ship Company. The historical record shows otherwise. Burns reports that Muybridge was invited by "the faltering steamship business [that] needed new passengers and merchandise."[34] However, H.C. Peterson, Curator of the Stanford Museum, disputed the claim of a contract. Peterson wrote on the second page of the Shay album that Muybridge

> attempted to coerce the Pacific Mail and Steam Ship Company to buy the lot [of negatives] from him on the basis of a purported contract […] In the endeavor to realize money from the Pacific Mail and Steam Ship Company he threatened suit—but the proof was too conclusive that there was no contract.[35]

While claiming that, "the object of the company in having these views executed, was to stimulate commercial intercourse,"[36] the more likely impetus was Muybridge's own entrepreneurial ambition, hope for stimulation of his own commercial intercourse. However, in this regard he was outstripped by the men who got him there. Stanford had recently acquired the Pacific Mail and Steam Ship Company in collusion with Jay Gould and Collis Huntington.[37] The three industrialists wished to manage competition against their railroad enterprises. By owning Pacific Mail, and following the 1869 completion of the transcontinental railroad, Stanford controlled two of the most important transportation systems on the continent. Stanford was already well aware of Guatemala's "vast fields of profitable enterprise."[38] He had already assessed the strategic value of Pacific Mail; it was not necessary to convince him, or any of his colleagues, "by exhibiting [...] in a convenient and popular manner the ports, and facilities of commerce."[39] Stanford knew very well what he had purchased. As Richard White writes, Pacific Mail "provided the only real alternative to the Pacific Railroad in travel from the West Coast to the East and whose rates often determined transcontinental rates. It was a company the railroads tried to control."[40] Though the *Central America* album may well have been rendered irrelevant as an immediate generator of venture capital, Muybridge certainly believed in its value.

Jonathan Crary has written authoritatively on the organization of perception in nineteenth-century culture. He notes that Muybridge's activity in Central America was exemplary of the "optics of colonialism in that period."[41] My aim here has been to examine the technological constitution of that optic. Crary links Muybridge's Central America landscapes with his motion studies for Stanford. He writes,

> Like Stanford's horses in motion, this image of Central America [Picking Coffee an Las Nubes, 1875] is a static section of movements and trajectories whose abstraction and velocity are also outside of the human capacity to perceive them. The destiny of these workers is fully part of the same process.[42]

The "Volcan" composite delivers that abstraction and velocity seemingly beyond unaided apprehension. These works are more than proto-cinematic dreams of the encapsulation of time: rather, dreams-turned-nightmares of the commodification of labour. The content of the frame becomes the matter of the image's construction: that one sees clouds or volcanic rubble seem like secondary dressings to the photograph's self-destruction, like picturesque remainders to the energy violently expressed. Mature as the *Animal Locomotion* sequences may be, they are ossified in their "immobilization and groundlessness," "their detachment from any binding continuities or trajectories."[43] The sequences are more like a litany of husks from which the most radical possibilities of his medium, to return to Hollis Frampton, "have been rigorously evacuated." In Muybridge's Central America experiments, the "Volcan" composite paramount among them, the ostensibly "static" image that elides the devastating process of capital organization offers a potent incommensurability that in *Animal Locomotion* seems even further from the artist's reach.

In Central America, Muybridge perfected his aforementioned Sky Shade for variable, instantaneous stereoscopic exposures. He developed faster chemical processes and a new shutter for rapid motion photography. In 1875 he returned to San Francisco capable of exposures at 1/1000 of a second.[44] And he returned as Eadweard Muybridge—no longer Helios, no longer Eduardo Santiago Muybridge. The heat energy, the enthalpy, Muybridge accrued in his experiments in the process from representation to presentation, such as "Volcan," would be expelled, redirected, and parsed into seemingly infinite variations. Its energy was evacuated into more lucrative projects of serialization in which the human and animal forms return to face Muybridge's shutters, now electrically operated. He, like Guatemala and his medium, relented to the atomization of industrial production. From the containment of "Vertical Steam Pumps" of 1873 to the artificial explosion of "Volcan Queszaltenango – Guatemala" of 1875: two pairs of exquisite wreckage promised and then executed. The material evidence delivered by these images and their related patents and theories of thermodynamics suggests that Muybridge's images may be understood as not simply representations of powerful new innovations in science and industry, but in themselves conduits of power, commodified.

Photography was Muybridge's means of producing himself as a participant in nineteenth century culture. Robert Bartlett Haas writes, "In that strange landscape [of Central America] Muybridge produced photographs intensely romantic in mood; even those in the so-called documentary series of the coffee industry convey the strength of this strangeness of feeling."[45] "Strangeness of feeling": the words are especially compelling if we recall that in 1860 Muybridge suffered severe injuries from a stagecoach wreck that left him bereft of smell, taste, and memory, and with double vision. It was indeed the event that led to his career in photography. This "strangeness of feeling" may be found in his *Central America* album. Muybridge used forced stereoscopic effects in "Volcan Queszaltenango – Guatemala"; through that work he came closest to representing, perhaps even inducing in his image's viewer, an anxious sensation of those "vast fields of profitable enterprise" elicited not in fact by the coffee extracted by the labour of the indigenous population but by the technical-libidinal speculations imposed upon those people, upon that landscape. Thus, in this "vast field," a crater—blasted, forlorn, split by scales that will never balance—Muybridge achieved his most cogent document. In his composite image, translucent mists shift into modelled forms of near-tangible weight and gravity. Imagine Muybridge considering that desolate crater, marvelling at the potential energy that might accrue to his exposures, the value-added that might "warm in."

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NOTES

I would like to thank Stanford University Libraries Department of Special Collections and University Archives for so graciously making available to me their Eadweard Muybridge materials. This article began in the winter of 2009 in the seminar "Photograph Document Archive" led by Maria Gough at Stanford University. I am grateful for her guidance and encouragement. My colleagues David E. Fresko and Alexander Greenhough provided essential feedback to early iterations of this article. My thanks to Chi Cheung, Thomas Elsaesser, Pavle Levi, Thomas Ryckman, and Bryan Wolf for their feedback on recent drafts. My especial thanks to Soyoung Yoon. Some portions of this writing appeared in different form in *Conveyor* 2 (Autumn 2011).

1 Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (Cambridge, MA: MIT Press, 1992), 116-118.

2 Marta Braun, *Picturing Time: The Work of Etienne-Jules Marey (1830 – 1904)* (Chicago: University of Chicago Press, 1992), 251. Braun first described the discrepancies in Muybridge's sequences in her article "Muybridge's Scientific Fictions," *Studies in Visual Communication* 10.3 (1984): 2-21.

Seventeen years prior to the appearance of Braun's article, the artist and writer Dan Graham published similar conclusions in his essay "Muybridge Moments." Graham writes, "[Muybridge's] shots aren't linked—nothing is necessarily prior to something else. Things don't come from other things. [...] What distinguishes one moment from another is a simple alteration in the positions of things. Each object is re-arranged relative to every other and to the frame. Things don't happen; they merely replace themselves in space. [...] The model isn't going anywhere. Her task isn't completed—no work is done. [...] There is no central or climactic moment. The series is cut arbitrarily by limit of the 24 photographs—by the sides of the plate on which they are arranged for reproduction. It might begin or end at any point. There is no natural order as no single image is the necessary result of any preceding one." See Dan Graham, "Muybridge Moments," *Arts Magazine* 41.4 (February, 1967): 24.

3 Rebecca Solnit and Braun attribute some critical import to Muybridge's stereographs. Solnit beautifully writes that among them one can find his first attempts "to change the tense of photography." But they are a "precursor" to his motion studies, portentous but limited first drafts. Braun describes the stereographs as "more than mere documents made to entice potential tourists or investors ... [They are] the first examples of his attempt to define himself as an artist." However, they "fit comfortably within the picturesque tradition" popular in his time. If the stereos exhibit extraordinary sophistication and artistic accomplishment, they do so within generic expectations. For Solnit and Braun, Muybridge's promise would be fulfilled later, in prints and albums that more plainly display conventions of genius. See Rebecca Solnit, *River of Shadows: Eadweard Muybridge and the Technological Wild West* (New York: Penguin, 2003), 53; and Marta Braun, *Eadweard Muybridge* (London: Reaktion Books, 2010), 36.

4 Hollis Frampton, "Eadweard Muybridge: Fragments of a Tesseract," *On the Camera Arts and Consecutive Matters: The Writings of Hollis Frampton*, ed. Bruce Jenkins (Cambridge, MA: MIT Press, 2009), 25. Originally published in *Artforum* 11.7 (March, 1973).

5 In his recent genealogy of under-acknowledged experiments in the spatial properties of cinematic representation, Thomas Elsaesser writes: "Assuming for the moment that one conceives of cinema not in terms of animated photographs in motion (as a pictorial art form capable of rendering on a two-dimensional surface the illusion of three-dimensional depth and turning intermittent succession into the illusion of movement), the cinema's telos can plausibly be reconstructed as the elimination of the frame or limit to the perceptual field, indeed as driven by the tendency to self-abolish its apparatic scaffolding and peculiar geometry of representation." Here I strive to articulate a notion of volatility that troubles the apparatic scaffolding in the particular case of Muybridge's experiments in stereoscopy. See Thomas Elsaesser, "The 'Return' of 3-D: On Some of the Logics and Genealogies of the Image in the Twenty-First Century," *Critical Inquiry* 39 (Winter, 2013): 229.

6 See Anson Rabinbach, *The Human Motor: Energy, Fatigue, and the Origins of Modernity* (New York: Basic Books, 1990), Chapter 4.

7 Braun, *Picturing Time*, 229.

8 Ibid., 254.

9 Tom Gunning, "Never Seen This Picture Before: Muybridge in Multiplicity," in Phillip Prodger, ed. *Time Stands Still: Muybridge and the Instantaneous Photography Movement* (New York: Oxford University Press and Stanford, CA: The Iris & B Gerald Cantor Center for the Visual Arts at Stanford University, 2003), 224.

10 Josiah Willard Gibbs, "Graphical Methods in the Thermodynamics of Fluids," *The Scientific Papers of J. Willard Gibbs, Ph.D., LL.D., Volume 1: Thermodynamics* (New York: Dover Publications, 1961), 1-32. Originally published in *Transactions of the Connecticut Academy* 11 (April-May, 1873): 309-342. Josiah Willard Gibbs, "A Method of Geometrical Representation of the Thermodynamic Properties of Substances by Means of Surfaces," *The Scientific Papers of J. Willard Gibbs, Ph.D., LL.D., Volume 1: Thermodynamics* (New York: Dover Publications, 1961), 33-54. Originally published in *Transactions of the Connecticut Academy* 11 (December, 1873): 382-404.

11 Irmgard K. Howard, "H Is for Enthalpy, Thanks to Heike Kamerlingh Onnes and Alfred W. Porter," *Journal of Chemical Education* 79.6 (June, 2002). I am grateful for Howard's helpful and informative article.

12 Gibbs, "A Method of Geometrical Representation of the Thermodynamic Properties of Substances by Means of Surfaces," 34.

13 Muriel Rukeyser, *Willard Gibbs* (Woodbridge, Connecticut: Ox Bow Press, 1942), 199. Through Rukeyser's luminous prose one can understand the privileged position Gibbs would be given by Norbert Wiener in his aspirations for a new science of communication and control, cybernetics. I elaborate these points in my Ph.D. dissertation *Libidinal Engineers: Three Studies in Cybernetics and Its Discontents*, Stanford University Department of Art & Art History, forthcoming.

14 Henry Andrews Bumstead, "Biographical Sketch" in *The Scientific Papers of J. Willard Gibbs, Volume 1: Thermodynamics* (London: Longmans, Green, and Co. 1906), xvi. See also Rukeyser, 201-202.

15 Oliver Wendell Holmes, "The Stereoscope and the Stereograph," in *Classic Essays on Photography*, ed. Alan Trachtenberg (New Haven: Leete's Island Books, 1980), 74. Originally published in *The Atlantic* (June, 1859).

16 David Stoddart, "Steam-Engine Valve-Gear," United States patent 26,301, dated November 25, 1859.

17 David Stoddart, "Steam Slide Valve: Improvement in Reciprocating Steam-Engines," United States patent 79,274, dated June 23, 1868.

18 Ibid.

19 Anita Ventura Mozley, "Introduction," in Anita Ventura Mozley, *Eadweard Muybridge: The Stanford Years, 1872 – 1882* (Stanford: Art Department of Stanford University, 1972), 8.

20 Eadweard Muybridge, "Method and Apparatus for Photographing Objects in Motion," United States patent 212,864, filed July 11, 1878. Patented March 4, 1879.

21 Eadweard Muybridge, "Method and Apparatus for Photographing Objects in Motion," United States patent 212,865, filed June 27, 1878. Dated March 4, 1879.

22 Muybridge's interest in such technology was already affirmed in his 1869 "Sky Shade." In that device, a spring-activated trigger allowed him to vary "instantaneous" exposure times on a single photographic plate. Muybridge conceived the Sky Shade especially for stereoscopic work. Eadweard Muybridge (signed "Helios"), "A New Sky Shade" in Mozley, 110-111. Originally published in *The Philadelphia Photographer* 5, ed. Edward L. Wilson (May, 1869).

23 Anita Ventura Mozley, "Photographs by Muybridge, 1872 – 1880: Catalogue and Notes on the Work," in Mozley, *Eadweard Muybridge:* 59.

24 Mozley, "Introduction," 8.

25 Mozley, "Photographs by Muybridge," 45.

26 E. Bradford Burns, *Eadweard Muybridge in Guatemala, 1875: The Photographer as Social Recorder* (Berkeley: University of California Press, 1986), 15.

27 Karl Marx, *Grundrisse: Foundations of the Critique of Political Economy* (1939), trans. Martin Nicolaus (New York: Penguin, 1993), 749-750.

28 Muybridge, "Kingston Scrapbook," 14, cited by Mozley, 55.

29 Burns, vii. Documentary purposes continue to motivate the publication of Muybridge's Guatemala photographs. His work is beautifully reproduced in Regina Wagner's informative book *The History of Coffee in Guatemala*. She writes that his 260 exposures are "of incalculable historic value. Muybridge left the largest and oldest photographic record of coffee production in Latin America, and captured an important period of transition from the conservative to the liberal eras." Regina Wagner, *The History of Coffee in Guatemala*, trans. Eric Stull (Bogotá, D.C. Colombia: Benjamín Villegas & Asociados, 2001), 68.

30 My account may be disputed. In literature published in association with their 2007 exhibition *Eadweard Muybridge: The Central American Journey*, the Smithsonian American Art Museum states that Muybridge produced ten copies. I understand that Stanford originally held three, now two; and one copy each may be found in the collections of the California State Library (given by Muybridge to W. W. Pendegast's widow), Cornell University Library, Stony Brook University Library, Museum of Modern Art, New York, Smithsonian American Art Museum, and the Center for Creative Photography at the University of Arizona. The University of Arizona record claims that eight copies exist. There is wide variance in the number of images they each contained in each album. As I describe, the Stanford University Special Collections copies contain 143 images (Shay album) and 59 images (Johnston album). The California State Library copy contains 60 images, the Cornell University Library copy contains 144 images, and the copy held by Center for Creative Photography at University of Arizona contains 100 images.

31 Hollis Frampton submits Muybridge's murder of Larkyns as the defining moment of in the life of the photographer, a moment of extraordinary passion that was powerful enough to stop time. That moment, that rupture, argues Frampton, compelled Muybridge to devote himself to the inscription of time by photographic means. "That brief and banal action, outside time, was the theme upon which he was forced to devise variations in such numbers that he finally exhausted, for himself, its significance. To bring back to equilibrium the energy generated in that instant required the work of half a lifetime. So that we might add, in our imagination, just one more sequence to Muybridge's multitude, and call it: *Man raising a pistol and firing.*" See Frampton, 30.

32 For example, see "Panama – from the Water Gate" (page one); "Volcan Aqua and City of Antigua" (28); "Church of El Carmen – Antigua – destroyed by earthquake 1774" (30); "Cactus plantation for rearing Cochineal" (31).

33 This pagination refers to the Johnston album. The images' sequence of appearance vary from one album to another. Their titles also vary but remain in a descriptive mode. "Volcan Queszaltenango – Guatemala" appears on page 60 of the Shay album. In the Johnston album, the composite appears on page 36 with the title "Volcan Queszaltenango – The Crater."

34 Burns, 21.

35 Peterson, inscription in Eadweard Muybridge, *The Pacific Coast of Central America and Mexico, The Isthmus of Panama; Guatemala; and the Cultivation and Shipment of Coffee* (San Francisco, 1876). Stanford University Department of Special Collections and University Archives, Stanford, California. Shay album, inside fly leaf.

36 Eadweard Muybridge, "Kingston Scrapbook," Collection of the Kingston Museum, Kingston-Upon-Thames, England, 14. Quoted by Mozley, 55.

37 Crary, *Suspensions of Perception*, 144, n. 119. Crary cites Robert Edgar Riegel, *The Story of the Western Railroads: From 1852 through the Reign of the Giants* (1926; Lincoln: University of Nebraska Press, 1964), 160-178.

38 Muybridge, "Kingston Scrapbook," 14, quoted by Mozley, 55.

39 Ibid., 55.

40 See Richard White, *Railroaded: The Transcontinentals and the Making of Modern America* (New York: W. W. Norton, 2011), 104. White continues, "If the Pacific Mail wished to do so, it could dominate the [transcontinental] traffic. The question then becomes why did it not do so? The first part of the answer is that the Pacific Mail was a lazy and corrupt corporation. [...] The second part of the answer is that the Union Pacific and the Central Pacific, recognizing their vulnerability to rate cutting by the Pacific Mail, offered to pay what amounted to a subsidy for the company to raise its rates. The Pacific Mail consented. It could make more money by doing less." In fact, as part of the agreement with the railroads, Pacific Mail "charged rates identical to those of the railroads, did not add new ships, and refused to solicit traffic to compete with the railroads." See White, 166. White cites Maury Klein, *Union Pacific: The Birth of a Railroad 1862 – 1893* (Garden City, New York: Doubleday, 1987), 314.

41 Crary, *Suspensions of Perception*, 145, n. 121.

42 Ibid., 145.

43 Ibid., 147.

44 Robert Bartlett Haas in Mozley, *Eadweard Muybridge*, 18.

45 Haas, 59.

OWEN CHAPMAN AND ALISON REIKO LOADER

OF MOTORS, MARTIANS, AND JAZZ AGE CUTIES

The Stereoscopic Inventions of Laurens Hammond

> At any rate, something happened that had never happened on Broadway: People would leave the theatre when the story began; they'd get up and go out and say, "Where's the box office?" and buy tickets for their friends, saying, "Oh, Joe would love this!" But they'd seen it, as far as they were concerned. There was no more entertainment in it for them. Well, when I realized that the thing wasn't going to play, I cried in my sleep... We had to close at the end of two weeks. The movies and the radio industry all got it wrong. People would say, "Well, Hammond, if you could only put this thing on without that funny gadget on the chair, then you'd really have something." The only person who got it right was my sister Eunice. She said, "Larry, who asked you to put three dimensions into the movies? That's ridiculous!"
> —Laurens Hammond[1]

THIS IS THE STORY of Laurens Hammond and his 1920s stereoscopic patents—the Teleview and the Shadowgraph. Our approach is archaeological in terms of our attention to temporal disconnections, non-chronological relations and material as well as discursive histories.[2] Our examination of Hammond's stereoscopic systems are intended not only to enhance understanding of the technology and the inventor, but also to shed light on the relationship between cinema and vaudeville, the haptic and erotic aspects of stereoscopic history, and the physical/mechanical experience of S3D. In response to teleological histories that have asserted S3D as the inevitable future, our analysis reveals how the novelty of stereoscopy can draw attention to itself and the cinematic apparatus and remind audience members of devices and viewing modalities of the past.

Remarkably, both Hammond (who is best know for the Hammond Organ)[3] and his competition Harry K. Fairall unknowingly screened the first two S3D feature films within weeks of each other in the Fall of 1922, demonstrating two different systems on opposite American coasts. In September 1922, Fairall offered a private screening of *The Power of Love* at the Los Angeles Ambassador Theatre

FIG. 1 Cover of an original program from The Teleview screening at the Selwyn Theatre in 1922.
Image obtained from the Billy Rose Theatre Collection at the NY Public Library.

FIG. 2 Stills from *Mars Calling* featured in *Movie Weekly*, 11 November 1922.

and although the feature was not publicly released, the anaglyph system (tinted left and right images filtered by red/green or red/blue glasses) remains common.[4] A month after Fairall's debut, Hammond previewed *The Man from M.A.R.S.* on his Teleview cinema, which opened for a single theatrical run at the Selwyn Theatre in New York that December (FIGS. 1 & 2).[5] The Teleview remained unused thereafter, and the "active shutter 3D system" or "eclipse technique" that it employed would not be seen again until Imax introduced "liquid crystal shutters," 60 years later.[6]

Hammond immediately followed the Teleview with a second S3D invention—the Shadowgraph live theatre—which he licensed to the Ziegfeld Follies.[7] Despite the technological innovations represented by Hammond's systems, bringing the mechanical realm of S3D technology into the electrical age of cinema, most histories of stereoscopic cinema dedicate little space to Hammond's contributions. There is a tendency within the popular and academic literature on S3D to imagine its history as a progressive trajectory towards the glorious present, often explaining failures as mere detours caused by inevitable technological and economic hurtles in the inexorable march towards S3D ubiquity.[8] The construction of S3D history has been by and large the realm of inventors, filmmakers, and aficionados, with the same individuals often inhabiting more than one of these roles and all carrying great investments in the putative capabilities of S3D in their particular historical moment.[9] The success of stereoscopic cinema equated with overcoming practical and technological concerns, with narrative and aesthetic issues as secondary challenges. This is especially true of recent discourse that presents digital film production and exhibition as panacea to S3D movie woes (both technical and financial).

Such Whiggish histories assert a contemporary virtuosity in stereoscopic filmmaking that is the result of better tools, a century's worth of development, and the industry's ability to attract better quality filmmakers. As director and S3D patent holder James Cameron posits,

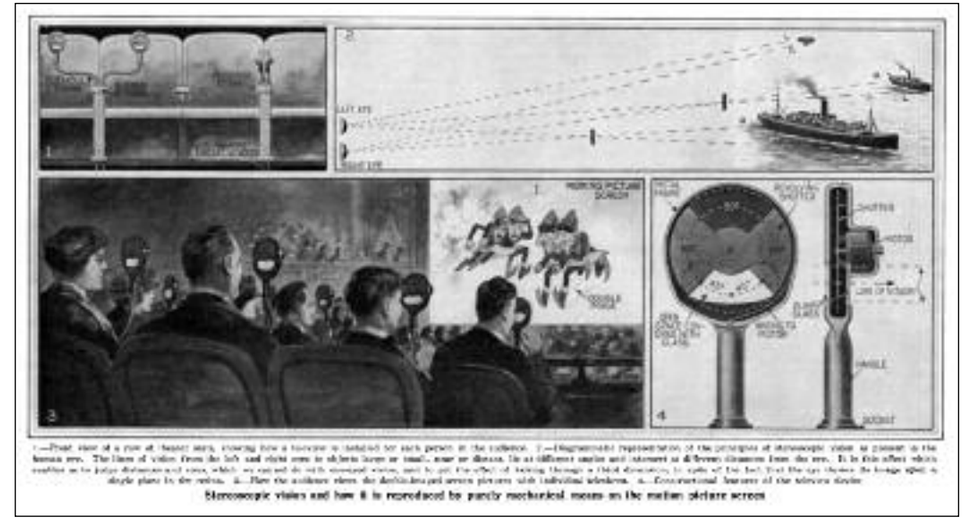

FIG. 3 "Motion Pictures in Three Dimensions." featured in *Scientific American*, January 1923.

> The new 3-D, this stereo renaissance, not only solves all the old problems of bad projection, eyestrain, etc., but it is being used on first-class movies that are on people's must-see lists.[10]

Such optimism rests on assertions like the following by another S3D filmmaker/inventor Lenny Lipton, whose decades of developing S3D motion picture display technology complements Cameron's production-oriented research.[11]

> Stereoscopic cinema has not become an accepted part of the neighborhood theatrical experience because the technology hasn't been perfected to the point where it is satisfying for either the exhibitor or the viewer.[12]

Desires to perfect or master stereoscopic motion picture technology, however, are not unique to our digital age (FIG. 3). Rather it is a long standing pursuit that implicates some of the best-known pioneers of cinema, including the Lumière brothers and Thomas Edison, among others.

The Teleview

Born into wealth to Idea Louise Strong and William Andrew Hammond in 1895[13], Laurens' father died in 1897, and Idea raised him and his three elder sisters on her own, relocating the family to Europe to live off of her husband's estate.[14] In France, at the age of 12, Laurens applied for his first patent—an automatic gear shift for automobiles.[15] In 1909, his family moved to Detroit in order for Laurens to avoid mandatory service in the French Army. Instead, he studied Mechanical and Electrical Engineering at Cornell.

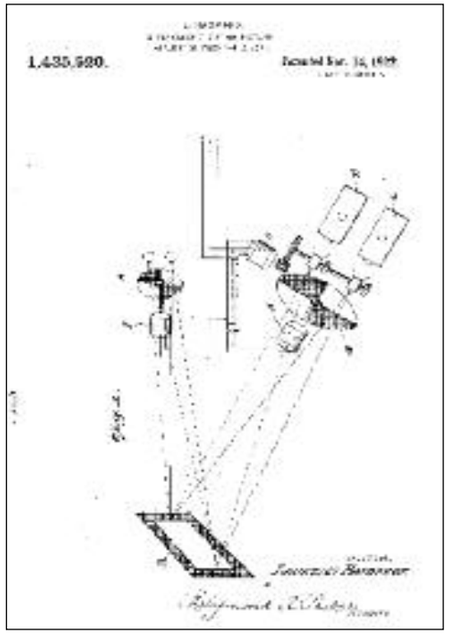

FIG. 4 L. Hammond, Stereoscopic Motion Picture, U.S. Patent # 1,435,520.

In the early 1920s, through mutual acquaintances, Hammond met and pitched a system for stereoscopic films called the Teleview to John Borden, who became the financial backer of the project.

> I eventually came up with a very ingeniously made device with a little window, and inside was a whirling shutter that made you see one picture with one eye just as that picture was flashed on the screen—and the next picture with the other eye just as that picture was flashed on the screen. I had designed the little motor that whirled the shutter, synchronized with the projector motor—they were both keeping time with the special generator, which I had installed in the Selwyn Theatre in New York for this purpose. We had rented the Selwyn, and each seat in the theatre was equipped with one of these devices.[16]

While developing the technology necessary had proved a surmountable hurdle, creating compelling content was a significant challenge, in part because Borden insisted that Hammond cast his "sweetie-pie" who worked for Ziegfeld Follies.[17] *The Man From M.A.R.S* apparently involved an inventor of a tick-less clock falling asleep while working on a radio transmitter intended to reach Mars, dreaming of Martians who tell him how to become fabulously rich, and upon waking, learning that the rights to his tick-less clock have been sold.[18]

As there were no movies in existence really appropriate to this new technique, I had written the scenario myself, but the property man did not know that. One day he found he was supposed to hoist into the sky a man holding a pair of enormous dumb-bells. "I don't know who wrote this," he announced, "but I know he's a fool."[19]

Hammond's patent application for the Teleview system used A/C electricity from a generator installed in the theatre to control the synchronized motors of both the image projection system and the whirling shutters in the Teleview eyepiece. The projection system employed two different film reels, each with the same content but shot to mimic the subtle differences in perspective between a left and right eye. Two projectors were then used for playback, each with a different reel, and focused on the same projection space. A shutter system revolved in front of the projectors at quite a fast speed, allowing alternating views of the two images to be projected sequentially. This system for the projectors was coupled with whirling shutters integrated into the viewing devices affixed to every seat in the theatre. These viewing devices were electrically synchronized with the projector

FIG. 5 Still image from *The Man from M.A.R.S.*
Image retrieved from Daniel Symmes' currently offline website, www.3dmovingpictures.com.
http://web.archive.org/web/20100521034656/
http://www.3dmovingpictures.com/ chopper.html

shutters so that when the right-eye image was visible, the left eye of the view piece was shuttered and vice versa, ensuring that each image was only seen by the eye it was intended for. The result gave the moving images the stereoscopic impression of 3D relief.

Hammond was not the first to propose such a system. He mentions in Patent No. 1,435,520 (FIG. 4) the work of "Jenkins" and an apparatus described in the latter's Patent No. 606,993 wherein a frame of film is shown to the right eye, then the corresponding matched frame of film shown to the left eye, but set at a rate that would create a noticeable and distracting flicker.[20] Hammond's patent application was based principally in his proposed improvements through his flicker-free 3:1 ratio of stereoscopic image exposure to projector frame rate and his integration of A/C electricity to both power and synchronize the playback system, using the alternating frequency of the A/C current (controlled by the specially installed generator) to keep precise synchronous time. Hammond's viewing device recalled much older apparatuses, as we discuss below.

The Teleview received a considerable amount of favourable publicity, with one film critic declaring that the "impression of objects in relief that one gets from them is so startling, so real that is seems inappropriate to speak of it as an illusion."[21] Yet it was a complete flop from a commercial point of view. Variety reported that the $100,000 installation made it "too elaborate and costly" for general exhibition purposes and the *New York Times* wondered whether the public could "accept the instruments through which they must look."[22] But these weren't the principal hurdles according to Hammond, at least retrospectively. In Barry's 1974 biography, Hammond claims that the Teleview didn't take off because the format was unsuited to the storytelling that he came to realize people were looking for in the movies.

> Well, the Teleview pictures were marvelous—incredibly clear... But they couldn't tell a story—they put you up too close. When we showed the Grand Canyon, or Indians, doing a war-dance, it didn't matter,—but who wants to look up the heroine's nostrils? It showed you things you didn't want to see—all the perspiration on the actress's forehead under the Kleig lights. You couldn't follow the story—the details were too confusing. But it was the most marvelous photography you'd ever seen.[23]

Hammond comes to articulate a limitation for stereoscopy that is not shared by other S3D inventors and proponents: "People just don't take that idea seriously."[24] This is where Hammond's

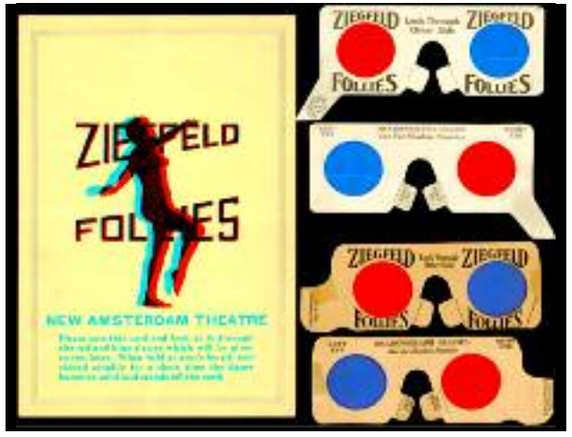

FIG 6 Image retrieved from http://web.archive.org/liveweb/http://en.wikipedia.org/wiki/ File:Laurens_Hammond_with_his_3D_glasses.jpg

FIG. 7 A Ziegfeld Follies playbill and anaglyph glasses. Image retrieved from Daniel Symmes' currently offline website, 3dmovingpictures.com. http://web.archive.org/web/20101015002459/http://3dmovingpictures.com/shadows.html

Teleview presents an interesting alternative story in terms of challenges that are neither technological nor economic, but based in the material experience of S3D (including the necessary viewing apparatus), which Hammond believed branded his system as an ephemeral cinema of attraction.

The Shadowgraph

While installing his Teleview system, Hammond ran a test using shadows produced by people and objects moving in front of two powerful arc-lights placed 2.5 inches apart, matching the average distance between a person's pupils. Light shutters synchronized with the Teleview eyepiece shutters produced strobing that resulted in a "live" S3D performance effect that was very popular. The two-week Teleview program began with "startling realistic" stereoscopic drawings (such as a jug marked "Rye" that tempted audience members to "reach out and seize it"), S3D still photography and movie clips, and ended with *The Man from M.A.R.S* feature (FIG. 5), which at least one reviewer found, "drawn out to a tedious length and burdened with much dreary humor in the subtitles."[25] Of the stereoscopic shadow performance also included in the show, the *New York Times* reported,

> One of the most pleasing numbers on the program followed. It was not a motion picture at all, but a shadowgraph dance, performed by real people behind a screen. When viewed through the teleview [sic] the shadows were not flat, as they would be ordinarily, but rounded and separated as figures from each other. The effect was decidedly novel and pleasing.[26]

Recognizing its popularity, Hammond patented this system as the "Shadowgraph." He adjusted it however to the more economical and convenient anaglyph process used by Fairall, and offered his system to the Ziegfeld Follies, where it was featured until the mid-1920s (FIGS 6 & 7). The act employed stereoscopic shadows of "girls who were presumably taking their clothes off and all that kind of thing," spiders on wires and eventually a little trained monkey.[27]

Other vaudeville producers apparently expressed interest in licensing the Shadowgraph, but Hammond had sold the exclusive rights to Ziegfeld. Despite holding numerous international Shadowgraph patents, Hammond claimed that the technology was eventually pirated in Europe and "all over the world."[28] Though there is no way to wholly substantiate this claim, vaudevillians did find it difficult to protect their acts as intellectual property.[29] We tracked one instance of an unlicensed exhibition of the Shadowgraph. In February 1924, it was part of the Rainbow revue at the London Palladium and a reviewer for *The Stage* wrote,

> "The Living Shadows," in which human figures silhouetted on a white screen appear to fly up and disappear over the heads of the audience, does not appear to be either original or exciting–until one uses the green and orange paper spectacles provided by the management. Then the figures appear to fly full in the face of the spectator, who also finds himself dodging the phantom missiles! This optical illusion causes great fun, and the device is likely to be extremely popular.[30]

The effect was also reported in a dispatch to the *New York Times*, followed by the editor's note, "This, plainly, is the shadowgraph of the Zeigfield Follies [sic]."[31] The paper that had praised the S3D shadows in Hammond's Teleview program had also printed an extensive and glowing review of their Follies appearance noting that the "marvelous invention" elicited "sharp giggles with gasps of horror" and that the S3D striptease of "a slender cutey [sic]" was "like those dreams that Freud tells about except that a lot of boresome people are present."[32] At least one of the Shadowgraph strips was performed by a young girl named Ruby Stevens who would later become the famous Hollywood actress, Barbara Stanwyck.[33]

Hammond's stereoscopic inventions demonstrate the reciprocal relations of cinema and vaudeville on multiple levels and the tensions inherent in the modalities of exhibition and reception of early cinema. The two mass amusements shared talent and vaudeville revues incorporated cinema as another novelty in its parade of attractions, while movie screenings incorporated live performances to lengthen their programs in the absence of filmic material and to attract respectable audiences that might otherwise shun what they considered an inner-city, working-class amusement.[34] At the turn of the twentieth century, nickelodeons (small movie theatres) and penny arcades (housing kinetoscopes, mutascopes and penny-in-the-slot stereoscope machines) shared similarly bad reputations. Erotic films that often displayed full nudity were common in early cinema, while penny arcades offered peep shows in both senses of that term—not only did the single-person apparatuses require users to peep into viewers (like the Teleview), they were also notorious for displaying "obscene" stereographs (FIG. 8).[35] Commenting on the haptic and therefore erotic qualities of stereoscopy, on which the Shadowgraph striptease also capitalized, Jonathan Crary writes,

> It is no coincidence that the stereoscope became increasingly synonymous with erotic and pornographic imagery in the course of the nineteenth century... Some have speculated that the very close association of the stereoscope with pornography was in part responsible for

FIG 8 & 9 Images 5155 ("Lucky Dogs") and 5416 ("Taking in a Difficult Reef") from "The Perfec[t] Stereograph" series, H.C. White and Co. 1902.

> its social demise as a mode of visual consumption. Around the turn of the century sales of the device supposedly dwindled because it became linked with "indecent" subject matter.[36]

Of course, these chronologies—the 1890 to 1915 penny arcades, the 1895 to 1908 cinema of attractions, and the 1922 to 1925 exhibitions of Laurens Hammond's stereoscopic inventions—are decades apart. Perhaps that disparity indicates one of the reasons that the Teleview and Shadowgraph were so short-lived—the risqué material, the gags, the exaggerated close-ups, etc. that Hammond opted for as content were already cliché.

Where Hammond's Stereoscopy Led

> When I developed the motor that turned the shutters for Teleview, I had become very expert in how to make a small synchronous motor. A synchronous motor, of course, installed in a clock, is wonderful thing, because if the generator is constant, it gives perfect time.[37]

Hammond registered his "Alternating current clock" and other clock components in a series of patents between 1929 and 1937.[38] As with the Teleview system, Hammond's patent application was not based on an "original" idea, but involved refining a pre-existing application of electromagnetic technology patented by someone else.[39] The G.E. Telechron had a self-starting motor, whereas Hammond's needed to be started by hand, which he argued was an improvement as it would remain stopped after a power outage, thereby alerting the clock owner that it needed to be reset. Hammond made his first fortune with his Chicago-based clock business. The Hammond Clock Company operated between 1928 and 1937, when the company became the Hammond Instrument Company (and then the Hammond Organ company in 1953). The production of clocks stopped in 1941.[40]

When the market started to dwindle for Hammond Clocks, due to the Great Depression, Hammond tried other things to keep his company afloat, all employing the same synchronous motor technology—an automatic bridge shuffling and card dealing table, an electric phonograph/gramophone turntable motor, and then the Hammond Organ. This musical instrument proved to be Hammond's most renowned invention. It uses a non-self starting synchronous motor to spin 96 "tonewheels" (91 active) assembled along a common shaft.[41] Originally targeted to the church organ market and professional musicians, the Hammond Organ company went on to have tremendous success in selling "home" organs, with a 1965 pronouncement of a billion dollars in sales in the 30 years since its founding.[42]

A Missed Synchronic Opportunity?

The Vitaphone—the last to be invented and the only commercially successful synchronized sound-on-disc system for the pairing of sound and film—was debuted by Warner Brothers studios on 6 August 1926 with the release of their silent feature *Don Juan*. The movie employed the Vitaphone for its pre-recorded musical score, interlude melodies and synchronized sound effects—all developed after the feature had been made as a silent film. On 6 October 1927, Warner Brothers premiered *The Jazz Singer* in New York City, which was made specifically for the Vitaphone and is generally cited as the beginning of the "talkie" revolution in cinema.

The Vitaphone worked by employing synchronous electric motors similar to Hammond's. These were employed in both the recording and playback equipment used to handle image and sound. To show a Vitaphone film, the projectionist needed to cue up the film reel and phono disc to precise points, start them simultaneously and then rely on the synchronous motors employed to guarantee perfect synchronization.

The introduction of disc-based syncing systems for film sound had been attempted throughout the first decade of the twentieth century, but had never evolved out of novelty act status. "Handicapped by song-and-dance strategy and insufficient film production, early sync-sound systems

[such as the Cameraphone, Chronophone, Picturephone, Synchroscope, Photophone, Phonoscope and Biographon] were always conceived as just a single act in a longer program. Never able to provide the entire evening's entertainment, as would their late twenties descendants, early sync-sound technology remained no more than a novelty because of its inability to achieve any significant economy of scale."[43] The same thing, of course, had happened to Hammond with his stereoscopic ventures.

Hammond, bitterly disappointed with the results of the Teleview escapade, would not have been in a hurry to throw himself into a business terrain already shown to be mired in a "cinema of the attractions" horizon, one that the Vitaphone managed to shake precisely through the savvy (and expensive) hiring of known commodities (such as vaudeville star Al Jolson) as lead actors for the early films. Warner Brothers also managed to overcome the problem of technological diffusion and standardization necessary for its particular sync-sound system through strong financing and industry-wide influence[44], two other hurdles that Hammond would have had a hard time surmounting. Nevertheless, Hammond asserted it was a problem intrinsic to stereoscopy that led to his lack of success—its inherent novelty status. But why would this have applied to stereoscopy and not to sync-sound? Might it simply be a question of the visibility of the apparatus?

In the case of Warner Brothers and the Vitaphone, the technology required theatres to outfit themselves with expensive equipment, but it did not require a physical contraption that was reminiscent of older "parlour" tricks in the way that Hammond's Teleview viewing apparatus reminded audience members of the Victorian stereoscope. In explaining the Teleview to his readers, *Movie Weekly* contributor T. Howard Kelly wrote,

> I will ask you to wander back to [when]...Grandma, herself, got out the stereoscope with careful hands. Upon showing you how to hold it properly, selected a picture of 'London Bridge," and placed it in the stereoscope. Lo and behold! You saw the flat photograph stand out as if it had four sides and everything. You exclaimed at it. You wondered.[45]

The immersive qualities of the Vitaphone experience would not have been impeded by the same degree of awkward technology that refused to erase itself and "leave us in the presence of the thing represented."[46] But it's not just a question of technological invisibility. The voyeuristic intimacy offered by the Vitaphone (discussed in Altman) and enthusiastically embraced by audiences was precisely what Hammond came to think had turned off his original audience from considering the Teleview as anything more than a novelty. But as his sister Eunice pointed out, "[t]he story's the thing,"[47] and from the sound of it, *The Man from M.A.R.S.* was not exactly Oscar material. Visual immersion was attended to by the technology Hammond developed, but not content that absorbed the audience in a narrative—an emergent expectation of the 1920s movie-going public. In the synchronization of different facets of the cinema-going experience, the Teleview failed where the Vitaphone succeeded remarkably. Even today, there remains something relentlessly conspicuous about donning 3D glasses. It's as though the "spectacles" are constant reminders of the gimmick that is being deployed in front of our eyes.

Our study of Hammond's Teleview and Shadowgraph demonstrates how discursive and close analyses of neglected or dead-end technologies can lead to rich and diverse avenues of exploration. While the organ master's early entrepreneurial forays are key to understanding the approach to business and invention that would lead to his eventually outstanding success, they also reveal some of the conditions of cinematic spectatorship and their relations to technological change during the Jazz Age. From our point of view today, *The Man from M.A.R.S.* evokes the cinematographic advancements and outer space adventure of James Cameron's *Avatar*, just as the Shadowgraph can be understood as anticipating various integrations of real-time interactive and cinematic technology into live music, theatre, dance and scratch video performance. However, for the audiences of the 1920s whose tastes were turning towards narrative cinema and eventually synchronized sound, Hammond's stereoscopic devices and vaudevillian erotica smacked of old-fashioned throwbacks to the cinema of attractions. Hammond saw the lay of the land, and moved on quickly to other more lucrative and lasting inventions.

NOTES

1 Stuyvesant Barry, "Hammond as in Organ: The Laurens Hammond Story" (Chapter X), 5. This biography copyrighted by Barry in 1974 can be found online at http://thehammondorganstory.com/.

2 See Erkki Huhtamo and Jussi Parikka, eds. *Media Archaeology Approaches, Applications, and Implications* (Berkeley: University of California Press, 2011).

3 Teleview patents include US Patent Nos. 1,435,520 (filed 2 February 1921), 1,506,524 (filed 29 May 1922) and 1,658,439 (filed 18 November 1922). Process of and Apparatus for Stereoscopic Shadowgraphs, U.S. Patent No. 1,481,006 (filed 23 January 1923).

4 Fairall's Patent No.1,784,515 for a "binocular [S3D] movie camera" was filed 21 November 1925. Plasticons, Plastigrams and Stereoscopiks were series of S3D shorts released in the 1920s that also used the anaglyph process. For additional details, see Ray Zone, *Stereoscopic Cinema and the Origins of 3-D Film, 1838-1952.* (Kentucky: University Press of Kentucky, 2007), 110-127.

5 Directed by Roy William Neill *The Man from M.A.R.S.* is also sometimes known as *Radio-Mania, M.A.R.S.* or *Mars Calling.* See R.M. Hayes, *3-D Movies: A History and Filmography of Stereoscopic Cinema* (Jefferson, NC: Mcfarland & Company, 1989), 291. "Screen," *New York Times* (22 October 1922) and numerous texts that follow it also credit the Teleview to an electrical engineer named William F. Cassidy [sic]. William F. Cassedy Jr. is listed on the Selwyn Theatre handbill, but is uncredited in patents or Hammond biographies, so we remain uncertain of the exact nature of his contribution.

6 See Lenny Lipton, "The Stereoscopic Cinema, from Film to Digital Projection," *SMPTE Journal*, September 2001: 588-589.

7 A detailed description of the 1923 Shadowgraph act appears in P. Ziegfeld & R. Ziegfeld, *The Ziegfeld Touch: The Life and Times of Florenz Ziegfeld, Jr.* (New York: Harry N. Abrams, 1993), 257.

8 For S3D cinema histories see: Hayes, *3-D Movies:* David Hutchison, *Fantastic 3-D - A Starlog Photo Guidebook* (New York: Starlog Press Inc., 1982); numerous texts by Lenny Lipton including *Foundations of the Stereoscopic Cinema* (New York: Van Nostrand Reinhold, 1982); and the aforementioned Ray Zone. Most of these texts dedicate little space to Hammond and contain errors such as incorrect dates (Hayes, 6-7; Hutchison, 9; Zone 104-109). Rita Theberge, "Teleview,"*Journal of the University Film Association* 32.3 (1980): 31-34, is very short but lists a number of contemporary reviews.

9 Cinematographer Daniel Symmes is another S3D expert and he maintained a website that featured the Teleview (which he called "The Chopper") and the Shadowgraph. Unfortunately his http://www.3dmoving-pictures.com is now offline, although we saved images from it when we began our research in 2009.

10 David, S. Cohen, "James Cameron supercharges 3-D," *Variety*, 10 April 2008.

11 Cameron's U.S. patents include 7643748, 7899321, 8090251, and 8170412. Lipton's patents are too numerous to cite though his "Zscreen" is the foundation for RealD Cinema and "CrystalEyes" is used for S3D computer and video displays.

12 Lipton, 586.

13 Hammond's personal history can be gleaned through the following sources: Stuyvesant Barry, Hammond as in *Organ: The Laurens Hammond Story*; Mark Vail, *The Hammond Organ: Beauty in the B* (San Francisco: Backbeat Books, 2002); and *Hammond Organ Company, When Electrons Sing: The Story of Hammond Organ Company* (1966). Although most all of these publications participate in a certain variety, to greater or lesser extent, of myth-making, *When Electrons Sing* is an over the top form of self published homage and advertising created by the Hammond Organ Company for its 30th anniversary.

14 Barry, Chapter I, 1.

15 Ibid, Chapter IV, 4.

16 Ibid, Chapter X, 3.

17 Ibid.

18 The plot synopsis of *The Man from M.A.R.S.*, is recounted at the Internet Movie Database entry for *Radio Mania: An Abandoned Work*, a 2009 short film by Iain Forsyth & Jane Pollard inspired by the original film (http://www.imdb.com/title/tt1485056/).

19 Barry, Chapter X, 3. Hammond's tickless alarm clock, U.S. patent # 1,345,766 was filed 19 July 1919. Lewis Allen Brown is the credited writer for *The Man from M.A.R.S.* (see Hayes, 290-291).

20 Hammond actually obtained a license from Jensen to use his patent mere weeks before he was due to unveil the Televiewsystem at the Selwyn theatre. Hammond claims to have purposefully made very bold claims to Jensen regarding how successful the invention using latter's patent would be, putting on airs of naive over-enthusiasm without revealing the immanent release of the Televiewsystem, and thereby obtaining the license for "a ridiculously small sum of money" (Barry, Chap X, 4), as Jensen believed his invention to be unworkable.

21 "Screen," *New York Times*, 22 October 1922, 98.

22 See "$100,000 for Showing," *Variety*, 22 December 1922, 36 and "Screen," *New York Times*, 19 November 1922, 92. In "Televiewy," *Variety*, 5 January 1922, the cost of installation amended to $30,000 but not the argument that the expensive is prohibitive.

23 Barry, Chapter X, 4.

24 Ibid., Chapter X, 5.

25 "Screen," *New York Times*, 28 December 1922

26 Ibid.

27 Barry, Chapter XI, 3-4.

28 Ibid., Chapter XI, 5. International patents for the Shadograph include Austria No. 99577, Canada No. 2433535, France No. 575,187 and UK No. 210,411.

29 Jeanne Allen, "Copyright Protection in Theatre, Vaudeville and Early Cinema." *Screen* 21.2 (1980): 79–92.

30 "The Variety Stage: The Palladium," *The Stage*, 21 February 1924, 12.

31 "Special Cable to the *New York Times*," *New York Times*, 24 February 1924, X1.

32 John Corbin, "Shadowgraph, 'The Follies' and Some Others," *New York Times*, 23 December 1923, X1.

33 Elizabeth Haas, "Performing Barbara Stanwyck 1922-1964", [Dissertation]. University of Michigan, 2000.

34 See Robert C. Allen, "Motion Picture Exhibition in Manhattan 1906-1912: Beyond the Nickelodeon," *Cinema Journal*, 18.2 (1979): 2-15, and Tom Gunning, "The Cinema of Attraction(s): Early Film, Its Spectator and the Avant-Garde," *The Cinema of Attractions Reloaded*, ed. Wanda Strauven (Amsterdam: Amsterdam University Press, 2007), 381-388.

35 See John Plunkett, "Selling Stereoscopy, 1890–1915: Penny Arcades, Automatic Machines and American Salesmen." *Early Popular Visual Culture* 6.3 (2008): 250-251. For a brief description of early erotic films, see Gunning, 382-383.

36 Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (Cambridge, MA: MIT Press, 1990), 127.

37 Barry, Chapter XIII, 1. The rotation rate of a synchronous electric motor is coupled with the frequency of the A/C current that supplies it with power. The electromagnetic field created by the motor rotates in time with the oscillations of AC electricity, which in North America is standardized to 60 Hz. Synchronous motors are very stable in terms of rotation characteristics if the A/C electricity supplied to them is similarly stable in terms of oscillation frequency.

38 U.S. Patent Nos. 1,719,805, 1,796,649, 1,797,912, 1,867,315, 1,924,853, 2,003,116, 2,013,208, 2,027,531, 2,042,337, 2,067,708, 2,080,371.

39 We see this again with the Hammond Organ (patented in 1935), which was based on a design developed by Thaddeus Cahill for his Teleharmonium, and was protected by three partial patents between 1897-1936. See Owen Chapman, "Radio Activity: Articulating the Theremin, Ondes Martenot and Hammond Organ," *Wi: Journal of Mobile Media* Spring Issue, 2009 and Vail, *The Hammond Organ*.

40 Vail, 56.

41 Ibid, 39.

42 *When Electrons Sing*, 45.

43 Rick Altman, *Silent Film Sound* (New York: Columbia University Press, 2007), 163.

44 Ibid., 165.

45 T. Howard Kelly, "New Picture Invention Gives Uncanny Realism," *Movie Weekly*, 11 November 1922, 5, 31. *Literary Digest* (2 December 1922), *New York Times* (19 November 1922), and *Variety* (5 January 1923) also refer to "old-fashioned" stereoscopes to explain the Televiewy.

46 See Jay David Bolter and Richard Grusin, *Remediation: Understanding New Media* (Cambridge, MA: MIT Press, 2001), 9 for their discussion of "immediacy."

47 Barry, Chapter X, 5.

HAIDEE WASSON

INDUSTRIAL MAGIC AND LIGHT
3D at the New York World's Fair (1939)

THE HISTORY OF 3D provides a rich opportunity to think about varied definitions of cinema, and by extension, varied ways of writing its histories. While contemporary trends might easily predispose us to think about big screens, monumental entertainment, and immersive spectacles, I would like to suggest that histories of notably small forms of cinema (portable projectors, mobile screens) and often pedestrian genres of film (industrial, educational and sponsored) can help us to open-up our understanding of stereoscopy's interdependencies with a range of film technologies and an expanded sense of how those technologies have been put to work to create very particular views of the world.

Redefining cinema as a family of technologies, a kind of iterative process, can help to reorient the historian of cinema away from the history of an art or the development of a language, and toward the history of a technological apparatus that was considerably different from what we often identify as the dominant cinematic ideal: a pristine, rich image, shown in a high-tech, highly professionalized, large-screen venue, a show unfolding in a dark room for a seated, usually paying audience. Thinking about the full range of cinema technologies, particularly those that lived beyond the movie theater proper, entails mapping a very different trajectory for film, one that includes an expanded idea about the sites and spaces of cinema (small and permanent, large and impromptu, fast and fluid). It also requires recognizing the whole range of audio and visual technologies that constitute what we might call an "expanded cinema apparatus," which calls attention to celluloid's fluid relations with a sizable collection of cognate devices and gadgets: record players, radios, microphones, radios and, of course, live human performance. This other cinema also entailed a very different set of spaces for film presentation (factories, offices, homes), and under-examined film genres (educational, advertising, business, religious) as well as uses for film itself (worker instruction, product merchandising, spiritual salvation and amateur hobby).

What does this broader approach to cinema have to do with stereoscopy? Even a brief glance at the history of three-dimensional imagery shows that this other cinema is equally pertinent for understanding the history of stereoscopic cinema, a history we know does not begin or end with large screen spectacles such as *Bwana Devil* (1952) or *Avatar* (2009) but expands well before and

beyond Hollywood and the big permanent movie theatre screen so crucial to its empire. The history of stereoscopy rests as much in the small as in the big; the still, the part-moving and the moving, the live and the recorded; the quiet and the loud, the bright and the dim, and as much in hand-held novelty as in large-scale entertainments, which we associate with it today. This history is also tied to a history of experimentation and genres such as business films, screen advertising, and special events such as fairs, expositions, and stand-alone destination-venues. What follows then is a productive reminder about the importance of this broader approach to cinema's history in order to understand more fully the compelling and dynamic histories of stereoscopy and its intersections with the present and past of moving images.

This essay will focus on a 3D film called *In Tune with Tomorrow* made for the Chrysler Motor Company's exhibit at the World's Fair, held in New York City in 1939. To be clear, the film was shown rather conventionally, projected in 35mm format in a small, darkened theatre that sat roughly 340 people. In discussing this film, however, I will provide a view to a whole context of display, one that included a wide range of unusual exhibition techniques that in one way or another involved moving images and their technologies. 3D, multi-screen projections, ride films, and daylite screens littered the fairground, all put in service of American industry searching for new strategies to effectively address consumers. What follows then is also a story about not just American corporate imperatives, but also inevitably a story about a particular kind of industrial experimentation with technologies of display and filmed expression. How did one of the largest industries in the world, the American auto industry, look and sound in 3D? And, how might we explain why one of the first and most widely seen examples of 3D film was a short industrial film made by a car company? The article that follows includes considering this 3D film by also discussing its links to expanded, adaptable and hybrid forms of cinema which similarly exuded spectacle and novelty. This fuller history of 3D requires understanding cinema as an iterative technological platform—rather than a singular text, apparatus, or venue—with a deep foundation in a broad range of cultural practices of display and address. With this in mind, 3D becomes part of a much more expansive cinema, one that operated in a kind of hybrid media environment, and in this instance serviced an economy predicated on the persistent movement of people and goods, fuelled by an ascendant trend in advertising which presupposed the constant buying and selling of things.

The 1939 World's Fair, dubbed *The World of Tomorrow* is best known in media history as the site for the North American debut of television. At the fair, RCA and NBC inaugurated the country's first regular television service, watched by viewers in the New York area on an estimated 200 television screens. Television told a prescient tale about the ascendant electronic geographies of the moving image. Yet, this tale of omniscience and simultaneity by air has overshadowed another persistent technological tale, one that narrates the persistence of a nineteenth-century technology, one based on celluloid and a range of mechanical gadgets that sought to automate and often amplify images (and later sounds) small and big, quiet, and loud. It was these technologies that played a far more extensive role in constituting the highly mediated dreamworld of the fair. Magisterial and miniscule forms of projected moving images and sounds transformed the space, movements and the scale of the massive built environment at Flushing Meadows. The result was a multiply textured and spatially complex display ecology built in the service of American corporate mandates, which at the time were directed toward persuading consumers that technological innovation and private enterprise provided a sure path to prosperity.

In general terms, we know that early cinema has long and deep relationships to expositions and fairgrounds.[1] Yet, the fairs of the 1930s entailed dynamics that are distinct from both earlier expositions, as well as the corporate and government sponsored, artist-designed experiments that came later.[2] In 1939, the primary, though not exclusive, use of new moving images and screen technologies worked in concert with the mandates of corporate America: selling products, extolling the wonders of industry, spectacularizing research and development, and exalting technology's place in the clean, efficient future. By 1939, the previous and overt didacticism that was typical at fair exhibitions was counterbalanced by a heavy dose of magic, wonder, and spectacle. A telling example rests with the Ford Motor Company. In 1915 at the San Francisco fair Henry Ford reproduced a fully operational assembly line on-site, demonstrating to fairgoers his revolutionary process for making a car: a kind of gargantuan worker-machine hybrid constituted an imposing display of industrial might. In 1939, rather than bringing the factory to the fairgoer, the manufacturer brought the fairgoer to a new kind of factory—a factory on screen. *Symphony in F* (Audio Productions, 1940) was a 10-minute film depicting everyday scenes in a Ford factory. The first half is comprised of live-action shots highlighting the wonder of the machines that enabled mass assembly, replete with inserts of symmetrical whirling gears and mathematically precise conveyor belts, timed to ensure harmony between worker and thing. Grand orchestral music provides a momentous soundscape. The second half of the film presents in colour and stop-motion animation a kind of parade of happy car parts. Blinking cam shafts, dancing pistons, and smiling wing nuts alike march in service to their final destiny: forming part of the whole that is Ford's 28,000,000th car, signaled by flipping numbers on a giant cash register. An audience of toy workers sits watching joyously, hands clapping, standing in for the millions of fairgoers who also saw the film. The short movie is not subtle, celebrating plainly the magnitude, efficiency and the profit entailed by the Ford worldview: mass production, individualized transportation, and compliant workers conjoined in harmony. Yet the leap from 1915 to 1939 is instructive. In a nutshell the display techniques of American car manufacturers went from object lessons that taught "this is how we make our stuff" to animated Technicolor, and, in one instance, 3D movies that said: "this is how we express what our products mean and how you will feel buying them." Screens were instrumental in creating a new and distinct kind of corporate language.

While Lee Grieveson has shown that Henry Ford and his car company enjoyed an early, long, and healthy relationship to film and its technologies, Ford was no exception to the trend in corporate speech.[3] Throughout the 1920s and 1930s, one industry source claimed that U.S. car companies were the single largest American maker, distributor, and exhibitor of films outside of Hollywood.[4] Joining Ford's program, which began in 1914, General Motors began making sales and promotional films in 1924, a practice that became standard across the American car industry during the 1920s.[5] Ford, GM, and Chrysler all used film in multi-faceted ways. Indeed, recent work has shown that internationally industry of many stripes used film to serve many purposes including screen magazines for general circulation, worker training, education and hygiene films, as well as publicity and advertising films.[6] Some of these titles were designed for broad release and shown in commercial theatres, some were designed primarily for workers or car dealers, others travelled in non-theatrical circuits and were shown in churches, clubs, YMCAs, and schools. Grieveson's study of Ford's film program suggests that its films were not only regular and plentiful throughout this period, but they were among the most widely seen films of the silent era, with wide distribution in both theatrical and non-theatrical sites throughout the Americas.[7] This makes "car movies" a familiar

genre to Americans, who during the 1920s and 1930s, saw the national highway program connect more and more communities, witnessed the first trends toward suburbanization, and drove to the first car cinema. That is, in 1933, the first "drive-in" opened for business in New Jersey. In retrospect, it makes perfect sense that two such paragons of the industrial-machine age would find such early consort.

The broader context for the car industry's use of film is just beginning to be written. Though, recent scholarship suggests that new kinds of films and new technologies of displaying them were slowly gaining traction in American industry and retail operations. Small gauge projectors (8mm and 16mm); as well as rear projection devices meant that more kinds of movies could be seen in more kinds of places, circumventing the hold the American film industry had on film screens. New uses for cinema were being explored. For instance, advertising firms began to open up film divisions, albeit small ones. Technology manufacturers began to market small desktop and portable projectors to businessmen. Rear-screen projection technologies developed to support the display of financial information, product merchandising films, special event displays (business conventions) and all manner of daytime projection.[8] American businesses such as Aetna life, Bell Telephone, John Deere, General Mills, Renault, Shell Oil, all made films to aid their publicity and sales campaigns throughout the challenging decade. Cinema had become but one tool of corporate organization, communication, and address.

Throughout the 1930s this industrial use of cinema found a ripe ground for experimentation and also fuller integration into the grand pronouncements of industrial accomplishment and benevolence. The corporate and state enthusiasm for film yielded 612 films which were shown at the fair in its first year. The site hosted 34 dedicated film theatres and many more provisional or impromptu projections throughout the grounds.[9] According to one source, some one hundred and thirty-odd small projectors operated on a near-continuous basis.[10] Clearly, film—along with its mobile, adaptable, and cognate technologies—proved a particularly efficient and natural consort to changes in corporate and industrial communications. A range of film techniques were harnessed to express the optimism of the future and to espouse a clear image of technologically and industrially induced prosperity. This was a cinema of new image and sound technologies, and new languages and visual techniques, all of which worked to shape relations between this expanded cinema and its spaces. This includes some innovative uses of film sound and electro-acoustic spaces.

The idea of cinema as an acoustic and spatially multi-dimensional phenomena—no longer the flat screen space but more dimensionally dynamic and multi-directional— led to some prescient experiments. Indeed, a family of film technologies was in operation in a kind of partial and paracinematic way and was linked to still and moving displays, flashing lights, electrically amplified sound as well as the transformation of built space into complex display environments. Collectively, this amounted to a distinct kind of corporate experiment, a new kind of interface between corporate and consumer desire. Cinema was a modern machine, used creatively and imaginatively in the service of this futurist corporate utopia.[11] For instance, General Motors launched one of the more popular exhibits at the fair. Its Futurama installation featured a moving 1586-foot, "chair train" that mobilized thousands of seated spectators daily, carrying them through the whole of the pavilion's elaborately designed dioramas, illustrating the highway-saturated future of 1960. The ride lasted about fifteen minutes but was in a sense endless, enclosed in a continuous loop. Sound for this ride emanated from speakers placed underneath the seats. A recorded lecture secured optically on a filmstrip played from a nearby control room. The ride combined the latest sound reproduction and amplification technologies, the very ones being used in film theatres as well as in the new portable film projectors that littered the fairgrounds.[12] While the Futurama was not cinema proper, technologies of cinema shaped the ride experience at its core. It embraced mechanical movement and reproduced sound. Its iconography echoed that of the much older ride film like Hale's tours, and also presaged that which would become commonplace in the 1950s with the roll-out of Cinerama's widescreen, which present theatrical cinema as a form of panoramic travel. Futurama was, of course, also an experiment in dimensionality. While not stereoscopic, it made use of elaborate dioramas, the movement of spectators through exhibition space, and a whole display environment.[13] The immersiveness of the experience was also one that relied on various plays on scale, focusing mostly on depth and breadth of viewing. Designed panoramically, with a glass window as a kind of horizontal screen, viewer-riders looked onto a miniaturized view of a model highway one that would speed our way toward the automobile's manifest destiny. Spectators moved through the space physically but also sonically, as sounds played from speakers below their seats; navigating around its perimeter, but also through its small but imperial vision of a cosmic car-future.

In addition to Futurama, GM also boasted the largest conventional theatre at the fair with 650 seats. The venue featured a 10-minute, 35mm sound film called *Coach for Cinderella*, an animated film showing Cinderella's pumpkin transforming into a GM car. The theme of a magical automobile with powers of self-construction and the ability to morph from one thing to another subtended many of the car films at the fair, resonating with the insights of Roland Marchand who has suggested that magic was a common element of the new mass mediated, corporate languages.[14]

But the magic of GM's Cinderella notwithstanding, it was Chrysler's 3D film that became known as the most popular and most spectacular film at the fair. *In Tune with Tomorrow*, billed as "10 Minutes of Magic," was one part of a five-part exhibit, or as Chrysler called it a "five star show." The exhibit included a "Rocket Port of the Future," which, in a nod to the immanent rise of in-flight entertainment, featured a 15-minute sound film entitled *History and Romance of Transportation*, which was projected "on a huge silhouetted map of the world." Live sound effects were also used. Another section of the exhibit featured a "Miracle Plymouth," billed as a "talking car" that responded to questions and claimed to perform "amazing feats of magic." Equally appealing was Chrysler's "Frozen Forest," which was an air-conditioned, mirror-panelled room filled with frozen palm trees and Chrysler cars. There can be no doubt that Chrysler's 3D film formed part of an elaborate alternative world, a world critic Jean Baudrillard would call a "simulation," one constituted by wholly fantastical, artificial environments created by a rising corporate empire that promulgated a world of reflections filled with cars that talked, refrigerators for rooms, and movies that floated above you: magic.

In Tune with Tomorrow ran for a total of 17 minutes beginning with a 2D, 7-minute didactic introduction by "Major Bowes," a popular radio host, who explained how the 3D effect was achieved. The 3D portion of the film begins with a shot of the half-mile long assembly line at a Detroit-based Plymouth plant, but then quickly takes viewers to the story's main stage, where each part of the soon-to-be car is animated by stop-motion. For roughly 10 minutes, viewers watch as the various parts of the car fly towards the screen, but then methodically settle into a completed car. The bits and pieces fly through the air to upbeat, peppy music written specifically for the film.[15] Visitors to the exhibit were given the familiar bi-coloured glasses but these were shaped like the

front grille of a car, with lenses where the headlights would normally be. Each spectator's head temporarily became kin to the machine being birthed on screen. The glasses doubled as souvenirs; viewers were encouraged to take them home. Apparently the stereoscopic effect was successful, though the appeal was often articulated with a typically contradictory pull between pleasure and pain. One viewer reported: "You [still] hear the howls of delight when a cam shaft hits you in the eye."[16] According to statistics issued by the fair, the Chrysler theatre was the busiest at the fair, with a frequently filled auditorium and, according to several sources, a "waiting line for every performance." The theatre was in continuous operation from 10:00 a.m. to 10:00 p.m. An estimated 12,000 people watched the 17 foot wide screen every day. In its first year, the film was in black and white but in 1940, a Technicolor version was produced and the title changed to *New Dimensions.* In 1953, RKO bought the rights to the film and re-released it as part of the well-known 3D cycle of that decade. Now you can find it in bits and pieces on YouTube. *In Tune with Tomorrow* clearly furthered the fair-wide appeal to magic and wonder through its use of new display technologies and techniques. It should also be pointed out that this film, along with the other car films discussed, presented a context of labourless production and fantastical automatic assembly. Sidestepping a decade of labour strife, these films extolled the pleasures of various animation techniques and stereoscopic delights. Workers did not fare well in the cinematic life of the American car at the fair.

In Tune with Tomorrow was made by a small production firm, Louck and Norling, which primarily took on industrial and corporate contracts. The company specialized in advertising films, which it claims were more effective than other advertising methods both at capturing and keeping people's attention.[17] Like other such companies, Louck and Norling advertized in the magazine *Business Screen*, which was the primary and nationally distributed organ for this developing area. They also produced another 3D film for the Golden Gate International Exposition in 1940 called *Thrills for You,* produced for the Pennsylvania Railroad. Drawing on a long tradition of train films, *Thrills for You* featured onrushing locomotives, as well as footage shot from the front of the train or what is often called "phantom ride" footage.[18] John Norling announced at a meeting of the Motion Picture Engineers in May 1941 that an estimated 4 million people had seen one of these two 3D films, a triumph for the ascendant language of film advertising (and 3D), whose proponents worked hard to establish the appeal and efficacy of the film screen as a platform for selling.[19]

Norling has an interesting history. He had laboured throughout the 1920s to innovate 3D techniques, working at Fleischer Studios on early sound shorts, as well as on bouncing ball sing-a-long shorts (KoKo the Clown). At Fleischer Studios, he collaborated with others, going on to successfully make and exhibit 3D shorts in the 1930s. He worked on two short series, one called Plastigrams and the other Stereoscopiks.[20] These films were often marketed in ways very similar to the way that 3D and Widescreen films were marketed in the 1950s, with images of shapely women swimming, diving, or swinging towards the audience, emerging from the screen, usually wearing very little.[21] It is worth mentioning that the shorts included baseballs hurling at the audience, fisherman casting lines, and baseball players sliding into base.[22] These 3D shorts were merchandized with stereoview cards as keepsakes, suggesting that the practice of home stereoscopy was still very much alive and interdependent with public entertainments. Initially these Plastigrams and Stereoscopiks were developed and sold to a small chain of New York picture palaces which had the necessary projection equipment. Theatre owners persistently sought ways to compete with other theatres; movie theatres competed with theatres that featured *live* entertainments. In this case, the 3D film shorts were first used in order to counter the appeal of a system called Shadowgraphs, used as part of the well-known Ziegfeld Follies, a live review show. This system worked with a scrim that was lowered halfway through the show. With dual coloured light, a stereoscopic moving image of dancing girls bursting forth from the proscenium filled the hall.[23] This was a kind of live 3D, integrated as part of the regular and often spectacular stage show.

I have worked here to provide a broad context for a single 3D film in order to show that this particular history of corporate stereoscopy is integrally linked to a set of longstanding practices of corporate experimentation with display practices, shifts in the techniques of advertising, and a broad range of cinema technologies big and small. A full history of media stereoscopy should include a broad consideration of the institutions and mandates of those seeking to develop and employ stereoscopy as a useful, effective tool in its operations. This will require consideration of not just large screen features but a fuller range of film genres (advertising and industrial films), as well as hybrid technological forms (live 3D, handheld 3D, immersive environments) which often demonstrate links not just to cinema proper but to live performance, telephones, videogames and virtual, mediated, and so-called smart environments.

In Tune With Tomorrow was in tune with cinema's tomorrow, but also its recent past. A period of history and experimentation which film scholars tend to associate with synchronized sound and colour also entailed a range of experiments which partly reimagined the relationship between image, screen, and space, opening up the seeming uniformity of cinema to a range of ideas about exhibition and performance. 3D film has an intimate connection to these expanded cinema practices which include both the idea of cinema as an ever-expanding spatial technology but also as a series of useful or even instrumental screens (large and small, spectacular and banal). These screens worked in consort with an ascendant drive to capture not just the attention but the mind of the pre- and post-war consumer.

To be sure, *The World of Tomorrow* in 1939 was a particularly corporate, governmental and technological utopia wherein alliances across machines (cars, cinema, refrigerators) came to aid and abet a new form of expression, three dimensions and two. This new kind of language was multidimensional, highly adaptable to a range of spaces and purposes, and announced a kind of common sense for a new kind of cinema in sometimes fantastical but also banal terms. Cinema would provide a new language not just for artists or the entertainment industry but for all industries. It would do so by familiar terms—telling stories, showing pictures, animating things—but also through rearticulating the relationships between flat screens, projected light, space and the movement of pictures and people. Stereoscopy played a key role here. The fair staged 2D, 3D, flat and highly topographical displays, with varied lighting, recorded and automatic sounds, moving chairs and purpose-built movie theaters to create a kind of prescient dreamscape for not just cinema but also for consumer culture more generally.

NOTES

1 See Lauren Rabinovitz, *For the Love of Pleasure: Women, Movies, and Culture in Turn-of-the-Century Chicago* (New Brunswick, NJ: Rutgers University Press, 1998); Kristen Whissel, *Picturing American Modernity: Traffic, technology, and the Silent Cinema* (Durham, NC Duke University Press, 2008); and Tom Gunning, "The World as Object Lesson: Cinema Audiences, Visual Culture and the St. Louis World's Fair 1904." *Film History: An International Journal* 6.4.

2 See for instance, Janine Marchessault, "Multi-Screens and Future Cinema: The Labyrinth Project as Expo 67," *Fluid Screens, Expanded Cinema*, ed. Susan Lord and Janine Marchessault (Toronto: University of Toronto Press, 2007), 29-51.

3 Lee Grieveson, "The Work of Film in the Age of Fordist Mechanization," *Cinema Journal* 51.3 (Spring 2012): 25-51.

4 References to the automobile's industry are commonplace in the pages of *Business Screen* at the end of the 1930s.

5 Leo C. Beebe, "Industry," *Sixty Years of 16mm Film, 1923-1983* (Evanston, IL.: Film Council of America 1954), 88-98.

6 For a survey of European industry and its relations to cinema, see: Vinzenz Hedigger and Patrick Vonderau, eds. *Films That Work* (Amsterdam: Amsterdam University Press, 2009).

7 Grieveson, 29. These films were also shown at the 1915 Panama-Pacific Exposition in San Francisco. Ford's film program began as early as 1913 as part of its well-known time-motion studies to make workers more efficient, and to attune their bodies fully to the logics of the machine. These films gradually became one small part of a diversified film program, which included the *Ford Animated Weekly* (1914) which circulated widely to Ford dealers and other non-theatrical sites, as well as *Ford Educational Weekly* (1918-) and *Ford Educational Library* (1921) which were sent to schools and other nontheatrical venues. (Grieveson, 27-28).

8 For more on this see Haidee Wasson "The Other Small Screen: Moving Images at New York's World Fair, 1939," *Canadian Journal of Film Studies* 21.1 (Spring 2012): 81-103.

9 Films Exhibited at the World's Fair 1939: A Survey (1940) [Box 398, File 10: New York World's Fair 1939-40 Collection] Manuscripts and Archives Division, NYPL, 7.

10 "The World's Fair Survey of Motion Pictures and Slidefilms at the Fairs," *Business Screen* 2.1 (1939): 21-25.

11 Use of celluloid, projectors and screens at the fair was highly diversified. This included a wide range of what can broadly be termed "experiments in non-fiction film", which partly helped to fortify the fair's reputation as an unprecedented site for documentary films.

12 *Exhibition Techniques: A Summary of Exhibition Practice, based on surveys conducted at the New York and San Francisco World's Fairs of 1939* (New York: New York Museum of Science and Industry, 1940), 41.

13 The expanded cinema of the Futurama also had its more conventional film companions. GM, in addition to Futurama, used four different screens at the fair, two equipped with 35mm and two with 16mm.

14 See Roland Marchand, "Corporate Imagery and Popular Education: World's Fairs and Expositions in the United States, 1803-1940," in *Consumption and American Culture*, ed. David Nye and Carl Pederson (Amsterdam: VU University Press, 1991), 18-33.

15 The score was written for the film by George Steiner and Phillip Sheib.

16 "The World's Fair Survey of Motion Pictures and Slidefilms at the Fairs," *Business Screen* 2.1 (1939): 21-25.

17 Louck and Norling also produced the *Symphonies in Fragrance* film shown at the fair, discussed most often for its use of colour.

18 Ray Zone, *Stereoscopic Cinema and the Origins of 3-D Film* (Lexington: University of Kentucky Press, 2002): 159.

19 qtd in Zone, 159.

20 Zone, 120-122.

21 Ibid., 123-124.

22 Ibid., 125.

23 Ibid., 124-125; 126.

PART 2

VISUAL REGIMES OF 3D CINEMA

OLIVIER ASSELIN AND LOUIS AUGER GOSSELIN

THIS SIDE OF PARADISE
Immersion and Emersion in S3D and AR

TECHNOLOGICAL DEVELOPMENT is a complex process. It is connected to demand, to the needs and desires of consumers, to the interests of industry, to the needs and desires of manufacturers—and to competition, which favours products that stand out in the overall supply. Obviously, supply and demand are closely linked, each informing the other, mutually and continually. But needs and desires will vary, and are sometimes even incompatible: in communication, portability, interactivity, gameplay, etc. Be that as it may, immersion has always been a primary goal in all research and development programs, and a key factor in the buying patterns of consumers. Everywhere, there is a constant search for more illusion, more definition, more movement, more relief and depth, more spatial extension, more multisensory extension, more interactivity, more immediacy, more presence, and especially more immersion. Insofar as it gives the image more depth, S3D is naturally part of this immersive program. But since it gives the image more relief, it may appear to deviate from this program, aiming at *emersion* rather than *immersion*. And in this respect at least, it would seem closer to augmented reality (AR) than virtual reality. But things are more complex than they appear.

S3D and the Emergence Effect

Akira Mizuta Lippit states that "the history of three-dimensional cinema is remarkable for its absence of historicity.[1] Unlike the progressive vocabulary pervading historical discourse, 3D experimentations have been characterized by amnesiac stumblings and long periods of silence. Lippit reminds us that for many theorists, the film medium's implicit mission was to conquer the entire sensorial complex, to represent reality in its totality. The arrival of S3D was thus seen to be part of a natural evolution, a step towards realizing this destiny. As we now know, of course, the introduction of S3D turned out to be more complex than sound and colour; its status in the commercial film industry is still uncertain, despite its almost century-old history: the first stereoscopic projections date back to the mid-1910s. Again, according to Lippit, "[S3D cinema] replaces the temporal linearity of history with the atemporal force of fantasy. We can thus see it as an endlessly recommenced fantasy: it never reaches its intended goal. […] Three-dimensional film has thus proven to be […] forever outmoded and forever developing."[2]

Naturally, if Lippit had written this article after the box-office triumph of *Avatar* (Cameron, 2009) and the more modest successes of such films as *Alice in Wonderland* (Burton, 2010) and *The Avengers* (Whedon, 2012), he may have held a different view. Nevertheless, before the launch of IMAX 3D in 1987 and the return of 3D glasses in commercial theatres in 2005, the "amnesiac stumblings" the author refers to were numerous indeed.

In North America, between 1915 and 1985, 3D stereo technology had three periods of intense commercial use. Each of these periods corresponded to the rise of a competing medium or format (television, VHS), and consequently with a drop in theatre attendance. To win back audiences, S3D—as well as CinemaScope and Cinerama, among other technologies—were launched in a veritable competition of special formats. The first period began in the 1920s, when other forms of entertainment, including radio and music hall, threatened the future of cinema—or so it was thought. The response was disorganized. On the one hand, flocks of inventors in search of the medium of the future applied for a wide range of patents; on the other, attempts were made to lure viewers into theatres with special effects, most notably by Frederic Ives and Jacob Leventhal, who specialized in vignettes with objects emerging from the screen, heading menacingly toward the viewer. In the words of Ray Zone, these vignettes "broke the fourth wall of the motion picture screen, foregrounding spectatorship and display, acknowledging the viewer with a visual shock."[3] With these emergence "effects," the short films of Ives and Leventhal became models for attracting film audiences, evoking surprise and visual pleasure to the detriment of the imaginary immersion of the spectator into the image.

Although S3D entered a period of dormancy following the advent of the talkie, certain innovations, such as the invention of polarizing filters in the 1930s, paved the way for its return to commercial theatres. This occurred in 1952, when Arch Oboler successfully released *Bwana Devil*. Seeing a golden opportunity, the major studios began to produce a raft of 3D films. Between 1953 and 1955, over 50 titles were released. But the craze was short-lived, and waned even further following the launch of Cinemascope, which proved more popular.

During the 3D era, it was the urgency with which producers pounced on this new invention, on its instant attraction, that accounts for the meagre exploration of its expressive potential. The majority of films merely recycled the emergence effects popularized in the 1920s and wedged in a subordinate narrative framework. The excess genres, such as horror, science fiction, and fantasy, predominated, providing ample pretexts for repellent figures and objects to burst out of the screen, invading the audience. Instead of exploring aesthetic issues, producers tried to capitalize by promising audiences a powerful emotional reaction. The marketing campaigns reflected this: it was not so much the content of the film that was praised as the *experience* these films afforded. "A lion in your lap! A lover in your arms!" exclaimed the ads for *Bwana Devil*. "*You*—not the camera—but *you* are there!" The promotional messages thus focused not on the narrative, but on the *nature* of the show: the theatre itself was now centre stage, the site of objects emerging from the screen, bombarding the audience.

Although the interest in special formats was clearly on the wane, there were a number of 3D films released in the 1960s. It was not, however, a time for innovation: horror and science fiction

continued to be the vehicles of choice, while the only new development was the recourse to yet another excess genre: erotic films. Later, in the 1980s, history repeated itself: S3D made a major comeback. As in the first golden age, the infatuation was strong and short-lived (some twenty films in three years), and special effects took precedence over aestheticism.

To account for the failure of these initial efforts to establish S3D, several factors have been cited, some technical, some financial.[4] But the overuse of emergence effects was likely a decisive factor. Emergence creates a temporary confusion between the virtual world and the movie theatre: the illusion that the two are communicating spaces. The effect, however, quickly shows its limitations. The integration of these effects into the narrative is problematic, since the propulsion of figures into the theatre activates the body of the viewer. Because they are physically challenged by the images, which threaten to swoop down on them at any moment, it is difficult for audience members to forget they are sitting in a cinema, and to identify with the characters. As William Paul observes, "Smashing the window [of the screen] called attention to the fact that there was a window there to be smashed […] The window ends up constructing itself in its own deconstruction."[5] Furthermore, as the emerging object approaches the viewer, it is quickly cut by the frame, producing a twisting of perspective worthy of Escher: at the centre, the object is projected beyond the surface through negative parallax, but at the edges, it is pushed behind the surface by the frame—and from the space of the viewer it appears, strangely, both volumetric and truncated. And this is no doubt why emergence effects remained limited, reserved for small, floating, flying, or projected objects that are not anchored in the ground of the diegetic world. The emergence effect, which establishes a path of communication between the virtual world of the film and the real space of the spectator, tends to contradict the logic of the frame—which presupposes an absolute separation between the two spaces.

Following Paul, we can see how the preponderance of emergence effect in these films from the 1950s stems, at least in part, from the need to distinguish S3D from other competing formats. Cinerama and CinemaScope were often presented as immersive apparatuses. "You won't be gazing at a movie screen," promised the ads for *This Is Cinerama* (1952). "You'll find yourself swept right into the picture, surrounded with sight and sound." Rather than draw the viewer into the image, the S3D technology sent the image outward into the theatre. While this aesthetic aimed to increase the viewer's belief in the reality of the representation, it in fact undermined the experience of immersion. When, for example, an axe or human skull was propelled in the direction of the audience in de Toth's *House of Wax* (1954), the illusion was so strong that it automatically led to a questioning on the part of viewers; in their protective reflex, they were reminded of the illusory nature of the menacing object. That being the case, the promised fusion of the theatre and the image did not occur either on a perceptual level or on an imaginary level, for the spectator was constantly drawn back to his empirical position. Far from losing himself in the fictional space, he witnessed the performance of the *medium*, contemplating the effects produced on his sensory system.

The current interest in S3D films and games, and the development of 3D TV and 3D portable game consoles, may seem to indicate that this tension between emersion and immersion has been resolved. But such is not the case. In fact, since *Polar Express* in 2004, filmmakers and game designers have limited emergence effects and the targeting of the body of the viewer, concentrating instead on the display and deployment of depth. The image is no longer designed to simulate a spatial continuity between the space of the viewer and virtual space; it confines itself to giving an appearance of materiality to the fictional world. The imaginary projection of the viewer into the image is thus no longer undermined, since that which is represented is returned to the "primordial elsewhere" referred to by Christian Metz.

AR and Augmentation

At first glance, AR would seem to have little in common with S3D, either historically or technologically, industrially or commercially. But if we consider it in a more general context, in a reflection on immersion, on the relationships between image and spectator, virtual space, and viewer space, AR can be seen as an analogous response to the problem of immersion, but on another playing field: not in the closed space of the movie theatre or living room, but outdoors, in the public space, and with other resources. AR, like S3D, brings the image, or certain elements of the image, into the space of the viewer, but it also allows viewers to escape their stationary, frontal position and make their way around the image. The augmentation thus produces the same type of thrill as emergence, but accentuated.

Generally speaking, augmented reality allows us to introduce, with a certain interactivity and therefore in real time, virtual data into real space. It embraces a wide range of technologies and apparatuses: head-attached, hand-held, or spatial displays, see-though surfaces with projections or LCD screens with cameras, optical mixing, or video mixing, etc.[6] Originally, in the 1990s, augmented reality most often involved fixed displays, installed indoors, within a controlled institutional framework, but now it has been expanded with the development of mobile platforms and their urban proliferation. Although it was first used in such specialized fields as medicine, and in the military and manufacturing sectors, AR now has numerous applications in marketing, education, tourism, social sciences and, of course, entertainment.

Augmented reality is often used in the creation of an *annotated space:* attaching information, texts, or images to objects, architectures, and specific locations. Marc Tuters was a pioneer in this field with his *GeoGraffiti* (2004), which allowed users to leave and access, in situ, location-dependent messages. Today, the mobile browser Layar (2009) and geosocial network Facebook Places (2011) allow users to locate nearby businesses or friends while leaving blocks of text or icons in the environment. In these cases, the relationship between the virtual data and the real space is weak: the data are localized, attached or pinned to the real. And the resulting mixed-reality environment is a layered, heterogeneous, and discontinuous data space.

But in certain cases, the relationship is more firmly motivated: the data are not symbolic, but rather iconic and even realistic; they are not only localized, but also carefully defined (dimensions, colours, light, etc.) and arranged in real space (distance, height, angle, etc.) so that, from a specific viewpoint, the image and site are perfectly aligned according to the laws of perspective, and the virtual object appears as an element of real space. The environment thus created is spatially more consistent, homogenous, and continuous, as if this technology was designed to create a seamless blend of real and virtual elements. Through the use of augmented reality, certain museums, including the Museum of London (*Streetmuseum*, 2010) and Montreal's McCord Museum (*MTL Urban Museum*, 2011), are able to superimpose images from their collections over the real sites they represent;

architects, using such applications as 3D on architecture, are able to insert 3D models of structures at the very location they are to be built; certain games, such as Sky Siege, AR Drone, and SpecTrek, allow the introduction of virtual animated 3D objects and characters into real space.

From this perspective, the principal challenge of augmented reality lies not so much in *localization*, the positioning of data in space, but rather in *registration*, the visual alignment of the virtual and the real, of the image and the space, from the user's point of view, in real time, regardless of his or her position. This problem of registration is complex, as it involves a variety of parameters: shape, colour, brightness, contrast, direction of light, resolution, realism, transparency and opacity, field of view, parallax effects, eye accommodation, calibration, transmission, rendering, processing, positioning, and so on. But the principal means of registration is the tracking, in real time, of the position and direction of the user or screen, which allows the image to be modified accordingly. The tracking may be effected in a number of ways. It can be done on the viewer's side, with a gyroscope, an accelerometer or electromagnetic sensors placed on the head-mounted display (HMD) or portable screen. Or it can be done in the environment, with fiducial markers and shape recognition and visual tracking software, whereby the movement of the camera can be followed based on a visual reference placed in space. Recently, these systems have been enhanced with a compass and GPS, which are able to determine the position, direction, and movement of the user over a larger area. But none of these technologies is perfect; all have limitations. The majority of these augmented reality devices therefore employ a hybrid tracking system.

While tracking has improved substantially in recent years, registration remains a challenge. In many cases, given the imprecision of positioning technologies and the delay in the processing and transmission of data, the virtual objects continue to be fragile and weakly anchored, floating above the real, often wavering in their position like sub-atomic particles, appearing and disappearing like ghosts—and so the illusion is broken. And this no doubt explains why augmented reality applications continue to favour simple objects with more stability (inanimate or lightly animated, stationary, etc.), or floating objects (airborne vehicles, ghosts, etc.) whose ties to reality are weaker—in the same way S3D films favoured floating objects to create convincing emergence effects.

But in the creation of this seamless mixed-reality space, registration is no longer the most important challenge; rather, the question of display is now central. Despite the promotional language surrounding AR, innocently parroted by many users, the majority of recent devices do not really insert the image into the site, the virtual object into real space. The mix of virtual and real is achieved, not directly within the space of the spectator, but indirectly on an image of this space, on a screen—a giant screen, tablet or phone—as in a *mise en abîme*. Augmented reality retains its magical dimension since it continues to combine, in real time and live, the real and the virtual, as it takes into account the movement of the objects and user. But on an immersive level, the experience it offers is limited, since it continues to use the traditional imaginary projection of the viewer into the image. And in this respect, the problem of the frame remains.

Immersion and Emersion

Briefly defined, immersion is an experience that gives one the feeling of physically entering a separate space. While everyone agrees on the term's general meaning, an analysis of the experience it names has long remained hazy. Over the past few years, however, with rapid developments in the theory of immersion, most authors have come to agree that the term covers a variety of experiences, and that the general category subsumes several distinct immersive experiences. For example, in her inaugural study of immersion, which explored the relationships between literature and virtual reality, Marie-Laure Ryan distinguished four degrees of *absorption*: concentration, imaginative involvement, entrancement, and addiction; and three types of *immersion*: spatial (a response to setting), temporal (a response to plot), and emotional (a response to character).[7] More recently, Gordon Calleja, in his research on video game immersion, distinguished six dimensions of involvement: kinaesthetic, spatial, shared, narrative, affective, and ludic; and two phases in each of these dimensions: micro-involvement and macro-involvement.[8]

Obviously, S3D, like AR, is concerned primarily with so-called spatial immersion.[9] And yet this specific type of immersion, in and of itself, has received little attention. With a few notable exceptions: Jean-Marie Schaeffer, for example, in the context of his study of fiction, has made an impressive typology of "fictional apparatuses" based on the "postures of immersion" they assign to users.[10] From this standpoint, literary immersion, cinematic immersion, theatrical immersion from the audience's point of view, theatrical immersion from the actor's point of view, and children's immersion in role-playing games can be distinguished by the position they assign the user in relation to the fictional world—from the outer position of the observer to the inner position of the actor.

The most promising model, however, has been proposed by Paul Milgram, Haruo Takemura, Akira Utsumi and Fumio Kishino in their pioneering study of augmented reality.[11] To better situate augmented reality, the authors propose a typology of displays based on three criteria: "extent of world knowledge," "reproductive fidelity," and "extent of presence metaphor." While the first two criteria reformulate the traditional considerations regarding the realism of the image (modelization, colour, light, texture, stereoscopy, animation, resolution, etc.), the last criterion is more innovative, considering as it does the degree of immersion; for instance, the position of the user in relation to the image. What this does is allow us to distinguish between the *exocentric* displays, which leave the user outside the represented world, and the *egocentric* displays, which give users the impression they are immersed in the represented world. This simple yet overlooked distinction allows us to name and better understand a dimension that is fundamental to the immersive program. The ideal, in this program, is not the reproduction of the perceived objects, but the reproduction of the experience of perception; it involves not so much the illusion of depth or relief, beyond the surface, as the transposition of the user, outside the frame, into the centre of the virtual world—an egocentric spatial immersion.

Traditional images, since they are generally flat and delimited, cannot offer an immersion of this sort. Perceptually, the viewer is always left *in front* of the image, on this side of the surface and frame. By various means, however, these images can make the viewer forget the limitations and enter the space depicted through imagination. Historically, two main strategies have been employed to facilitate this imaginary immersion. The first consisted in enlarging the image. And this is how the fresco, *bel composto*, historical painting, large-scale landscape, panorama and 360° images, cinema, IMAX, circular cinema, Panoscope, Satosphere, and all the monumental displays, without ceasing to be limited surfaces, were able to offer viewers a new experience that approaches, or at least suggests, egocentric immersion.[12] The second strategy, too often neglected in studies of immersion, consists not in enlarging the image but rather in bringing it closer to the viewer. This is how the miniature, small-scale landscape, Kinetoscope and other proximity devices that presuppose

individual viewings were able, despite their small formats, to facilitate the imaginary immersion of the viewer into the image. These strategies may appear to be opposed, but in the end are identical: in both cases, it is a question of bringing the limits of the image closer to the limits of the visual field, affording less room to the real space and more to the virtual space, and allowing viewers to momentarily imagine themselves in the centre of the represented world. And it is significant that the majority of these immersive apparatuses, be they monumental or miniature, are based on processes of separation and eclipse of the real space inhabited by the viewer: the image is surrounded by a frame, the viewer wears eye shields, the theatre is plunged into darkness, etc. But regardless of the extension and curvature of the image, regardless of the distance or the frame, viewers remains firmly rooted to their own space. In this regard, it is interesting to note that sound technologies—with the appearance of stereophonic sound, surround sound, binaural recording and ambiophonics—have surpassed image technologies in situating users egocentrically, in the heart of the representation. And this historical gap is strikingly evident in cinema, where the 360° possibilities of surround sound are usually underused, so that the sound remains anchored in the image *in front* of the viewer.

S3D is obviously aligned with this immersive program. And insofar as it gives the image more *depth*, S3D may appear to be pursuing the dual strategy that favours the viewer's imaginary egocentric immersion beyond the surface and frame. The individual stereoscope is part of the tradition of small-format images and proximity devices, and 3D films part of the tradition of large-format images and monumental displays. But since it sometimes gives the image a certain *relief*, S3D introduces a new strategy into this program—or at least revives an old but marginalized one—which may appear to reverse the traditional strategy: in addition to favouring an imaginary immersion, beyond the surface and frame, in the virtual world, it allows for certain elements to emerge from the virtual world, below the surface and frame, in the real world, where the viewer is already immerged—exactly as was achieved in the past by certain trompe-l'œil effects with objects painted so close to the surface that they seemed to protrude from the canvas. These two strategies may seem contradictory—one seeks to make viewers forget their bodies and the space around them, while the other seeks to activate them—and when they intersect in S3D, they create a tension that is difficult to overcome, a double bind—as if the device requires viewers to be at two places at once, to be immersed in two heterogeneous spaces.

Producers of images have sometimes tried to hide this fundamental heterogeneity between the image and site and to simulate a continuity, even a communication, between the virtual space and real space, to suggest that it involves one and the same world. In fact, in certain cases the *threshold* between the image and site has been subject to special attention, presented as if it belonged to the two worlds at once, as if the represented threshold were realistic and the real threshold virtualized: often, in trompe-l'œil, a painted frame extends the real architectural frame of the image; in panoramas, the link between the real ground and the vertical support of the image is curved and continuous, masked by authentic elements from three-dimensional decors (a real handrail, shrubs, earth or sand, etc.). Sometimes it is the entire virtual space that is brought closer to the space of the viewer, and the entire space of the viewer that is virtualized and fictionalized. The phenomenon of the "phantom ride" is a perfect example of this. If cinema has so often depicted train rides since its early days, it is no doubt because they provided a diegetic justification of the movie theatre: a closed space with a window, which can accommodate several people, it resembles a form of public transport.[13]

And certain cinema owners did not hesitate to force the analogy: some of the ride films, which used a camera mounted on a moving train, balloon or other means of transport, were presented in theatres that were themselves decorated, structured and sometimes even animated like a railroad car, nacelle, or other vehicle.[14] Similarly, certain films today that depict rides are presented in simulator rides or motion theatres, whose seats are equipped with motion simulators that follow the virtual movements of the camera.

This strategy, active in both S3D and AR, and aimed at relief rather than simple depth, emergence rather than forward movement, emersion rather than immersion, seems to deviate from the immersive program. But it is simply another solution to the same problem of simulating egocentric immersion: unable to mask the real space to completely immerse the viewer in a virtual world, it attempts to virtualize the real world in which the viewer is already immersed.

Wearable Displays and Screenless Images

S3D and AR, emergence and augmentation, thus have certain similarities, for both call into question the surface on the side of the viewer by introducing virtual elements into the real space. A comparative analysis of the two strategies reveals that the mimetic program that structures the production and reception of technical images is not centered squarely on illusion, but more generally on immersion and more particularly on egocentric spatial immersion, which perceptually places the viewer at the centre of the virtual world. But at the present time, as they have developed so far, S3D and AR are imperfect responses to this ideal: emergence lets the virtual enter the space of the viewer, but it is always limited by the frame of the screen—that of the theatre, television or console; augmentation brings the virtual into the heart of the real space of the user, but it is generally done indirectly on a screen—on a giant screen, tablet or phone. And thus the ideal of egocentric immersion is far from being realized, since its principal condition has not been met: the identification of the limits of the image and the limits of the visual field. And it is clear that this condition will not be met by increasing the size of the image—through the development of monumental displays—but rather by bringing the image closer to the viewer, through the development of proximity devices.

Early on, S3D and AR, like virtual reality, experimented with proximity devices and wearable displays. The first stereoscopes required the user to come in contact with the apparatus, with angled mirrors (Wheatstone, 1838), eye pieces (Brewster, 1849), or a streamlined viewer that fit the shape of the face (Holmes, c. 1860). Similarly, one of the first virtual reality apparatus, which was also the first augmented reality device since it was partially see-through, involved a head-mounted three-dimensional display (Sutherland, 1968). But in the history of S3D and AR, the research on this type of display was quickly abandoned, or at least stalled, for a variety of reasons. The stereoscope, like the kinetoscope, became outmoded following the institutionalization of cinema, giant screens and collective experiences. The head-mounted display (HMD) fell into disuse due to the uncomfortableness, size and weight of the helmet, the maze of wires connecting it to the computer, etc. Thereafter, personal computers, the Internet, mobile platforms, smartphones, and tablets were to monopolize the attention of researchers, manufacturers, and consumers.

But the head-mounted display may be on the verge of a comeback, in an improved form. Certain signs indicate that display technologies could move from large screen and hand-held displays

to head-attached displays, from HDTV or phone screens to eyewear displays. With miniaturization and improvements in screens, resolution, field of view, batteries, and the development of mobile wireless technologies, the unwieldy helmets of the past have been transformed into elegant eyewear displays, both more comfortable and more effective, and hence a more attractive option for both manufacturers and consumers. And the fact that these eyewear displays are no longer the exclusive domain of small specialized companies, but of multinational corporations, can only fuel this movement.

We are referring here not only to the transparent shutter glasses that allow 3D viewing of TV or game console screens, currently made by all major television and console manufacturers. We are also referring to the 3D eyewear equipped with two miniature screens (LCD, OLED, etc.) and headphones, which allow users to watch films or play games, anywhere, in 2D or 3D, on a virtual screen and with surround sound, such as the Sony HMZ-T1 Wearable HDTV 2D/3D. We are also thinking of the new AR eyewear involving see-through screens and a tiny laser projector, such as Google's Project Glass, or opaque video screens and cameras, such as the Vuzix Wrap 920AR. These devices become particularly interesting when they are linked to geopositioning systems and motion trackers that monitor the position and movements of users, keeping them in the centre of the virtual space or augmented reality.

3D and AR eyewear are often developed separately, by different companies, some attempting to construct a 3D virtual environment with a fully integrated space, others a multilayered AR dataspace combining SMS, videophone, web access and social networking, and involving mostly text, 2D graphics and images. But the two may soon converge, as demonstrated by the new Epson Moverio BT-100, which incorporates 3D technology, see-through display and wi-fi connectivity, and allows users to view video and play games in 3D and experience content floating into their surroundings, or the Vuzix Wrap 920AR, which has two high-resolution LCD displays, a twin camera system, a 6-degrees-of-freedom tracker with compass and plug-in, which can introduce S3D animated objects and characters into real space. This convergence of 3D and AR heralds the formation of a fully integrated, mixed-reality environment that will provide a more complete immersive experience in a screenless, surfaceless and frameless image.

Some researchers, in fact, are already working on the next generation of displays: contact lenses or retinal displays. We are thus far beyond Sutherland's " ultimate display," and closer than ever to neuronal cinema and the utopian screenless imaging system involving a direct synaptic interface.

Translated by Jeffrey Moore

NOTES

1 Akira Mizuta Lippit, "Les trois dimensions du cinéma – reproduction, mimétisme, annihilation," *1895* special edition, Paris, October 1997, 50.

2 Ibid., 51.

3 Ray Zone, *Stereoscopic Cinema and the Origins of 3-D Films, 1838-1952* (Lexington: University Press of Kentucky, 2007), 120.

4 See Ibid., and R.M. Hayes, *3-D Movies: A History and Filmography of Stereoscopic Cinema* (Jefferson, N.C.: McFarland & Company, 1989); and Valérie Peseux, *La projection grand spectacle: du Cinérama à l'Omnimax* (Paris: Dujarric et cie, 2004).

5 William Paul, "The Aesthetics of Emergence," *Film History: An International Journal* 5.3 (1993): 321-355.

6 Paul Milgram, Takemure Haruo, Akira Utsumi and Fumio Kishino, "Augmented Reality: A Class of Displays on the Reality-Virtuality Continuum," *Telemanipulator and Telepresence Technologies, SPIE* 2351 (1994): 282-292; Ronald Azuma, Yohan Baillot, Reinhold Behringer, Steven Feiner, Simon Julier, and Blair MacIntyre, "Recent Advances in Augmented Reality," *IEEE Computer Graphics and Applications* 21.6 (November/December 2001): 34-47; Lev Manovich, "The Poetics of Augmented Space," *New Media: Theories and Practices of Digitextuality,* eds. John T. Caldwell and Anna Everett (London: Routledge, 2003), 75-92; Oliver Bimber and Ramesh Raskar, *Spatial Augmented Reality: Merging Real and Virtual Worlds* (Wellesley, MA: A.K. Peters, 2005).

7 Ryan, Marie-Laure. 2001. *Narrative as Virtual Reality: Immersion and Interactivity in Literature and Electronic Media* (Baltimore: Johns Hopkins University Press).

8 Gordon Calleja, *In-Game: From Immersion to Incorporation* (Cambridge, MA: MIT Press, 2011).

9 Once again, immersion is not the only objective of images (interactivity and gameplay, for example, may in some cases be favoured), and spatial immersion is not the only type of immersion possible (narrative immersion often predominates). But they remain central in contemporary culture and in the development and consumption of technologies.

10 Jean-Marie Schaeffer, *Pourquoi la fiction?* (Paris: Seuil, 1999).

11 Milgram et al.

12 Oliver Grau, *Virtual Art: From Illusion to Immersion* (Cambridge, MA: MIT Press, 2003).

13 Obviously, the analogy between the movie theatre and railway car is flawed: the theatre has only one front "window," while the train has several side windows. This approximation created certain tensions in the first phantom rides: in Hale's Tours, whose moving theatres were designed as train cars, films were screened not on the sides, behind the windows, but at the end of the carriage…

14 See, for example, Hale's Tours, which simulated train rides, and Cinéorama, balloon travel.

DAVID HARRIS SMITH

COLIN LOW AND TRANSITIONS 3D
Innovating Immersive Cinema

A WORK OF STRING THEORY PHYSICS[1] sat on Colin Low's kitchen table. Responding to an interview question about his current interests, the 84-year-old filmmaker had retrieved the text and exclaimed, "Now this is the thing!"[2] The moment seemed to offer an important insight into the intellectual motivations of his NFB works in animation, experimental documentary, and large format film. Like string theory, which attempts to resolve quantum and cosmic events, Low's œuvre might be similarly characterized as a quest to resolve the "here" and "there" of cinema, uniting the viewer, figure, and ground, in a synthetic immersive experience. As a filmmaker and technician, Low has struggled against the distance and passivity of spectatorship, and sought to devise the means of a participatory, immersive cinema. This led to a spatialization of cinema in the most visceral sense, developing spatial animation techniques, rethinking exhibition venues, projection systems, and film formats, and ultimately, contributing to the development of large format stereoscopic cinema. A pivotal moment in this quest arrived when Low first brought together live action stereoscopic filmmaking with the IMAX format to produce *Transitions 3D*, the NFB offering for Vancouver's Expo 86 World's Fair.

Low's aspirations to an immersive cinema reprise Bazin's account of the trajectory of total cinema, in particular the anticipatory dispositions of cinema's pioneers: "In their imaginations they saw the cinema as a total and complete representation of reality; they saw in a trice the reconstruction of a perfect illusion of the outside world in sound, color, and relief."[3] Low's film work reveals the pull of an ideal immersive cinema that is uniquely coupled with the reflexive documentarian's penchant for qualifying the technological and conceptual mechanisms of representation. Low's formal experiments in film often bear a meta-narrative explicating the technological artifice of realist filmmaking, while drawing attention to the historical situation of the films' makers, subjects, and audiences, on a yet-to-be fulfilled technological quest. Low exemplifies Bazin's film pioneer, whose technological accomplishments were incidental to the imagination of a total cinema that is yet to be invented, a filmmaker who made incremental victories over the "obstinate resistance of matter to ideas."[4]

In Low's case, the development of a realistic large format stereoscopic cinema exceeds the ambition of a total cinema; rather it is aligned with an encompassing vision that explicitly merges the cinematic apparatus with the technological portents of universal human progress. By reflexively foregrounding of the mechanisms of IMAX 3D, Low breaks with the traditional masking of artifice inherent in documentary photography and realist 2D cinema. Instead, *Transitions 3D* foregrounds the delineated relations of observer, image, and optical mechanism, in a manner characteristic of early stereoscopic and animation imaging machines. Referring to the "undisguised nature" of these early technologies, Crary writes in *Techniques of the Observer*, "The optical experiences they manufacture are clearly disjunct from the images used in the device. They refer as much to the functional interaction of body and machine as they do to external objects, no matter how 'vivid' the quality of the illusion."[5] It is this unique admixture of realism and mechanism that constitutes Low's immersive IMAX 3D cinema. *Transitions 3D* synthesizes Low's cinematic vision of the conjoined fates of culture and technology, immersing the audience in its most contemporary and spectacular machine.

Conjoined Authorial and Institutional Mandates

Low's technical accomplishments were integral with the mandate of the NFB to use film as a technology of Canadian cultural synthesis on the world stage. The successive NFB mandates of 1938 and 1980, highlighting social explication and film technology innovation[6], engage the often competing aims of a cultural conservation of the people and places of Canada, and the assertion of Canada's role in successive and increasingly globalized technological regimes. It is against the bifurcated orientations of cultural conservation and technological progress, that I situate the thematic concerns and technical innovations of *Transitions 3D*. When taken up by Low, the cultural tensions inscribed in the successive mandates of the NFB result in a conjoined portrait of a cinema and a nation whose ongoing renewal is manifested, rather than threatened, by technological succession.

Low's response to the conjoined mandates of the NFB and the Canadian National Railway—the industrial sponsor of *Transitions 3D*—reflect an ideological positioning of Canada as an emerging participant in a technologically brokered globalized economy. In *Transitions 3D* Low documents a unique Canadian identity that makes a virtue of its inherent instability and imprecise cultural definition. Canada's historic trail of obsolete technological regimes and disappearing ways of life is retold as a cultural identity of innovation, and a national history that is essentially a future hurrying to arrive. Low's quest for an immersive 3D cinema anticipated the ideology of the information age in its most optimistic guise: an immediacy of information and the reduction of distance to intimacy. Yet, even more true to the actualities of the information age, *Transitions 3D* conflates cultural identity with a sense of technological currency.

From a thematic perspective, Low articulates a Canadian cultural identity informed by a universal humanism, yet this figure is only brought into relief by the successive fading of specific cultures along with the technologies upon which they were founded; it is an identity that is simultaneously conservative and future-directed. Low's empathic sense for the passing of cultures is tempered by a futurist's sensibility and searching optimism for technical innovation.

The association of technological shifts with vanishing ways of life was first formalized in Low's social documentaries: *Circle of the Sun* (1960), a portrait of the Kanai first nation transitioning from a traditional to industrial economy, and The *Fogo Island Project* (1968), a portrait of a small

Newfoundland fishing village eclipsed by the growing industrialization of the commercial fishery. The documentation of the social costs of technology in these works contrasts and also helps to inform Low's contributions to successive world expositions. In the celebratory context of the expo, Low frames the evolution of technological humanity with the requisite expansive spirit and futuristic vision demanded by such occasions. These resolutions culminate in the Expo 86 production *Transitions 3D*, a special kind of stereoscopic impulse that is at once historically conservative, present-minded and spectacular; it is a meditation on technological progress, recounted in Canadian landscapes and dramatic historic vignettes. It is also a momentous theatrical reflection on the progress of cinema technology that makes accomplices of its audiences.

The Making of Transitions 3D

Transitions 3D is significant to film scholars because it is the first stereoscopic live-action IMAX film. In his historical periodization of 3D film, Zone (2007) names *Transitions 3D* as the film that announced the immersive era of stereoscopic film.[7] The film anchors other important histories of film innovation and culture. From a technical perspective these innovations include the development of large format cinema cameras and projection systems, computer animation, and exhibition architecture. From a cultural perspective, *Transitions 3D* was the culmination of a prolific and wide flung collaboration of Canadian filmmakers and technologists responding to the cultural mandates of the NFB and the national and industrial agendas of successive world expositions.

Low's first IMAX film *Atmos* (1980) was an NFB co-production with American OMNIMAX theatres. This project gave Low's team experience with the IMAX camera and projection system. Low had learned from his NFB mentor Norman McLaren to run simultaneous production and research projects, one project at the official level, and another, on the side, in pursuit of personal artistic goals. For Low, this was the pursuit of large format 3D. After wrapping up production on *Atmos* Low was able to use his relationship with the IMAX Corporation to have the loan of two IMAX cameras to build a 3D rig. Using some left over 70mm film stock from the *Atmos* project, Low shot an IMAX 3D demo in Ottawa's Gatineau park and used it to pitch the *Transitions 3D* project to Canadian National Railway (CN), sponsors for EXPO 86 in Vancouver.

With support from CN and IMAX Corporation, production on *Transitions 3D* began in 1983. Low co-directed the film with Tony Ianzelo, and contributed to the design of the CN IMAX Theatre at the Canada Pavilion on the Vancouver waterfront. Based on the Expo 86 themes "Transportation and Communication," the film was designed as a series of vignettes featuring the historic progression of Canadian technologies. From the canoe and telegraph, to submersibles and satellites, each technology was illustrated with human drama: a telegraphed wedding announcement, helicopter logging for lumber to build a family home, robotics for a child's missing limb, a child's dream of an enchanted teddy bear. In the spirit of Low's 1952 work *The Romance of Transportation in Canada*, *Transitions 3D* is a romance of technologies. The climax of the film features the then unprecedented use of 3D computer animated graphic imagery: the two minutes of wirefame animation of the ANIK telecommunications satellite required a special purpose frame-renderer written by the NFB's Doris Kochenek, and consumed over one million feet of magnetic tape.[8]

A story told without narration or voice, using linked dramatic vignettes that highlight scale, motion, and physicality, *Transitions 3D* angled for the embodied attentions its audiences. A party of early European settlers, accompanied by First Nations guides and seasoned Coureurs de Bois, struggle with their cargo over a canoe portage amidst maple-lined lakes of the Canadian Shield. Underway again, the cargo canoes cut the lake at speed, propelled by the synchronized choreography of powerful arms. A stoker feeds the boiler fires of an early steam locomotive as it traverses the landscape with its cargo of livestock; a farming family waves as the train passes. Saluting the frenetic physical comedy of a Mack Sennett silent film, a careening car chase sends the audience lurching down a winding road to overcome a Canada Post motorcycle courier. A fast-moving modern train pulled by a diesel locomotive glides through a mountain tunnel, its movements monitored in the flashing electronic display terminals of a centralized CN control room. A logging foreman radios to a helicopter operator as huge logs plummet into the inlet. A house-building bee, grain harvesting and transport, an automated bakery, a birthday party, a child's dream, each scene offers a portrait of transportation and communication technologies knitting together the intimate experiences of everyday life with Canada's industrialized resource economy. The final vignettes of *Transitions 3D* emphasize Canada's progress toward a future defined by leisure, the arts, and invention: a remotely operated submersible, robotic prostheses, satellite telecommunications, a swimming pool, a sulky race, Olympic fencing, a Chinese contortionist, 3D computer modeling, and celebratory fireworks. Each vignette frames an opportunity for the film's content to loom out, off the screen, into the audience space of the theatre.

Transitions 3D epitomized much of what was to follow in IMAX production: the cinematic conservation of the past, a scopic tourism of exploration and discovery, narrations of the progress of technological humanity, and the reflexive reminding of audiences of its own technical accomplishment.[9] As a populist form, *Transitions 3D* made of its audience accomplices in the narrative of progressive technology. The screening event itself was a technological wonder, immersive and sensational, its content, at once, entertaining and epistemological. Twenty-two minutes in length, over 1.75 million Expo visitors saw the film, often lining up for three hours in advance.

Cinema, Technology, and Empire

For Low the primary criterion for 3D cinema was screen size; a film window that fell short of the periphery of vision was contradictory to the aims of 3D, breaking the illusory construction of space. The IMAX screen and projection system provided Low with exhibition conditions in which a viewer's field of vision could be entirely filled by the projection. However, Low was never interested in hiding the artifice of the 3D experience, only with the failure of its immersive consistency. *Transitions 3D* is as much about the formal elements of film—of machines, light, and movement—as it is about the shifting horizons of human knowledge and technological progress. Consistent with Acland's observation that the materiality of the IMAX image is its primary content[10], Low foregrounded the technological accomplishment of IMAX 3D against the evolution of the techno-cultures he documented.[11] A teddy bear just out of reach, a looming tanker, a fencing foil between the eyes, are theatrical provocations to remind the audiences of *Transitions 3D* that they are immersed in the ultimate cinema technology.

Low's cinema brings aesthetic form to the role of technologies in the destruction of cultures, calling to mind Innis' thesis on the tensions between technology and empire.[12] Innis theorized that each media innovation introduces corresponding audience effects by its mode of delivery and shaping

of content, giving rise to new knowledge and new knowledge controls. Innis argued that communication technologies oscillate in their efficacy toward the competing objectives of spatial governance and temporal duration. He maintained that the progressive ratcheting of technological innovation leads to cultural instability as these innovations typically introduce conflicting differences in the practices of material and social life between the center and margins of an empire. There is an acknowledged determinist orientation of Innis' thesis[13], yet he relativizes technology as one sphere of determination in an encompassing synthesis that resolves theories of culture, technology, and state. Thus, technological systems are interdependent on systems of knowledge and governance, and, in total, the stability of this synthesis hinges upon the balance of cultural value invested in spatial governance and temporal duration.

In Innis' view the predominant technologies of North American culture, communication, and transportation, are biased toward spatial governance at the expense temporal duration.[14] The transportation and communication technologies, referenced in the Expo 86 themes and formalized in *Transitions 3D*, have played a vital role in the making of Canadian culture due to the relatively small size of the Canadian population and its sparse distribution across the vast North American continent. As Innis understood them, transportation and communication technologies are cultural technologies that either define and conduct the renewal of social space over time, or when left unchecked, supervene in its demise. Innis regarded the cinema as a medium particularly well adapted to the inherent cultural instability of North America, deriving its vitality from sites of movement and difference. Like news media, the cinema has found its subject matter in instability and excitation.[15] Further, the cinema has historically manifested a cyclical agitation about its own cultural obsolescence as a mass media.[16] As such, the cinema contributes to an atemporal culture, what Innis called "present-mindedness."[17] The initial bias of cinematic and televisual media was toward spatial governance, centralizing, and as mass media, generalizing and sensationalist. Yet the present-minded bias of these media is ultimately pressed to service the temporal exigencies of planning and bureaucracy, especially in the contemporary quest for continued economic growth and technological innovation in a globalized marketplace.

Following Innis, one is tempted to make the observation that IMAX 3D provides a new visual knowledge media, yet one whose elaborate and costly conditions of production and exhibition demand the requisite hooks for mass appeal, thus shaping both its content and audiences.[18] The occasion of *Transitions 3D*, as an industrially sponsored and state sanctioned cultural communiqué for the world stage, would suggest that the necessity of portraying a balance between technological succession and cultural duration was not lost upon Low and the NFB. However, the immediacy of IMAX 3D, the total cinema as reconstruction of reality, for better or worse, unwittingly fulfills Innis's assessment of the orientation of contemporary culture to perishable and instantaneous communications.[19]

In this critical reflection on the moment of the inauguration of IMAX 3D, Pattison's thoughts on the implicit limits to expression are salient: "Whatever we may think and scheme, as soon as we seek to produce our thoughts or schemes to our fellow-men, we are involved in the same necessities of compromise, the same grooves of motion, the same liabilities to failure or half-measures, as we are in life and action."[20] IMAX 3D audiences are rewarded for queue-filling and the higher costs of admission with a theme-park diversion and the chance to add another edifying institutional attendance to their cultural résumés. The IMAX audience finds its place on a continuum of public aspirations to higher education, a democratization of knowledge that has tended to assert, alongside the primacy of vision, the centrality of a modern universal laity in the ongoing renewal of an ordered world. Other theorists have developed this critical perspective: of the modern museum and world expos[21], and of IMAX cinema.[22] Acland regards the *edu-tainment* associations of IMAX cinema as a sign of the postmodern collapse of high and low culture, conflating consumption, spectatorship, and culture. As Acland observes, "Drawing upon the particularities of nineteenth-century bourgeois perception IMAX continues to insist upon spectatorial primacy as a form of knowledge."[23] These risks haunt *Transitions 3D*, where the spectacular physical immediacy of the IMAX stereoscopic image and the atemporal and universalist conceits of the modernist world exposition[24] are harnessed to a historical narrative that unites the progress of cinematic technologies with the technological destiny of its audiences.

Conclusions

Transitions 3D is a bookend to Low's *Fogo Island Project*, which sought the possibility of social renewal via advancements in the portability of the cinematic apparatus and the conflation of the films' audiences and subjects. The mobilization of a remote community through participatory documentary cinema is a logical compliment to the envelopment of the Expo 86 audiences in the cinematic apparatus of IMAX 3D. Low historically situates the moment of exhibition by imagining *Transition*'s audience as the present day beneficiaries of a universal technological destiny, an imagination accomplished in part by reflexive reminders of the artifice of immersive 3D: a broken egg that does not land, a fencing foil that does not wound. These conservative gestures are formalized in the novelty of the synthetic stereoscopic space of *Transitions 3D* and its monumental venue on the Vancouver waterfront. What concerned Low was the resolution of the "here" of the Expo audience, as witness to a spectacular just-invented immersive cinema, and the "there" of an idealized modernist Canadian historical identity, one that is to be renewed, rather than eclipsed, by successive technological regimes.

NOTES

1 Joseph Polchinski, *String Theory Vol. I: An Introduction to the Bosonic String* (New York: Cambridge University Press, 1998).

2 Janine Marchessault and David Harris Smith, *Personal Interview with Colin Low* (Montreal, QC. 16 August, 2010).

3 André Bazin, *What is Cinema?* (Berkeley: University of California Press, 2004), 235.

4 Ibid.

5 Jonathan Crary, "Techniques of the Observer," *October* 45 (Summer 1988): 3-35, p. 3.

6 "To help Canadians in all parts of Canada to understand the ways of living and the problems of Canadians in other parts" and film technology innovation "to be a part of the international film scene; to be a leader in film technology, research and development and professional training" (NFB mandates 1938 and 1980).

7 "The film that announced the 'immersive'" era of stereoscopic cinema and the giant screen was *Transitions*, a 1986 IMAX 3-D film produced by Colin Low for Vancouver Expo." Ray Zone. *Stereoscopic Cinema and the Origins of 3-D Film, 1838-1952* (Lexington: University of Kentucky Press, 2007), 3.

8 Richard Weinberg, "Computer Animation in IMAX/OMINMAX Films," *The Big Frame*. 5.4 (Winter 1988): 7.

9 With the exception of the concert movie *U2 3D* (2008) the top grossing IMAX 3D films are about the discovery of nature, technology, and history: *Space Station 3D* (2002), *Deep Sea 3D* (2006), *NASCAR 3D: The IMAX Experience* (2004), *Hubble 3D* (2010), *Wild Safari 3D*, *Cyberworld 3D* (2000), *Sharks 3D* (2005), *Dolphins and Whales Tribes of the Ocean 3D* (2008), *Encounter in the 3rd Dimension* (1999), and *Mark Twain's America 3D* (1998).

10 Charles R. Acland, "IMAX in Canadian Cinema: Geographic Transformation and Discourses of Nationhood," *Studies in Cultures, Organizations and Societies* 3 (1997): 289-305.

11 Langdon (2012) summarizes this tendency in his writing on IMAX founder Roman Kroitor, *Shivers Down Your Spine: Cinema, Museums, and the Immersive View* (New York, NY: Columbia University Press). "This reflexive tendency is embodied in the technologies he has invented. As many have noted, a large part of the IMAX experience involves a concerted foregrounding and celebration of the technology and the ways in which it distinguishes itself from traditional cinema" (Graeme H. Langdon, "The Info-Immersive Modalities of Film Documentarian and Inventor Roman Kroitor." (*Master of Information Thesis*, Toronto: Faculty of Information, University of Toronto, 2012), 15.

12 "…the character of the medium of communication tends to create a bias in civilization favourable to an overemphasis on the time concept or on the space concept and that only at rare intervals are the biases off set by the influence of another medium and stability achieved" Harold Innis. *A Plea for Time, First Edition* (Fredericton: University of New Brunswick, 1950), 7.

13 See Alexander J. Watson, "Introduction to the Second Edition," In Harold A. Innis, *The Bias of Communication* (Toronto: University of Toronto Press, 2008).

14 Innis, *A Plea for Time* .

15 "News and the cinema complemented each other in the emphasis on instability" (Innis, *A Plea for Time*, 9).

16 For example: "As always, we await the unknowable future, but I will make a prediction: It is my expectation that the stereoscopic medium will help re-invent the cinema. My hope is that this is not just a renaissance of the stereoscopic cinema, but also a renaissance of the cinema." (Zone, 523).

17 Innis, *A Plea for Time*, 3, 7, 14.

18 "Technologies of visualization are a structured relation between the human senses and knowledge production, fashioned by and operating within systems of social and institutional relations; they make discursive powers themselves visible, and in this way provide access to historiographic claims about what it meant to look with modern eyes." (Charles R. Acland, "IMAX Technology and the Tourist Gaze," *Cultural Studies* 12. 3 (1998): 434.

19 Innis, *A Plea for Time*.

20 Mark Pattison, *Isaac Casaubon (1559-1614)* (London: Oxford, 1875), 383. Quoted in Innis, *The Bias of Communication*.

21 For example: Tony Bennett, "The Political Rationality of the Museum," *Continuum*, 3. 1 (1990): 35-55; "The Shaping of Things to Come: Expo '88,'" *Cultural Studies* 5.1 (1991): 30-51. "In these respects, expositions have offered not merely technologies whereby the visitor might engage in a modernization of the self; they have also functioned as civilizing technologies precisely to the degree that, in including their publics among their exhibits, they have provided a context in which a citizenry might display to itself, in the form of a pleasurable practice, those codes of public civility to which it has become habituated" (ibid., 46).

22 For example: Charles R. Acland, "Shadows on the Landscape: Notes Toward an Anatomy of IMAX," *Point of View* 27. 8 (1995); Acland, "IMAX in Canadian Cinema"; Acland, "IMAX Technology."

23 Acland, "IMAX Technology," 434.

24 "[E]xpositions tick to the international time of modernity itself. They mark the passage of progress, a time without frontiers, while the inventories they organize are, at least ideally, ones which mark the achievements of the nationally undifferentiated subject of humanity" (Bennett, *Shaping of Things*, 30).

ROBERT S. ALLISON, LAURIE M. WILCOX AND ALI KAZIMI

PERCEPTUAL ARTEFACTS, SUSPENSION OF DISBELIEF, AND REALISM IN STEREOSCOPIC 3D FILM

IN THE EARLY DAYS of 3D film there was considerable resistance to the medium among many in the industry. Spottiswoode and Spottiswoode[1] attribute this to their belief that many of the established critics and directors felt that stereoscopic film was an intrusion of technology and science on the arts. Since artists did not initiate it, the 3D medium was considered a negative influence for it made artists change their approach to fit the technology. This attitude continues today, as some film critics and filmmakers argue that the use of S3D is merely a trick or distraction that constrains the filmmaker and is not integral to the art of storytelling. Of course this view is not held by all, and there are many in the film industry who would agree with Murray Lerner who argues that 3D is not just an enhancement to 2D but a rich and distinct art form.[2] The attraction to and aesthetics of S3D film are inherently complex topics. Here we discuss some of the factors that keep audiences coming to 3D productions and the ways in which these can be incorporated into the syntax and grammar of cinema.

Historical and Perceptual Context for S3D Film

Binocular viewing adds information to the viewer's moment-to-moment sensory impression of the world around them. This (combined with dynamic changes when the viewer or objects in the scene move) helps to disambiguate the 2D images formed on the retina. A 2D photograph or retinal image is inherently ambiguous as it is a 2D projection of a 3D world. However, assumptions about the structure of the world enable the use of pictorial cues that artists have used to portray the "missing" depth for centuries: linear perspective, relative size, occlusion, atmospheric effects, and so on. Our ability to interpret photographs and paintings attests to the utility of these pictorial cues and is the perceptual basis for television, cinema, and still photography. Nevertheless, the monocular image is ambiguous and prone to erroneous interpretation and illusion.

This ambiguity can be greatly reduced by including a second view of the scene taken from a different vantage point that constrains the possible interpretations. That two eyes are important for

depth perception was known in ancient times. However, the basis of this link was not understood until the celebrated Victorian scientist, Charles Wheatstone, invented the stereoscope in the 1830s. His invention clearly demonstrated that it is the differences or *binocular disparities* between the two eye's images that form the basis of the enhanced binocular depth perception. Noting the vividness and solidity of the 3D forms produced, Wheatstone called depth from binocular disparity *stereopsis* or "solid sight." Wheatstone's invention and its subsequent modification by Holmes, Brewster, and others triggered one of the first media crazes of the modern era. Combined with the new technology of photography, a market for stereo photographs grew rapidly. Stereoscopes were common in Victorian parlours and served as sources of entertainment and conversation.

The stereoscope's dominance as an entertainment device was eventually superseded by new technologies such as motion pictures. Stereoscopic presentation was a goal of many pioneers of cinema as it was for the early still photographers. Even Edison patented a stereoscopic motion picture device, known as the kinetoscope. Technically, stereoscopic cinema was demanding since the alignment, matching, and synchronization of two film sequences had to be maintained through filming, editing, printing, and projection. Thus, widespread distribution and commercial success of stereoscopic 3D film did not occur until the S3D boom of the 1950s. Although there were many reasons for the rapid decline in the number and box office returns of S3D films after the peak in 1953-1954, some of the most important are related to our current topic of visual perception. While technically excellent S3D could be produced with 1950s techniques, delivering this content to the viewers' eyes required skill and meticulous care at all stages. This was difficult to reliably achieve with the analog technologies of the time so that misalignment and mismatch led to irregular user experiences and the classical problems of S3D: fatigue, eyestrain, discomfort, poor image quality, double vision, and loss of the stereoscopic depth effect. Ironically, even with the improved precision and repeatability of digital cinema, irregular quality, notably substandard image brightness and poor 2D to 3D conversions, once again impact the viewer experience and threaten the viability of S3D film as a commercially successful art form.

What Does Stereopsis Bring to the Perceptual Experience of Film?

We believe that it is important for filmmakers and film theorists to understand the impact of stereopsis on the sensory and perceptual appreciation of film (and of course on the aesthetic and narrative aspects, but we will only consider a few select examples in this essay). The most obvious contribution made by stereopsis is the qualia that it enables or enhances: the third dimension. This not to deny that 2D images do not provide depth impressions (see the discussion of pictorial and motion cues above) but rather the implication is that stereoscopic viewing makes these impressions more concrete or quantifiable. In line with the dimensionalization view of S3D, stereographers—specialists on S3D film crews who focus on stereoscopic production values—often concentrate on the range of disparity in a given scene. This is pragmatic as these parameters are highly relevant to avoiding the unwanted side effects of S3D discussed in later sections. While there is no question that stereopsis improves the ability to precisely judge depth we argue that the simple addition of depth is not the most relevant aspect of stereopsis for S3D film. Instead, the perceptual experience is strongly dependent on less quantifiable factors. Going back to the etymological origins of stereopsis as solid sight gives insight into what impressed Wheatstone. Stereopsis lends a sense of solidity and volume to objects and of space and separation between them. It helps to define surfaces and their edges and to highlight surface properties such as sheen and texture. Here we will outline how this enrichment of spatial perception supports various artistic goals such as realism, spectacle, spatial consistency across shots, and intimacy. Stereopsis has also been shown to be important for perceiving the layout of the world about us and guiding our motion through it. Thus, we will also argue for a role in supporting artistic goals such as immersion, embodiment, and spatial context.

FIG. 1 A frontal view of a mirror rig shows the lens of the camera which films through the partial (beam splitter) mirror, as well as the reflection of the lens of the second camera that would record the image reflected off it. The distance between the two lenses is the inter-axial distance (IA). If there was no horizontal separation and lenses were vertically aligned as well, only one lens would be seen.

FIG. 2 Ali Kazimi, Director, working with Director of Photography Rozette Ghadery who is operating a stereoscopic 3D mirror (beam splitter) rig during the filming of the short drama *Hazardous*.

Stereoscopic presentation also brings perceptual challenges and artefacts to the experience of a film. To the casual reader this might be surprising as stereoscopic vision is our natural way of viewing the world but the simulation of a stereoscopic view of the world is only rarely geometrically perfect. As discussed below, geometrically "correct" viewing conditions can only be met for one individual positioned at a particular location in a theatre—all other observers will experience a range of geometric distortions. To a point, audiences are remarkably tolerant of such distortions. A potentially more serious challenge to the S3D experience is distortion due to the choice of rig parameters or due to variation in the size of the screen. Stereoscopic rigs consist of two separated cameras—one offset to the right and one to the left—to provide the right and left eye views, respectively. Key parameters include lens selection and the amount of camera separation (FIG. 1). The screen size variation is particularly problematic in our era of IMAX screens and handheld displays. Filmmakers must make choices regarding stereoscopic effects that can cause perceptual distortions and artefacts.[3] The use of a large camera separation, for instance, can induce miniaturization effects where objects and people appear toy-like. Other artefacts may make the world seem artificially large (gigantism) or people appear as cardboard cut-outs. With careful consideration most of these distortions can be minimized, accommodated, or as described below used to enhance the intended ambiance (FIG. 2).

Other Worlds: Immersion and Looking Through the Window

S3D can support a variety of experiences and one of the most intriguing aspects of the media is its ability to present a compelling 3D environment. Our experience of this environment varies depending on the technology and artistic intent—we can be drawn in and immersed in it, view it as outsider, view a world beyond and out of reach through a window, draw parts of that world toward us or hold it in our hand on a mobile device.

The window is a common and compelling metaphor for stereoscopic film. It is useful artistically and as a pragmatic response to perceptual and geometric constraints. In conventional cinema, the edges of the screen define the area where stereoscopic (or 2D) imagery can be presented. Obviously, objects located outside the field of view of the image above or below the screen cannot be represented in the image. These can be troubling or ignored depending on the degree to which they attract attention. Objects traversing or extending across the space from in-screen to beyond-screen (we will reserve the terms off-screen and on-screen for depth relative to the screen) may be more disturbing, particularly if they extend beyond the sides of the screen.

Why might this be so? To the left and right of the screen the situation is more complex as objects can be visible to one eye but not the other. Such monocularly visible objects are powerful stimuli for depth perception.[4] In the natural world monocular features commonly occur at the edges of objects where one eye can see slightly more of the background (or of the object itself) than the other. In these situations the monocular information is used along with the disparity information to interpret the depth in the scene.

Stereoscopic presentation introduces a perceptual asymmetry in what can be represented in front of or beyond the screen. Consider an object that is placed beyond the screen so it is visible to one eye but not the other (FIG. 3). This arrangement is entirely consistent with the view in the latter eye being blocked by the opaque edge of the screen (and wall or curtain beyond). Thus, the object appears to the viewer as it would through a window, and the edges of the screen define a window into the world beyond. This is a natural and comfortable situation experienced in everyday life anytime we look out a window. An object presented in the monocular zone in front of the screen however has no such natural interpretation. Under rare circumstances the object could be camouflaged against the surround of the screen in one eye but typically is inconsistent with the scene. Such discrepancy can draw attention and be disturbing, can result in the loss of the depth impression or cause features to be "pinned" to edges of the screen. While this might conceivably be used for artistic purposes it is generally to be avoided.

Given these factors, stereographers often embrace the window defined by the screen and use it to effect their purposes. This is often referred to as viewing through the "proscenium arch" in an allusion to the window around the scene and performers on a proscenium stage. In some recent films such as *Up* the action deliberately takes place nearly exclusively through the window of the screen. Bob Whitehill, stereoscopic supervisor at Pixar on the film explains "… we want stereo 3D to be a window into a new world, not draw attention to itself. People go to the movies to get lost in the movie."[5] Many other movies rely on the window metaphor with occasional out-of-screen effects for dramatic purposes. In this paradigm, out-of-screen objects that cross the screen edge boundaries are known as stereo window violations. They are usually avoided by controlling the camera parameters mapping real world depth to screen depth in order to push possible window violations back beyond the screen plane.

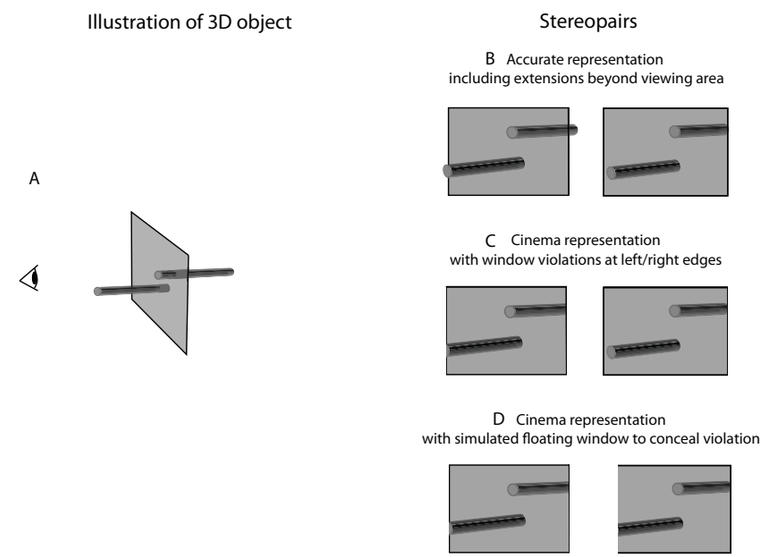

FIG. 3. Monocular occlusion and the asymmetry between out-of-screen and into-screen screen stimuli. On the left is a 2D representation of the stimulus, a pair of rods that extend beyond the borders of the screen either behind and in-to-screen (top rod) or in front and out-of-screen (bottom rod). The stereopairs to the right show how the objects should look naturally (B), where the occlusions occur when projected on the theatre screen (C), and how floating windows can be used to reduce the negative effects of window violations (D). In all cases, when crossing the eyes to fuse the stereograms (http://www.starosta.com/3dshowcase/ihelp.html), the upper rod extends into the screen and the lower bar extends in front. Monocular occlusions occur in both cases of window violation (C), but as outlined in the text, are more disturbing in the case of the protruding bar.

Another classic technique used to cope with window violations is known the "floating window." In this technique part of the image on the edge of the screen is masked. The masking is given disparity to set it off in front of the screen forming a virtual window floating in front of the screen. If this window floats in front of the potential stereo window violation the perceptual inconsistency is removed, as the window will naturally occlude the object. The technique can be introduced on one side of the image only, leading to a slanted floating window (although the screen is usually too wide for this to be noticeable). The floating window is an effective way to manage window violations but will introduce changes in the projected window size. Further, filmmakers using this technique need to be aware that their careful planning can be undone when it is exhibited—theatres have reportedly magnified the image or masked the sides of the screen with curtain to eliminate the "incorrect" changes in image size over the course of the film.

Bringing objects through the window frame allows the filmmaker to draw the action into the theatre space. This is then analogous to "breaking the fourth wall" in a proscenium theatre when the actor intrudes into the audience space (or directly addresses them). This space has been used in the past for spectacle and gags but can also be used more subtly to draw parts of the scene toward the viewer. A deep and rich space centered on the screen has been used to promote a sense of immersion, albeit not in the enveloping and interactive sense of virtual reality. Bringing action into

very near space is sometimes used in theme park films and in games. Perceptually this has the advantage of operating where stereopsis is most acute and in the range where the role of the vergence and stereopsis in hand movements and direct interaction with objects in the environment can be leveraged. In long-format film however such effects can only be used sparingly due to the unwanted side effects of visual discomfort.[6]

Stereopsis provides important information about the layout of the world and our motion through it. Thus it is important for situating ourselves in the world and making spatial sense of our surroundings. One of the most compelling aspects of S3D film is its ability to create a vivid sense of immersion such that the viewer feels as if they are part of the scene or story. An excellent example of the use of S3D to put the audience in a location occurs in the IMAX film Space Station.[7] The director of photography James Neihouse points out that the 3D gives the audience the sense that they are present inside the station with the astronauts in a way that 2D could not.[8]

Immersion in the enveloping, surrounding sense of virtual reality is limited in the conventional cinema. The stereoscopic window provides a window into a rich 3D world but also separates the viewer from it. In conventional theatres, immersion has been fostered by wide field displays that fill large parts of the visual field. Part of the decline of S3D films in the 1950s was due to the rise of competing technologies such as CinemaScope and Cinerama, which promised immersion through wide field of view rather than stereoscopic depth.

There is of course no reason that immersion cannot be fostered by both enveloping displays and S3D. IMAX pioneered the use of large format 3D and produced films that remain S3D classics and are renowned for their immersive quality. In addition to their orthostereoscopic approach outlined below, the sense of being in the scene is significantly augmented by the size of the IMAX theatre screen (22 x 16.1m). From the majority of locations in the theatre the edges of a screen this size are well outside the high-resolution region of the visual system when a viewer looks at the centre of the screen. This loss of a cinema window combined with the use of negative parallax (in front of screen) reduces barriers to immersion and enhances the feeling of being there. Future unconventional cinema, theme park rides and special purpose exhibits can heighten the sense of immersion by enveloping or wrapping the display around the viewing in CAVEs or wide-field displays, and by adding other sensory information such as motion and touch.

It should be noted that immersion does not necessarily imply realism or engagement. Some S3D experiences can be akin to watching a live stage show—realistic and engaging but with separation of the audience as outside observers rather than immersion. Hitchcock's 1954 S3D classic, *Dial M for Murder*[9], is a prime example of an engaging and compelling story but viewed as outside observer. The S3D effect is much the same as watching a stage play which suits the films' origins (being adapted from a West End stage play). The ability to support the intimacy and theatricality of live entertainment may explain why the medium is popular for dance and concert films. In the acclaimed *U2 3D*[10] production, both aspects of S3D are used to great effect, so much so that reviewers talk about coming away from viewing the film feeling as though they have seen the group live. One reporter writes that "By the end of *U2 3D*, I truly felt like I had attended a U2 concert, with added the privilege of having communed with the music in a way that an ordinary concertgoer never could."[11]

While powerful and effective, the sense of immersion in S3D film can be tenuous regardless of the format or screen size. As described above, content scaling can produce unwanted distortions that not only distract the audience, but in doing so break the sense of immersion in the scene. For example, a common consequence of presentation on a smaller than intended display is flattening of objects and people so that they appear planar, but at separate locations in depth. Such effects can draw attention to the mediated nature of the film, and disturb immersion. Technological issues can also be responsible for reduced immersion in S3D. Crosstalk is one important issue and refers to the situation where part of the left eye image is visible to the right eye (and vice versa). The presence of crosstalk as low as 4% has been shown to degrade stereoscopic depth percepts[12] and cause discomfort. Lack of control over projection venues is another common concern for the S3D production industry, particularly with respect to screen brightness.[13] Under optimal conditions, the amount of light that reaches the audience is a fraction of that available in 2D cinemas (approximately 33%) primarily due to the use of polarized[14] filters and eyewear to separately present the two eye's images. Unfortunately, theatres may not ensure optimal luminance levels; lamps will last longer if not used at maximum output levels and consume less power. In addition, lamps are used as long as possible, even though brightness falls off as projector lamps reach the end of their anticipated lifetime. Low image brightness can significantly affect the both the sense of immersion and enjoyment of a S3D film. With extreme luminance reduction colours will appear muddy (less saturated) and image contrast will be degraded, resulting in a concurrent loss of stereoscopic depth. Finally, even if immersion is compelling it can have unwanted side effects. Virtual reality research has suggested that increased immersion may be tied to motion sickness symptoms and a recent study suggests this may also be true for immersive cinema as well.[15]

Reality, Fantasy, and Abstraction

One of the defining and exciting characteristics of S3D is its potential to increase the fidelity of the cinematic world presented to the viewer. The enhanced realism through natural binocular perception and improved depth representation is often touted as a major factor in support of adopting S3D. It helps explain the popularity of the format for virtual reality, simulations, documentary, and theme park films. On the other hand, in many respects modern narrative cinema is not very realistic and relies on convention, film language, and expectation (see below) to define the experience and story telling rather than a faithful, high-fidelity rendition of the events and scenes. How the potential for improved realism and fidelity can be effectively integrated with the conventions and language of film has been a major concern for stereoscopic filmmakers. S3D techniques might allow for simplification of these conventions as more spatial understanding might be implicit in this media rather than explicit through film grammar. Although not yet studied, the capability of S3D to support spatial understanding and orientation might be expected to provide a more coherent sense of the layout in the scene and hence of continuity across cuts and changes in vantage point. It is likely that S3D will call for its own unique conventions built upon but different from existing 2D language.

One of the long standing approaches to achieving realism in 3D film is to try to mimic the geometry of the human visual system during filming and to ensure that the viewing distance and angle correspond to the placement of the cameras relative to the scene. This is the approach taken in virtual reality and other high-fidelity stereoscopic graphics displays such as aircraft simulations and is referred to as *orthostereopsis*. The resulting projected image will be a faithful reproduction of the original scene, including depth relationships and object size/shape. Perfect orthostereopsis is not

feasible for cinema, because it can only be created for a single location in the theatre, for individuals with exactly the same interocular separation as the separation of the dual cameras, and it puts severe constraints on filming conditions (e.g., distance of the cameras from scene).

Many IMAX films, especially those involving S3D pioneer Hugh Murray, have used a philosophy of approximate orthostereopsis. The wide field of view allows the use of lenses with a perspective similar to the audience's view, parallel cameras and effective disparity appropriate for the eye spacing of the average viewer. The intent is a human scale perspective on the world presented to the audience.[16] When the scale is natural it helps to support the sense of immersion inherent in the IMAX format. Such a goal is reminiscent of the aims of immersive virtual reality in promoting presence. Presence is defined as a state of being there—the sense that one is located in and engaging with the virtual world and that the events in that virtual world are actually happening despite *knowing* this is not the case. Given that presence is fostered by natural and consistent simulation, it is related to the suspension of disbelief believed to be critical to narrative cinema.

However, in movies, the suspension of disbelief also depends on the viewers' willingness to engage with the story. The success of this endeavour then relies on their readiness to discount the knowledge that they are witnessing a mediated experience and become engaged and engrossed in the story. Such suspension of disbelief is important for the perceptual experience of watching a film in that it drives and supports the storytelling. As a consequence, attempts at realism can interfere with suspension of disbelief and narrative in a number of ways related to perception.

First, as we have discussed above, S3D media are prone to artefacts and a truly orthostereoscopic experience is not feasible. The 2D cinema is not a high-fidelity representation of reality either but we have grown accustomed to the conventions of cinema. Therefore, despite the artificiality of cuts, scene changes, time distortions, and so on we seamlessly accept these as part of the 2D storytelling process. These mechanisms are essential for effective storytelling but their artifice might become more apparent in the heightened reality of a high-fidelity stereoscopic film.

Second, artefacts and limitations might become more troubling as the representation approaches reality. This would be a manifestation of the well-known phenomenon of the "uncanny valley" introduced by Mori[17] to describe the strange disturbing sensation experienced as an artificial experience (in his case humanoid robots) approaches but falls short of reality.

Third, the S3D experience can call attention to itself rather than the narrative. For example, the novelty of the experience can detract from the narrative. For instance, a viewer may visually explore a rich and complex stereoscopic scene or attempt to reach and touch an object in near space. Spectacular effects can sometimes interfere with the suspension of disbelief and draw attention to the movie as a mediated event. Rob Engle notes this can often occur with out-of-screen effects (negative parallax):

> When you're talking about narrative cinema, anytime you use overt negative parallax, your have the potential for taking the audience out of the narrative. You're reminding them that they're watching a movie. And most filmmakers don't want to do that.[18]

He argues that even in horror and comedy, where such effects are deliberately and effectively used, the filmmakers needs to draw the audience back into the narrative afterwards.

Ray Zone repeatedly argues, in his book on the origins of stereoscopic cinema, that realism and spectacle were, on one hand, the driving force that fuelled interest in stereoscopic media but, on the other hand, also limited it to novelty status due to perceived impact on narrative and suspension of disbelief. In one passage he sums up both the problem and the potential solution:

> The utopian dream of stereoscopic images in cinema, then, was a double-edged sword. The heightened realism it presented was alluring, but it had to be justified in the context of narrative.[19]

Reality is not relevant when the scene is fantastic or not on human scale. As discussed above, S3D distortions such as miniaturization and gigantism are normally artefacts to be avoided. However, these can be used for effect to produce the impression of doll worlds or larger than life scale. Stereo 3D media have been effectively used to show a large range of scales from the impressive vistas used in IMAX documentaries to the microscopic world of insects. In the popular large format film *Bugs!*[20], the tiny performers are filmed with minute camera separations of approximately one third of an inch, and then displayed on an enormous screen. The 2D larger-than life effects combine with the stereoscopic effects to create a compelling intimacy on a large scale. Sean Phillips the director of photography of the film, notes that while the creatures would still appear larger than life in 2D, that venue would provide a less intimate experience.[21]

One of the enormous advantages of 3D filmmaking is the ability to create impossible scenarios where, for instance, the amount of depth varies from scene to scene. In a number of films the camera separation is changed within a single shot, as the cameras move from a distant vista to an interior scene. For instance, Murray describes changing the separation between cameras from 100 feet to 2.5 inches in a single shot in *Cyberworld*.[22] Transitions of this type may be effectively invisible to the viewer, but maintain the sense of 3D space in the scene that would be lost if a fixed separation were used.

As mentioned previously, changing camera separation over a large range can create distortions of size and shape. While these distortions are typically avoided by filmmakers, they can also be exploited to create the sense of the bizarre and unnatural. Murray Lerner used this technique in the Disney theme park show, *Magic Journeys*.[23] He shot separate components of a scene using widely different camera separations, and then composited them to generate toy clowns, and a boy dancing on the rim of a magician's hat.

On similar lines, in some cases it is possible to intersperse 2D footage within 3D film. If done effectively, the audience is unaware of the absence of stereopsis. This can be achieved by only using this technique for distant landscape shots, where naturally the depth from stereopsis will be minimal, or by combining multiple cues to depth within the shot, to lessen the impact. In *Avatar*[24], James Cameron employs a conservative range of depths overall, and intersperses shots with no stereoscopic depth throughout the film.[25] Occasionally, in some films, 2D content is presented with a disparity offset relative to the screen so that it appears behind the screen. Such "poor man's" stereo is surprisingly effective especially for brief shots. We believe that the offset from the screen breaks the expectation that the shot is 2D and promotes the use of the monocular depth cues in the image.

The combination of 2D and 3D effects can also be used to create spectacular effects. In his short 1996 tribute to Hitchcock's *The Birds 3D*[26], Lerner leads the audience to think they are going to see

old film footage, and suddenly (in 3D) the screen rips, and birds fly out at the audience. For an instant the viewer feels that they are being attacked and so, in a remarkable twist, Lerner is able to convey the sense of terror so prized by Hitchcock himself.

As well as intermixing 2D and 3D shots, conceivably 2D and 3D content could be mixed within a shot for dramatic effect. Similar techniques have been with other parameters, for example like colour and black and white content was mixed to aid the narrative in *Pleasantville*[27] or even how cartoon animation and live action were integrated in *Who Framed Roger Rabbit?*[28]. Depending on the choice of content and stereoscopic shooting parameters the dimensional discrepancy could be obvious and could draw attention or be unobtrusive. As far as we know, such mixed shots have not been used in film.

Spectacle, Emotion, and Intimacy

Stereoscopic 3D can have a profound effect on the viewer's visual experience and, as a result, on their understanding and response to the film. S3D can be used to impress and fascinate or to evoke engagement and emotional responses.

The best-known but perhaps crudest use is the ability to present spectacle to the viewer. Spectacular effects based on large disparity such as impressively deep scenes and large out-of-screen effects ("spear poking") have been a mainstay of the S3D cinema since the earliest days. These effects are especially common in the comedy and horror genres where they are used to impress, surprise, or titillate. In other genres such effects are less common since, as discussed above, they may draw attention to the medium itself. This is not to say that spectacular effects are not judiciously used; for example, in the famous out-of-screen effect in the murder scene in *Dial M for Murder*[29] and in the aftermath of the death of the villain, Voldemort, in *Harry Potter and the Deathly Hallows: Part 2.*[30]

In contrast, the use of S3D to influence emotion is usually more subtle. One of the most exciting and open issues in S3D filmmaking is the relation between stereoscopic depth and emotive impact. Filmmakers are starting to experiment and explore these aspects. Prior to shooting, control of the key stereo rig parameters is usually carefully planned by the stereographer for comfort, visual impact and dramatic effect. Often, particularly in animation, a depth script is produced that lays out the depth range on a shot by shot basis to ensure appropriate scale and a match to the desired emotional response. For example, in *Up*[31] Bob Whitehall points out that they

> …created a graph of how we would use stereo. In the beginning when the character is happy there is a deep space, then it flattens out when he loses his wife and then it slowly increases throughout the film. Just like the lack of color in dark scenes make the vibrant images stand out more, so do the flat scenes enhance the scenes where you are more aggressive with the 3D.[32]

Similarly, in the film, *Coraline*[33], the depth is increased in her "other world" along with colour saturation to enhance the distinction between the two places. In *Beowulf*, the depth was subtly changed to reflect the power relations among the characters and was slightly exaggerated to highlight the unreality of dream sequences.[34]

The spatial and emotional aspects of S3D can combine to promote a sense of intimacy with the characters. This intimacy is related but distinct from the sense of immersion. As opposed to (or possibly as well as) being enveloped in an immersive world, the viewer is drawn close to the subject and can engage with them in a more personal way. Some of the most compelling examples are in the portraits in Wim Wenders' *Pina*[35], close-up S3D shots of the dancers in the film looking into the camera with voice overs of their thoughts. The effect is very powerful and best expressed by the director himself:

> There was "volume." Roundness, no longer a flat surface, like in any close-up I had ever seen before, but a true "presence." There was the aura that you only see when you are confronting somebody and really recognize him, or her. When you can reach out and touch, not only with your hands. You can also touch somebody with your eyes, when he (or she) is there. When there is a you and a me. I and the other. That is a situation we only know from life, not from cinema.[36]

An often-overlooked aspect of the intimacy that is afforded by the S3D medium is the viewer's social/interpersonal reaction to the images on the screen. It is well known that in many societies there are firmly established norms for acceptable distances between individuals, particularly strangers. As Hall famously documented in 1963[37], interpersonal space can be divided into categories which include an intimate space (0-1ft) and a personal space (1-4ft). Within the intimate space smell, touch and body heat can be experienced, but within the personal space these are typically absent. Many studies have shown that there are strong physiological reactions when a stranger invades one's personal space. We have shown that this negative response (both physiological and psychological) also occurs in response to stereoscopically presented images of individuals at a viewing distance of one metre.[38] Further, these responses were statistically equivalent to our participant's reactions to these people presented "live" under similar conditions. These and other studies suggest that our natural discomfort in response to invasion of personal space has not been re-calibrated for mediated stimuli. As argued by Lombard in 1995[39], humans have not had sufficient exposure to mediated imagery to adapt their social response appropriately. This little-recognized aspect of S3D film could have important consequences; filmmakers could capitalize on the discomfort to enhance feelings of fear or anxiety, alternatively by increasing the apparent distance or space between the audience and the actors, filmmakers could reduce these negative reactions. On the other hand, a positive intention, say in using a close up or beauty shot, may be thwarted by inadvertent violation of the audience's interpersonal space.

While it has a history as long as filmmaking itself, 3D cinema has often been viewed by critics as a fad, a technical trick meant to startle but with no subtly. This view is changing as each stage in the filmmaking process from capture to projection becomes more accessible to artists interested in S3D. The consequences of the rapidly advancing technologies cannot be underestimated as more filmmakers with limited or expansive budgets are able to explore the possibilities of this medium. As they do so, they will develop a new film grammar, one that embraces the perceptual intricacies and vagaries of stereoscopic 3D. From this grammar will emerge 3D films that delight, amaze, and touch audiences in ways that were envisioned by the pioneers of this field. At the same time, audiences will become more 3D literate and their expectations and understanding of the medium will also evolve. Perceptual vision science forms the foundation of this understanding but only provides a substrate on which to build the emotional and narrative context of an enhanced cinema. Good stereo can achieve these goals with care and attention to detail; poor stereo has the potential for

discomfort and unsatisfactory experiences distracting the viewer and taking them away from the story. The complex relation between the perceptual experiences enhanced by S3D and its relation to supporting the narrative and emotional aspects of film is only beginning to be understood and will be an active area of inquiry for years to come.

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LANCE DUERFAHRD

FOR YOUR GLASSES ONLY

The Stewardesses and Sex in Three Dimensions

Porno, finally, is the only genre to demand the third dimension. Remember *The Stewardesses*? Huge breasts spilling out from the screen. Or *Heavy Equipment*? Gay male porno with, well, life itself gushing into the audience's lap.
—John Waters[1]

LONG BEFORE 3D audiences succumbed to the hype of blue figures riding atop multicoloured dragons in *Avatar* (2009), they lined up to see a film as desultory as an extended layover, featuring stewardesses milling around in their uniforms and taking them off for passengers. Alf Silliman's *The Stewardesses* (1969) is a little-studied soft-core porn film, which until *Avatar*, held the box-office record for a 3D production, grossing $26 million.[2] The numbers only partly tell the story of the films' cohesion: both offer us a narrative of the unobtainable. The Na'vi creatures from *Avatar* inhabit a planet with vast deposits of *unobtanium*, valued at $20 million a kilogram. The soft-core pornography of *The Stewardesses*, on the other hand tries to bring us into orbit with a possibly still more valuable unobtanium: the elusive figments of our desire. Tripping on acid, one of the stewardesses gets into bed with a lamp that has a Roman bust as its base. With the lampshade off but with the cord still plugged in, she begins kissing the sculpture and imagines making love to it (FIGS. 1 & 2).

Whereas the mythic qualities of *Avatar* are assumed and commodified by its immersion in 3D technology, *The Stewardesses* shows us this process from the outside: desire stumbles toward myth. In this soft-core version of Pygmalion and Galatea, the sculpture does not successfully metamorphose into a lover but into a mass, a 3D souvenir. It becomes a chunk of mineral, which under the gaze of the fantasy, looks something like *unobtanium*. Covering the bust with kisses, then, the stewardess repeatedly asks, "What have they done to your eyes?" It is a good question. She is on acid. We are on 3D. "What have they done to your eyes?" implies: What does 3D (or "stereoscopic") porn do to our eyes? How does this technology alter our experience of pornography and the film language of pornographic cinema? What does *The Stewardesses*' fusion of pornography and technology tell us about the possibilities and limitations of 3D technology in film?

I. Is 3D Pornography Different from Other 3D Cinema?

3D pornography is less shamefaced about the gratuitousness of its technology than contemporary 3D cinema. Films like *Avatar* diligently sublimate the gimmick status of 3D and seek to make the technology part of the new status quo of film production. By contrast, *The Stewardesses* makes no presumption about the future but sends off a wave of soft-and hard-core 3D movies in the 1970s including *The Capitol Hill Girls* (1977), The *Starlets aka Starlet Club 69* (1977), *Liebe in drei Dimensionen aka Love in 3D* (1973), *The Groove Room aka What the Swedish Butler Saw* aka *Man with a Maid* (1975), *Heavy Equipment* (1977), *Manhole*, (1975) and *Prison Girls* (1972). These films utilize 3D blatantly for the sake of exploitation. Generic attributes of pornographic film can overwhelm the contributions of the technology. The tawdriness of films like *Disco Girls in Hot Skin* reminds us of cinema's origins in the circus and the peep show, rather than in the shop window or engineering lab. Every tussle in contemporary 3D cinema bears the mark of motion capture in which the actor's body becomes the support for a perfected digital image, interfacing with an algorithm that hygenicizes and regulates movement. The fight in the prison showers that opens *Prison Girls* turns into an amorphous tumbleweed of naked bodies with female convicts pulling hair out into the third dimension.

Stereoscopic pornography also counteracts the growing disappearance of the live human figure from the 3D screen. The first wave of 3D cinema in Hollywood, as exemplified in Hitchcock's *Dial M for Murder* (1954), is constructed over artfully murdered bodies. *House of Wax* (1953) rests upon the revelation of corpses concealed within sculptures at an exhibition. Nor do the writhing bodies of porn jibe with the mythic heroes populating contemporary cinema, emblematized in the character of Jake Sully, who gains access to the massive fantasy of *Avatar* by annulling his disability. Digital and 3D technology combine to liquidate the human figure either in the exploration of sensational landscapes (*Wild Ocean*, 2008) and outer spaces (*Prometheus*, 2012), or in depicting the fantastic structures of allegiance, the justice leagues, that dwarf the subject.

From a taxonomical perspective, 3D pornography is a hybrid genre more typically grouped with pornography than with 3D. This is partly the foible of the critic. Though people may want to see sex, *reviewing* it can be awkward, as instanced in the loathsome post-coital question "So…*how was it*?" The idiosyncrasy of arousal collides with the "critical distance" writers maintain from the material. It is difficult to say something insightful about films designed to make audiences shudder (and not from fear). R. M. Hayes' *3-D Movies: a History and Filmography of Stereoscopic Cinema* completely ignores arousal as an effect of cinema (as it is harder to contain), and focus exclusively on the effect of the third dimension. This enables the author to construct a purely technological and linear history of 3D cinema in which pornography, when it appears at all, makes a poor showing.[3] Duly noting that pornography is a deeply coded genre, critics proceed to write only about the code. Lenny Lipton's discussion of *The Stewardesses* in his study *Stereoscopic Cinema* demonstrates the incompatibility between the critic and the pornography filmgoer: "The format design positioned two frames side by side on a single band of 35mm. I suffered severe eyestrain after a few minutes of trying to view the film, although some other patrons seemed to have a better time of it—or maybe they were just more determined to look at the screen."[4] Lipton notes that the other patrons look at the screen with desire that has escalated into "determination," no small feat since the allure of 3D is the fact that nothing remains anchored there. Lipton, by contrast, seems to look around the screen: at the film's technological aspect shorn of any content, at all the other patrons wearing glasses, and at the movie's intake. The author does this possibly to avoid being touched by what he elsewhere calls *The Stewardesses'* "silliness," or that dimension of pornography that remains obtuse to thinking.[5]

FIG. 1 Statue + acid + 3D = Prince Charming. Still from *The Stewardesses*.

FIG. 2 *The Stewardesses*: Staring longingly into missing eyes.

Unlike mainstream film and 2D film technology, the goal of both pornography and 3D is not to replicate or even enhance the world (sex, movement), but to transform it—to take us into a world never before seen or experienced. In his essay on photography from 1859, Charles Baudelaire observes that the only uses of the medium were pornography and costume drama. He reports being at a party in which his friends are "discretely concealing such pictures from a woman of high society," when that woman demands to see them: "No…give them to me. Nothing is too strong for me."[6] This request to see the stash at a cocktail party inaugurates our modern subjectivity based on the capacity to endure shock, and to measure inner strength through the demonstration of one's immunity to images. Baudelaire isolates the society woman's statement because it speaks of images in terms of their narcotic, rather than representative, value. Pornography introduces a wager of escalation into our experience of photographs. In his blurb found on the advertisement of the 3D hard-core film *The Starlets*, Al Goldstein, editor of *Screw* magazine, seems to incorporate reality and subsume reality into the impossible and never-before imagined: "The action is so real I thought I was cheating on my wife."[7] Watching 3D porn is promoted as more than reality and a displacement of real sex. It becomes in itself a moral violation. In other words, in Goldstein's blurb, fidelity to reality is made to lead up to infidelity to one's wife.

II. How Pornography Overlaps with 3D Technology

Stereoscopic technology and pornography successfully convene on account of a mundane truth: the notorious "flatness" of pornographic films. Stereoscopic cinema excels not at providing depth *per se* but at bringing seemingly flat objects closer to us; what "comes out" at the audience resembles not a body with realistic mass but the cardboard advertisements for the film seen in the cinema lobby. In this way, stereoscopic technology ideally renders the stereotypes of porn (in the same way it

FIG. 3 Characters in *The Starlets* demonstrate how best to enjoy 3D cinema.

FIG. 4 *The Starlets*: a climax wearing 3D glasses.

ideally renders the flatness of heroes pulled from the comic book pages in *The Avengers*).

The 3D film also shares a distinct method of presentation with pornography: the demonstration. Every stereoscopic film inevitably returns to the incandescent display of its third dimension. A material history of 3D cinema could be rendered as a stockpile of the objects (their number, texture, velocity, and algorithm) thrown at the camera: an energetic paddleball in *House of Wax*, Grace Kelly's hand in *Dial M for Murder*, a lion in *Bwana Devil*, a sumptuous Viking feast overturned in slow motion in *Thor*. The inevitability of these displays suggests that audiences forget they are watching 3D cinema and need to be forcibly reminded of that fact (frequently the reason they came to the movie). No less ruthlessly, pornography seizes every opportunity to demonstrate sex. Each pornographic film unfolds according to a fate as overbearing as the one found in *King Lear* or *Oedipus Rex*: no plumber, bored housewife, or pizza deliverer escapes the copulatory law. The inevitability of sex is in step with the genre's compulsion to make it visible: the plot, the acting, the actors' bodies, in short everything that cannot be contained in close-ups of industrially functioning genitalia, is merely an obstruction in the porn universe. The sex seems mechanical because the bodies seem only to show, never to give, themselves.

Pornography also seeks to demonstrate its own viability as a medium. It issues working papers to the masturbator by demonstrating how characters are aroused by watching pornographic cinema. The 3D hard-core film *The Starlets* features five actresses trying to succeed in the porn industry. The casting director just happens to be watching 3D porn as the starlet walks in for an audition; the actresses put on the glasses and rehearse at the same time they watch smut. The only people not wearing these glasses are the people in the films they are watching. The audiences within *The Starlets* supply an antidote to images, immortalized in photographs by Weegee and on the cover of the English translation of Guy Debord's *Society of the Spectacle*, of how spectators in the 1950s consumed 3D cinema: unspasmodically and only while fully dressed in formal evening wear. The film aims to assure its spectators that post-orgasmic bliss will not be upstaged by the gimmick of red and blue tinted glasses (FIGS. 3 & 4).

FIG. 5 Shadow of leg projected over three dimensional chair in *The Stewardesses*.

III. How Does 3D Transform the Conventions of 2D Cinema?

The medium of film disappears at the moment of its introduction to audiences. Spectators supposedly reacted to the very first projection of a moving image in 1895 at the Grand Café in Paris as if it were a 3D film. A familiar story describes how, unable to distinguish the image of a train from a real one, audiences watching the Lumière Brothers' *Arrival of a Train* ran from their seats. Film scholars such as Tom Gunning have tried "not to deny this founding myth of the cinema's spectator, but to approach it historically."[8] Whether or not this happened, the myth bears witness to the capacity of the spectator to animate a film—either through gullibility or conviction—beyond the boundaries of the medium. The first spectators got out of the way of something they were anticipating, an expectation that they had devised between them and the screen. This founding myth testifies to the holographic nature of the spectator's desire, which made the film exceed its two dimensional restrictions.

3D cinema disrupts the space between audience and screen. In the process it infringes upon the work we unconsciously do in the space between our eyes and the image. It literally shortens the room spectators have in which to project onto the film, replacing a spectatorial capacity with an immediate technological effect. 3D technology obviates two fundamental questions viewers have about their task: how does a film approach us? What do we do to bring it nearer? If cinema's hypnotic effect depends on the distance between image and spectator, stereoscopic cinema threatens to wake us from our fascination by swinging the stopwatch too closely to our face. Photos of spectators watching 3D films in the 1950s resemble those of scientists studying an atomic blast (both technologies emerged in the post-war years). The similarity of these images suggests that 3D glasses are "enabling" devices only in part: they also protect and shield the viewer from an experience of light. Perhaps 3D goggles foster a misunderstanding: audiences are led to imagine that, like scientists, they are watching an experiment that is only in front of them, a technological spectacle. But with cinema the experiment is conducted not outside but *inside* the spectator.

The Stewardesses shows how the effect-oriented technology of 3D threatens illusion, the domain of 2D cinema. Soft-core porn is uniquely invested in both the explicitness of the technology and the perpetual deferral or promise of sex, its "simulation" rather than its graphic depiction. The film begins with a set of images that encapsulate this conflict. A stewardess knocks repeatedly on a hotel door saying, "Vicki, we're going to be late!" Inside the hotel room, we hear a woman panting and the sound of mattress springs. The shadow of a leg thrashes violently over a chair on which rest an airline uniform and a purse (FIG. 5).

In this one image we see the collision of two regimes of representation. The shadow represents all the seductive and illusory powers of the 2D cinematic image. In films such as *Nosferatu*, *M*, and *Cat People*, shadows report what transpires off screen: something we cannot see yet which the

FIG. 6 Shadows projected onto door from *Dial M for Murder*

FIG. 7 Lovers' shadows sundered by Ray Milland opening door in Hitchcock's *Dial M for Murder.*

shadow makes apparent. *The Stewardesses* adds to this noble lineage. Yet for the shadow to take life as a medium (both connecting and dissevering us from what it depicts), it needs a flat surface, a screen, onto which it is projected (the way shadows of murder appear crisply against a wall in *Cat People*). Yet the shadow in *The Stewardesses* falls upon an unaccommodating surface, one that is not only uneven but that makes an immediate appeal to us as a surface. Angled to our vision to highlight its three dimensional depth, the chair draws all fascination away from the shadow thrashing across it. The 3D effect (the second regime of representation) therefore blocks our curiosity about what is happening off screen. The purse and rumpled dress are no longer the traces of hasty seduction but become intrinsically interesting as part of the chair's play of volumes. Instead of precipitating interest in what is happening off screen, this shot strangely saturates our desire with nothing more than a chair. Our desire for technology radically displaces the desire to see sex on screen. The shot arouses our glasses, but not our eyes.

A similar dissipation of the shadow transpires in Hitchcock's *Dial M for Murder.* What Silliman compresses into one image, making it buckle, Hitchcock extends into a sequence. A rapid montage introduces Margot (Grace Kelly), married to Tony (Ray Milland), yet romantically interested in her ex-lover Mark (Robert Cummings). The shadows of Margot and Mark are shown visibly embracing against the door of her apartment. Their shadows separate with the sound of a key opening the door (FIGS. 6 & 7).

Unlike the *The Stewardesses*, *Dial M* does not entirely render the shadow illegible: Hitchcock actively cultivates nostalgia for 2D by bidding the shadow adieu: the shadows are allowed to embrace before the door onto which they are projected bursts into three dimensions. The shadows retain their illicit power. Hitchcock artfully eases our focus away from the lovers' liaison to the question that structures *Dial M*: how do you enter three-dimensional space, the space of the "living" room?[9]

The opening sequence of *The Stewardesses* focuses on the increasing incompatibility of flat shadow and stereoscopic space. The shot following the image of the leg-shadow over the chair moves us closer to the bed yet without showing the corporeal activity that is projecting the shadow. We have, as it were taken one step closer. Yet the 3D effect mutes our interest in this game of "getting warmer" by subjecting the shadow to further attrition. As the grunting and bedsprings continue in mutual harmony, the shadow of the leg in the air is cast over a three-dimensional screen wrapped around and connecting with itself (also known as a lampshade) (FIG. 8).

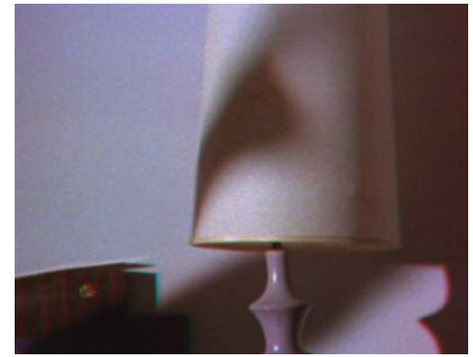

FIG. 8 Shadow cast across a curved screen: lampshade in *The Stewardesses.*

FIG. 9 Holographic sex.

The lamp is rocking violently because its nightstand is contiguous to the action. This tells us that the lamp "registers" sex seismically, not semiotically. With each thrust the lampshade shimmies and the lamp's base shakes at a different rhythm. The shadow of the shaking lamp does not hold our attention as much as the living seismograph of the lamp. The shadow of the lamp on the wall offers only a silhouette compared to the shifting and pulsating volume of the lamp object. The curved screen of the shade provides a poor surface for the shadow of the leg. The shadow is not more stirring than the way the lampshade arches out at us.

The final image of this sequence pulls the rug out from under our expectation. Both legs of the woman thrust towards the audience as she makes love to a man in a sailor's uniform (FIG.9).

This sequence ends not in an image that arouses lust but with one that defines a new technological obscenity: an image that gropes our eyeballs. Schooled in 2D cinema, we expect a "payoff" image of two entwined bodies that would reunite the erratic shadow with the source of its projection. Yet *The Stewardesses* escalates towards a different climax. As a soft-core pornographic film, it cannot display graphic sex. Yet instead of the anticipated image of simulated sex, it offers only holographic sex, a Kama Sutra formulated around the copulating figure's wayward points. The erotic body becomes a constellation near which we orbit and whose stars lend no sense of a figure to us, as they do when we see them flat against the evening sky.

III. How Does 3D Redefine Pornography?

The Stewardesses redefines the concepts of pornography, technology, and audience desire. In her study *Screening Sex*, Linda Williams observes that one of the "truisms of media studies," is the claim that pornography has "historically driven the invention of new media."[10] She counters this adage by noting that pornography frequently follows, rather than precedes, technological invention.[11] Instead of undermining the model of historical priority, Williams merely reverses it, fitting pornography and technology into the spaces once occupied in argument by the chicken and the egg. *The Stewardesses* invites us to take a different route toward interrogating this truism. A bizarre and

unsuccessful hybrid of stereoscopy and pornography, the film resembles a cinematic mishap, a creature that is half-chicken and half-egg and moves accordingly. Neither pornography nor technology remains what it was prior to this merger. Upon experiencing the film, we are left to wonder not *what came first* (did pornography pass on its genetic code to technology or vice versa), but *how do I name what I just saw*? *The Stewardesses* invents new effects and reveals the rough edges of pornography and technology in attempting to force them together. Unwittingly experimental, the film inflicts unforeseen mutations on the terms of Williams' "truism" and necessitates its rearticulation: *what does this film insistently invent within us* in employing the technology of *Creature from the Black Lagoon* to achieve the same audience response as *Deep Throat*?

The Stewardesses aims to merge out desire for technology (our wonder at the capacity of film to reach into our space) and for what it purveys (bodies in various states of desire). Yet instead of "putting us in the cockpit" as its tagline promises, the film unwittingly bifurcates these desires. One of the curious aspects of the film is its tendency to put the *wrong objects* into relief for us. Only a woeful pornographic film does not know how to mete out relief. Unable to capture small detail, the dual stereoscopic lenses that produce one image for each eye render close-ups impossible. In order to overcome this limitation while directing *Dial M for Murder*, Hitchcock constructed an enormous phone and an outsized wooden finger for the insert showing Ray Milland dialing his soon-to-be-murdered wife from a call box. This impediment is even more dire for pornography, which depends heavily on the close-up. The attempts to overcome this problem in "adult" stereoscopic features have required perhaps even greater ingenuity. While directing *The Playmates*, Steven Gibson wanted to show his actor licking the breasts of actress René Bond. Because he could not zoom in, Gibson decided to enlarge the elements in the frame. In a Bunuelian moment of inspiration, he resorted to merely simulating a human tongue by using a cow's, stuck to a broom handle. The cinematographer reports, "It took two guys to manipulate the tongue."[12] Without close-ups, pornography loses a key component of its film language. Because of this limitation, *The Stewardesses* subsequently brings more periphery into the frame.

From the underwater shots of *The Creature of the Black Lagoon* (1954) and *The Abyss* to the mid-air waterfalls and mountains in *Avatar* (2009), 3D technology has been drawn to gravity-free environments whose hovering objects transition easily into the space between screen and audience. *The Stewardesses* inaugurates the bedroom as one of these subaqueous spaces. Yet the objects here float only because they come under the attention of our deflected desire. 3D technology unintentionally reasserts the place of peripheral vision in a genre that encourages monomaniacal attention. Unlike standard pornography, *The Stewardesses* does not require the spectator to become a Cyclops (one eye, monstrously focused, lacking depth). The film instead encourages not just binocular but strabismatic or "lazy eye" viewing in which one eye follows the action but the other is haphazardly caught on a jutting and irrelevant detail. The objects in *The Stewardesses* seem lighter because our desire becomes less ponderous.

In *The Stewardesses* the camera frequently readjusts its position to show bodies writhing from a different angle. Fascinated by mid-anatomy, it picks up on everything else at that height including a lamp, objects on a night table, a typewriter on a desk, or a tumescent bed post (FIG. 10).

Pornographic films habitually follow a strict separation of foreground and background. Close-up shots graphically cataloguing the anatomy of the participants ensure the secondary importance of setting. When glimpsed, these interiors evince the same unlived-in look of real estate photographs. The

FIG. 10 Peripheral distractions in scene from *The Stewardesses*.

FIG. 11 Chandelier intrudes into male bonding in *The Stewardesses*.

despotic emphasis on the coupling of organs usurps our attention. In *The Stewardesses* by contrast the objects and spaces adjacent to the sex become part of its unfolding. This is in keeping with one of the peculiar mannerisms of the characters in the movie: each time a stewardesses arrives at a lover's house or apartment, she meticulously inspects each of the rooms, empty of people yet replete with objects. The camera shows us the array of furnishings and light fixtures, the heft of a bureau made of teak. These objects in the room will resurface during the sex scenes. The woman's cursory survey was not to estimate the wealth or class of the man she met on the plane: its purpose was to initiate visual foreplay with the objects, to introduce them to the camera. In 3D an inanimate thing acquires body: it is not far from acquiring *a* body, one that vies with the entangled lovers for our attention. The 3D momentarily sidetracks our desire but without annulling it. The inadvertent inclusion of the bedpost, for example, retains our attention not just because it acquires a kind of tumescent or bulbous quality. It also introduces thermodynamics into the image, as we move back and forth between its cool metallic surface and the exploratory warm touches we see in the background.[13]

Elements of the setting descend more violently at other instances. In one scene, Colin is pulled aside by a colleague whom he meets by chance while out with one of the stewardesses. He wants to know why Colin hasn't "pinned down" the contract for an ad campaign for which Colin has devised "a background of dancing pineapples."(FIG. 11)

This image answers the question "What does rigmarole *look* like?" Shot from below, the two men seem like flat cut-outs superimposed against the gaudy entanglement of the chandelier. This ornament is juxtaposed to the ornament of speech. The interludes between sex in pornographic films are as gratingly empty as the intermission between movies at a drive-in. Dialogue attains a state of excess that gratuitous fornication can only aspire to. As the men talk about their business of the dancing pineapples, the décor effloresces around them. Umberto Eco concludes his essay "How to Recognize a Porn Movie" with a simple litmus test: "If, to go from A to B, the characters take longer than you would like, then the film you are seeing is pornographic."[14] *The Stewardesses* visualizes this wasted time on screen for the audience. The third dimension exacerbates the empty form of the chandelier, giving our eyes a complex topography to explore but nothing to discover.

FIG. 12 Neither in our space nor theirs: a stewardesses' wayward hand.

The convergence of 3D and the adult film opens new possibilities for destabilized gestures and ultimately for how ecstasy is expressed in pornography. One of the stewardesses meets a soldier on leave from Vietnam on the plane. They go to an amusement park together: he in his military uniform, she in her striped flight hostess mini-dress.[15] Back at her place they do a lot of kissing, seemingly happy just to be out of their cumbersome uniforms. As things heat up, the woman's hand strays towards the camera in a seemingly negligent manner (FIG. 12)

Gestures in both pornography and 3D cinema are as tightly regimented as military parades or marching bands performing at half-time. In pornography, gestures become part of the hyperbolic display of sex. The deliberateness of gesture is at odds with the sense of abandon the porn aspires to depict. Pornography permits no awkward movements, no "wrong" or failed moments between people, just as it permits nothing to be out of focus. Yet this gesture from *The Stewardesses* falls by the wayside and seems like an uncaptured motion. It has not been encrusted with the status of a signal (of passion, real or feigned). Its passionate feeling derives not from its being symptomatic, or in the arousal it may provoke in the audience, but rather in its seeming so accidental, free of the entrapment of porn's artifice.

The gesture also falls short of the demonstrative function of 3D. The actress's hand emphatically keeps itself from attaining a third dimension. The history of stereoscopic cinema is replete with histrionic gesture: hands thrust toward us, outstretched arms, straightened fingers, all of them breaching our space. In *Dial M for Murder* Grace Kelly reaches toward the camera, conveying first her panic and then her resourcefulness as she grabs hold of some scissors with which she stabs her attacker. Yet the hand of the stewardess is useful neither in the film nor for the film. It asserts nothing, not even the glorious third dimension. Surprisingly indifferent to penetrating our space, this hand seems otherwise absorbed.

IV. How to Watch 3D Pornography

One episode of the American television series *The Twilight Zone* features a compulsive character whose asocial nature is expressed in his reading not only while at work (making him an absent-minded bank teller), but also while on break as he reads in the tranquility of the bank vault. One day nuclear apocalypse strikes while our character is in the vault. He wanders through a devastated landscape emptied of people, wracked with despair until he finds that some books at a local library escaped incineration. He is about to sit down and enjoy the Armageddon peacefully when his glasses break.

What if this story featured a character who happened upon not *Robinson Crusoe* and Keats but *The Girls of Capitol Hill*, *The Stewardesses*, and *The Four Dimensions of Greta* (and with these, a functioning projector)? What if he discovered a stash, rather than a library? Only apocalypse might offer the conditions under which a filmgoer would no longer be tripped up by a disillusioning sideglance at other spectators wearing dismal multicoloured spectacles. It is possible our survivor would turn to these films dreaming they would connect him more intensely to a physical humanity that no longer exists. What would happen, in turn, if he were to accidentally break his 3D glasses? How would the irony be different? The man would be baffled by images in which everything seems irradiated and all the actors, even the bedposts, are followed, like an afterthought, by their own semblance. Forced to forego the immersive experience, the man would start to become a seeker. Only by learning to see just the thing or the ghost of the thing would he be able to restore the three-way to its proper number. He would reject the intended effect of the films as someone else's titillation (someone else as defined by the spectacles they wear). Unable to inhabit the effects of the 3D film, he would become an anthropologist, forced to reconstruct the culture of his desire.

NOTES

1 John Waters, "Whatever Happened to Showmanship?" *Crackpot* (New York: Scribner, 2003), 22.

2 R. M. Hayes, *3-D Movies: A History and Filmography of Stereoscopic Cinema* (London: McFarland, 1989), 303.

3 There is no room for arousal in the historian's tale. Not seeing the 3D porn *Scoring!* does not keep Hayes from reviewing it, or from condemning it in his awkward techno-speak: "[*Scoring!*] appears to be another skin-flick of questionable merit. Apparently this time Deep Vision was billed as 70mm Holorama. The 3D quality was, I'm sure, as good as polybiochromatic anaglyphic can be." Hayes, 304.

4 Lenny Lipton, *Stereoscopic Cinema: a Study in Depth* (Boston, MA: Van Nostrand Reinhold, 1982), 49.

5 Ibid.

6 Charles Baudelaire, "Photography," *Photography: Essays and Images*, ed. by Beaumont Newhall (New York: MOMA, 1980), 112.

7 Quoted in Hayes, 329.

8 Tom Gunning, "The Aesthetic of Astonishment," *Viewing Positions: Ways of Seeing Film*, ed. Linda Williams (New Brunswick, NJ: Rutgers Press, 1995), 116.

9 *Dial M for Murder* revolves around the question of how a murderous presence finds its way into the domestic space. Hitchcock utilizes 3-D to explore a new ontology of murder, where simply to appear in particular spaces constitutes guilt. The camera integrates the furniture into every discussion and even into the motivation for the crime. Milland seeks to kill his wife less out of passion but than for the sake of a lifestyle: he fears his wife leaving him, and hence losing the decor and all it implies. Crucial statements about the murder address the decisive constellation of people and furniture. "Where will the murder take place?" asks the murderer for hire. "Approximately where you're standing now," answers Milland.

10 Linda Williams, *Screening Sex* (Durham, NC: Duke University Press, 2008), 375. This "truism" seems to explain why voice recognition software lags so far behind instant streaming video technology. Eric Schaefer takes a more nuanced approach in observing that the introduction of new technologies influenced the form and structure of pornographic cinema. Schaefer argues that the introduction of 16mm into a production landscape dominated by 35mm precipitated the development of narrative pornographic cinema. He calls the use of 16mm as a theatrical mode "just as important as individual legal decisions and the porn auteurs, often cited as major causes in the development of the feature." Eric Schaefer, "Gauging a Revolution: 16mm Film and the Rise of the Pornographic Feature," *Cinema Journal* 41.3 (2002): 4.

11 Williams, 376.

12 Ray Zone, *3-D Filmmakers: Conversations with Creators of Stereoscopic Motion Pictures* (Lanham, MD: Scarecrow Press, 2005), 38. It was difficult for René Bond to maintain the mood of the scene, as she kept wincing at the coldness of the cow tongue, which had to be kept in a refrigerator between shots.

13 Photographer Larry Sultan's study, *The Valley*, details the baubles, interior designs, and the pseudo-majestic fireplaces and mantelpieces that provide pornographic film shoots with their domestic backdrop. In Sultan's images, one senses the strange "at home" feeling of kitsch on the pornographic set: the gaudy vase with fake flowers here finds its place of necessity implicitly because *everyone's attention is somewhere else*. The strange suitability of these objects anchors them to where they happen to be. In Sultan's work, the décor confirms the pornographic code, whereas its accidental inclusion in *The Stewardesses* gives us a different feeling, a temporary reprieve from that code.

14 Umberto Eco, "How to Recognize a Porn Movie," *Movies*, ed. Gilbert Adair (New York: Penguin, 1999), 164.

15 While sitting around their apartment naked and smoking pot, one of the stewardesses proposes they go to a club. When asked what she will wear, she replies, "How about that 747 uniform?" There is no informal wardrobe in this film and T-shirts are forbidden. All characters transition directly from work clothes to nakedness. They hook up only with proverbial men in uniform: sailors, soldiers, cops. Despite the compulsory quality of official wardrobe, the film never suggests that people are always (or ever) at work.

PART 3

POETICS AND POLITICS OF 3D SPACE

FIG. 1 Damiano Ottavio Bigi and Clémentine Deluy, duet from *Bamboo Blues (2007)*, Waldfrieden Sculpture Park by Tony Cragg, Wuppertal, 2010. © 2011 Neue Road Movies, photo by Donata Wenders.

ALLA GADASSIK

ANTICIPATION OF CONTACT
Pina 3D and Stereoscopic Cinematography

THE DREAM OF CAPTURING the essence of dance through the medium of cinematography, or capturing the essence of cinematography through the medium of dance, is integral to the very history of cinema. Dancing bodies and dance routines were frequent subjects in early photographed and animated films, where they were featured as spectacular attractions or as objects that demonstrated the kinesthetic appeal of the moving image. The Soviet filmmaker Dziga Vertov famously used an example of a filmed dance to explain the revelatory potential of experiencing the world through a camera. For Vertov, the movie camera could capture and organize dynamic events in ways that would radically change our understanding of movement and everyday life. For instance, in describing a filmed ballet, Vertov writes: "[t]he camera 'carries' the film viewer's eyes from arms to legs, from legs to eyes and so on, in the most advantageous sequence."[1] If a choreographer could compose the movement of bodies in space, then the cinematographer could, potentially, choreograph the movement of the spectator's vision. Dance, as a subject of film or a metaphor for filmmaking, was thus central to early cinematography. Throughout the twentieth century, dance remained not only a staple of classical Hollywood cinema, but also an important artform for many twentieth-century avant-garde filmmakers.[2]

It is therefore not surprising that Wim Wenders' film *Pina 3D* (2011), a film about dance, has become a favourite object in recent discussions of stereoscopic cinematography and optimistic comments about the artistic potential of S3D technology. Anthony Lane's review of the film in the *New Yorker* is exemplary of the critical acclaim that *Pina* received in the press; Lane calls the film a "leap" for stereoscopic cinema, as well as a "disciplined" and "unforced" application of S3D to live performance.[3] And yet, despite its status a dance-film, *Pina* starkly departs from the kinetic aesthetics of dance cinematography that have been integral to its mainstream and avant-garde predecessors. There are few complex kinetic camera arrangements in the film and almost no camera engagement with the choreography itself. Although the camera is frequently in motion, the pace of the movement can best be described as a tightly-managed crawl. There are few rhythmic cuts or montage accents, and certainly no confusion of spatial orientation that might play with the spectator's

sense of bodily positioning. Formally, the film does not fit into the tradition of dynamic camera-choreography that one might associate with Hollywood spectacles (from the musical to the action blockbuster) on the one hand, or with artistic experiments in cine-dance on the other hand. Paradoxically, much of the praise that *Pina* has received as a "mature" appropriation of S3D technology has focused on the film's refrain from the kinetic effects and dynamics typically associated with the medium.[4]

One can ascribe *Pina*'s kinesthetic restraint to director Wenders' desire to remain a respectful observer of the dance pieces, which were choreographed by the late choreographer Pina Bausch. The film was originally planned as a joint project between Wenders and Bausch, but Bausch tragically died shortly before filming began.[5] What began as a collaboration between filmmaker and choreographer became an elegiac piece, celebrating Bausch's innovative work, while mourning her absence. The choreographer's unexpected death may be a major reason why Wenders avoids the kinesthetic possibilities of S3D cinematography in favour of a more stilled and observational approach to dance. In what follows, however, I pursue another possible reason. I interpret *Pina* as a film that explores the stereoscopic cinematography of dance through a tactile sensibility. In doing so, the film moves away from the primary kinaesthetic dimension of dance-films in favour of exploring their dimensions of touch. Wenders has noted that Bausch's work was especially suited for exploring the potential of stereoscopic cinema, and that stereoscopic technology, in turn, was especially suited for capturing Bausch's work.[6] In thinking about this dual connection, I consider the ways in which *Pina* takes up the themes of proximity and bodily encounter that are central to Bausch's choreography and applies them to the aesthetics of S3D cinematography. Moving away from rollercoaster attractions or kinesthetic experiments, *Pina* investigates stereoscopy as a medium of anticipatory contact, spatial veiling, and ambiguous touch. In its restraint from movement, *Pina* opts for a sculptural approach to the moving image that skims surface extensions and retractions, glides over textures. This approach evokes spatial proximity by building a space that can be touched or moved *into*, rather than space that moves *around* or *toward* the viewer. Lastly, I consider how the film's own production discourse, echoing themes found in Bausch's choreography, traverses the permeable line between stereoscopic vision as pleasurable proximity and as a painful violation of vision.

Stereoscopic Portraiture

In the absence of Pina Bausch's living body, *Pina* works to document and preserve the collective body of her Tanztheater dance company. The film interweaves excerpts from four of the theatre's flagship productions (*Rite of Spring*, *Café Muller*, *Kontakthoff*, and *Vollmund*) with dance solos and duets shot in external locations around the city of Wuppertal and its vicinity. Most scenes feature current and past company members, but some scenes also include nonprofessional dancers who participated in the company's community-based projects.[7] This organizational structure follows Bausch's own artistic philosophy, which has always traversed the boundaries between personal and public patterns of movement, as well as the boundaries between theatrical performance and everyday life. As a collective, the dancers of Tanztheater Wuppertal range in age, body shape, and nationality. The result is an international and inter-generational portrait of the theatre, which captures the details of each dancer's individual style, while simultaneously collating a composite portrait that spans location and time.

Bausch's choreographic methods relied on the dancers' individual gestural tendencies, challenging performers to incorporate their own experiences into the choreography. For this reason, the process of documenting the company becomes as much a challenge of capturing the diverse and diversely-moving bodies of the dancers, as recording the choreographic arrangements themselves. Between performances, the film inserts numerous portrait shots of the dancers, as they reflect on their work with Bausch or quietly remember her in front of the camera.[8] During these moments of reflection, the dancers quietly look toward the camera without talking. Their voices are played over this silent footage, as if the viewers are able to hear their internal monologue. The term "talking-head" witness, so central to the genre of documentary profiles, is inappropriate to describe these portrait inserts. The sound and even the content of the dancers' reflections become secondary to the visual rendering of their faces. Few of the dancers can articulate their work in any significant words, and many of them appear with no dialogue. In the absence of meaningful language, the camera dwells on the dancers' facial features, their micro-expressions, and their skin. The portraits not only document the performers' physical appearance, but also work to capture aspects of their self-comportment that can, in turn, reveal each dancer's contributions to Bausch's work. Stereoscopic rendering is central to this probing and preservationist impulse. The stereoscopic depth of the image extends the dancers' faces into negative parallax–the space that the viewer perceives to be in front of the media screen. Lost in memory or engaged in quiet contemplation, their pensive faces take on the form of living sculptures, extended for the camera's and the viewer's probing touch.

The film's connection between stereoscopic portraiture and corporeal preservation is particularly prominent in a series of inserts that interrupt a segment of the *Kontakthoff* performance. In this scene from *Kontakthoff*, the dancers are paired off in embraces, while one of them, playing a photographer, snaps pictures with an old camera. The film uses the photographer's snapshots as opportunities to transition into its own portraits of ensemble dancers. On a thematic level, the scene transitions from fictional portraiture (the characters are photographed within the performance) to documentary portraiture (the film profiles the performers themselves). However, this scene also implies a cross-medium transition between two-dimensional portraiture within the fictional performance and stereoscopic portraiture within the documentary film. The snapshots that occur within the fictional space of *Kontakthoff* are framed through the dated technology of the Polaroid camera, and the process is visually staged as an act of stilling life. As the photographer's shutter snaps, a strong flash over-exposes the image, compresses all depth, flattens the faces of the performers, and arrests the image into a freeze-frame. It is as though the photographer's flash petrifies the image in a burst of cold blue light that stiffens the characters' expressions. The effect is made stronger through the addition of prominent and sharply defined shadows that float in the parallax space behind the photographer's subjects. The image is thus split into at least four clearly differentiated layers of depth: the photographer, the dancers posing for his Polaroid camera, the shadows of the dancers floating behind them, and even the wall—all of which are spread out at disparate distances from the screen. As a result, the photographed dancers appear like cardboard cutouts of flesh-and-blood people. For viewers watching these particular shots in 3D, the effect produces the kind of "planar" spatial organization that Jonathan Crary has ascribed to nineteenth-century stereoscopy: "We perceive individual elements as flat, cutout forms arrayed either nearer or further from us."[9] Yet in *Pina* this flat planar effect is achieved through careful staging and post-production decisions that align the volume-less "cutout" image with the photographic gaze, not the stereoscopic.

This effect is immediately contrasted with the film's close-up portraits of the dancers. Each dancer is shot against a dark grey textured background, with no markers of depth or perspectival layering that one might expect from a 3D mise-en-scène. All of the dancers wear black or grey clothes that threaten to blend into the background flats. The effect of this minimal composition is twofold. First, since the colours are uniform and the set is flattened, the main feature that defines the dancer against the background is the perceived volume of the body. The textures and outlines of the dancers' hair, chests, and shoulders become the primary depth markers, and they bring spatial definition to what would have been an unforgivably low-contrast image in standard cinematography. Second, the monochromatic and de-saturated composition of set and costume foregrounds the colour and light of the actors' eyes and skin. Since little or no dialogue is played over the image, the focus remains on the surface of the body. Later, studio scenes with the dancers' solo performances repeat this effect by highlighting and dynamically extending the dancers' hands and feet against darkened and bare backgrounds. The result is a moving sculptural relief that molds the face through volume and preserves it in depth. Each portrait functions as a living mask, rather than as a speaking witness.

Film theorist André Bazin famously connected the development of photography with a psychological drive to still the passage of time and preserve nature against death. For Bazin, the impulse toward verisimilitude (optical realism) in the arts stemmed from a deep-seated mythical relationship between physical likeness and preservation, particularly the preservation of someone's spirit through a physical likeness of their body. A photographic portrait can put us in contact with an absent subject, whose miraculous apparition before our eyes is made all the more palpable due to the photograph's status as a direct impression of something real that once existed in front of the lens. Cinema extends the photographic embalming of life to the temporal dimension, providing, as Bazin calls it, "change mummified."[10] Tellingly, Bazin traced the development of Western visual realism to the Renaissance system of rendering perspective, which was not only a "mechanical system" for copying images, but also a method for constructing three-dimensional space.[11] With this connection in mind, one can describe *Pina*'s dancer portraits as aggregates of photographic light-impression, cinematographic time-impression, and stereoscopic depth-impression—all working together to construct breathing and palpable masks of the dancers. Bazin himself was skeptical about the visual effects of stereoscopic cinema, noting that the hovering images in front of the screen produced a sense of a "ghastly" and "unapproachable reality" that seems "strangely spun out of a hole on the screen."[12] Yet, one might consider whether un-approachability is inherent to the task of preservation, as the preserved object or mask is simultaneously present in ocular depth and yet forever elusive to actual touch. In applying stereoscopic depth to bodily portraiture, *Pina* does not construct an environment to move-into, but rather a voluminous surface that emits a tactile impression across unbridgeable space—like a conjured face emerging from the murky swirls of a crystal ball.

Since no comparable stereoscopic masks of Bausch are available, the film occasionally tries to conjure her body by including archival footage of the choreographer. However, the film incorporates the two-dimensional archival footage into its three-dimensional composition by rhetorically aligning the celluloid and the analog video image with older or "flatter" imaging technology. In the film's opening and closing shots, photographs of Bausch are masked onto the background of a theatre stage, as if they were flat sets suspended within a performance space. This framing device recurs in another scene from the film, where filmed footage of the choreographer is cast onto a dark movie screen by an old clattering projector. In this scene, some of the company dancers are seated in chairs in front of this screen-within-a-screen, as if they were watching these images of Bausch, while we (the spectators) are watching their own three-dimensional memorial. This arrangement speaks to the tension between the two-dimensional and the stereoscopic image within the film, as well as the broader challenge that the former poses when it becomes cited or incorporated into the latter. A similar challenge of citation already occurs in live-action cinema, when a photograph or a freeze frame intrudes into the flow of a film. As several scholars point out, the inclusion of the photograph into the moving image often refers to an absent person, suggests an irrecoverable past, and layers the temporality of a film into a diegetic past (the time of the photograph) and a diegetic present (the time of the film's present narrative).[13] In *Pina*, another kind of tension occurs between the flat moving image and the stereoscopic moving image, as the two-dimensional footage of Pina becomes a reference to an absent subject and an absent technology. While the stereoscopic portraits of the dancers are constructed as preservations of living, breathing, sweating, and vibrant energy, the video footage of Pina is framed as a ghost of media past.

Stereoscopic Curtaining

Bausch's choreography often explores the complexity of human touch and contact—its potential to be loving and caring, its threat of pain and violence, and the permeability of such categories. Contact with others is sought and avoided; it is a gift or a command that one can embrace but can rarely refuse. Loving gestures like petting and kissing can turn aggressive and cruel in Bausch's works, whereas perilous movements like falling or colliding can become opportunities for trust and mutual discovery. Occasionally, supporting contact with others is redemptive and compassionate, as when a dancer in *Café Muller* frantically removes dangerous obstacles from the paths of his staggering blind fellows. At other times in the same piece, touch is oppressive, as when one dancer forces and manages the embrace of a couple, while another dancer flings his female partner against a transparent wall. Even individual bodies are internally fragmented and conflicted in their gestures, so that parts of the body frequently confront and touch one another—one hand slaps another hand into submission; forceful elbows propel a limp torso; an arm commands the body forward by tugging on the hair.

A similar ambiguity of touch occurs in the rhetoric and formal composition of stereoscopic cinematography. On one hand, S3D holds out the promise of full contact between the cinematic image and the spectator, as bodies extend from the screen into the theatrical space, or as the spectator's look is drawn into a three-dimensional performance space constructed by the film. *Pina* accomplishes such a suture between the screening space and the theatrical performance space by occasionally including rows of empty theatre seats in the outer negative parallax area, framing the film spectator's movie theatre as a boxed extension of the diegetic performance space. On the other hand, the appearance of spatial realism and the illusion of spatial contact with the image demand painstaking effort in stereoscopic cinematography. Misalignments and contradictory spatial cues constantly threaten to break apart the continuity of depth in the image, and the coherence of space demands labor and vigilance that become antithetical to the live kinesthesia of performance and dance. Moreover, in popular commentary on stereoscopic cinematography, spatial verisimilitude

and close contact with the moving image is frequently described as an uncomfortable, alienating, and invasive experience. Reviewers of the Hollywood blockbuster *The Hobbit* (2012), for example, describe the apparent proximity of the stereoscopic performance space in negative terms. One critic notes that "the film is more true to life, sometimes feeling so intimate it's like watching live theatre. That close-up perspective also brings out the fakery of movies." [14] Another writes: "The effect is like stepping into a diorama alongside the actors, which is not as pleasant as it might sound."[15] It is as though stereoscopic perspective runs the risk of falling into a kind of uncanny-valley of spatial relief; as the depth of the cinematographic space approaches the depth of the movie theatre, the mediation of the cinema screen becomes increasingly felt.

As a documentary project, *Pina* is not invested in building a romantic illusion, nor does it rely on painted sets and makeup. Nevertheless, the film's cinematography must still work to mediate the ambiguous effect of the voluminous stereoscopic image, navigating the line between spatial presence and its ultimate impossibility. To achieve this tactile navigation, *Pina* relies on the motif of the curtain, both as an actual prop and as a compositional device. In classical theatre, the curtain has historically served a dual purpose. The first purpose, dating back at least to Medieval performance, was to construct an illusion of increased spatial depth on the stage and to suggest the co-presence of different spaces within a singular stage area (for example, a public exterior on the front of the stage and a domestic interior on the back of the stage). The second purpose of the curtain was to divide the public (profane) space of the theatre itself from the fictional (sacred) space of the performance. In early European theatre, the back curtain mediated between the sacred performance space and the profane backstage world of the actors. A similar division would also occur with the frontal curtain. In Germany, for instance, the early use of the frontal curtain was adapted from Italian opera, where the dramatic raising and lowering of the curtain was used to build audience suspense and maximize the spectacular impact of the stage.[16] In the English and American theatre tradition, the division of the frontal curtain also offered the audience a kind of promise of social security, allowing spectators to witness extremely dramatic or socially embarrassing events on the stage without the uncomfortable pressure of needing to react or to ameliorate the event.[17] In either case, the curtain functioned as a spatial, temporal, or even metaphysical mediator between incommensurable spaces and realms. Twentieth century modern theatre, and in particular the Brechtian tradition that influenced much of German performance (Tanztheater included), actively appropriated the curtain for both purposes. Sheer curtains were often used to distance the spectator from full psychological immersion in the events on stage, to suggest continuities between otherwise incompatible spheres, and to reorganize the space on stage by making curtains alternatively opaque (lighting them from the front) or transparent (back-lighting).[18] Curtaining became an important theatrical medium of distance—material, spiritual, or ideological—that promised eventual traversal and revelation without ever fully lifting the veil. As Brecht's contemporary Walter Benjamin would write, the veil could function as "an ancient accomplice of distance. Distance appears veiled."[19]

Pina adapts the theatrical curtain device into what I would call a kind of "stereoscopic curtaining," a process of layering and obscuring the image in ways that suggest an ever-penetrable depth without ever eradicating or collapsing the distance. The most obvious appearance of this device in the film is the motif of the sheer curtain, borrowed from Bausch's original performances or added through location choices. In one of the first scenes in the film, a long row of Tanztheater dancers snakes its way diagonally between parallel sheer curtains. The arrangement of the fabric panels and the row of dancers highlight the depth of the image through the semi-transparency of the material. One can see the nearest row of dancers passing close to the camera, but also a further row of dancers behind the curtain, who are both visible and somehow out of reach. Using this curtain as a visible marker of depth, the camera moves across and through several layers to traverse the parallax depth of the screen. As the camera passes through a curtain, the spaces "in front" and "behind" gradually shift in their relative distance and proximity to each other and to the cinema screen. The bodies of the dancers form an additional semi-transparent veiling layer, simultaneously blocking the action and promising something extended in the *beyond* of positive screen parallax. A similar framing of dancing bodies as moving screens is used throughout the film. The motif of sheer fabric also recurs in other scenes, not only in a couple of dance arrangements, but also the costuming of some of the female dancers, including one shot where a dancer bunches up the material of her dress and gleefully extends it toward the camera, as if offering the viewer to touch the light fabric.

In the exterior location shoots in the film, architectural framing choices frequently add yet another layer to the curtain effect. In a couple of the scenes, large glass panes supported by steel frames (a swimming pool, a greenhouse, a train car, and escalator with wall-to-ceiling windows) provide the interplay of proximity and distance and indicate deep extension into horizontal screen space. With the aid of glass panes and other types of screens used in the film, one can see not only the space of the performance, but also that which extends beyond, within possible reach, into potential infinity. In addition to architectural layering, the movement of dancers is predominantly arranged on a slight diagonal, so that a dance composition begins in a more distant corner of the parallax space and then progresses in minor increments toward the opposite nearer corner (or reverse). Stark diagonals, which are commonly used as depth cues for two-dimensional framing, lose their perspectival potency in an S3D composition (FIG. 1). Therefore, the action in S3D is frequently blocked on a subtle diagonal.[20] Diagonal lines of composition are amplified by series of geometrically composed repeating objects that produce their own curtaining effect: rows of dancers' bodies, tall wooden pillars, chairs—so that the depth cue of size diminution can complement the more ambiguous cues of parallax depth.

In interior scenes with opaque walls, a similar dynamic is created by framing a dance through adjacent rooms and receding architectural spaces. The dance sequence is frequently introduced from a distance, so that the spectator's first experience is that of intruding on the dance from an external environment, one that is removed from the dance. Subsequently, the camera either cuts to a closer angle or slowly dollies forward in an impulse to approach the dancer, to hear and touch the effort and strain of the dance. As the various curtains and architectural veils are traversed by the camera, the stereoscopic depth of the image evokes the sense that proximity is forthcoming, and that the contact is almost within reach. Many of the dance numbers, such as the *Rite of Spring*, are also alternatively framed from the back of the theatre—showing the stage, the theatre space, and the audience seats—and through close and layered compositions shot directly on the stage, at eye level or below. As such, the framing in the film alternates between distance and immersion, moving through a polarity of depth cues and rarely landing on the medium shot or the ambiguity of the center. The "neutral" parallax of the actual cinema screen becomes its own kind of invisible curtain that mediates between the bodies extended before the screen and those that move in the distance, adding an additional dimension of spatial traversal to Bausch's choreography.

A final major curtaining technique in the film occurs through the inclusion of particle elements (water, dirt, leaves) into the scene. Environmental elements are integral to Bausch's projects, and her choreography frequently explores contact between the body and its material environment. Some of her productions have involved drenching the stage with water or covering it with moss. *Rite of Spring* takes place on a stage covered with red peat, and parts of *Vollmond* are performed under pouring water. In one noteworthy dance duet, one female dancer shovels dirt onto the head and body of another crawling female dancer. The camera approaches the crawling dancer at a low angle so that the flung earth appears to fly over her head and extend in the direction of the movie theatre spectator. Miriam Ross notes that this kind of blocking of environmental particles and elements has become a major formal strategy in stereoscopic cinema, including more independent projects like *Pina* and mainstream dance-films like *Step Up 3D* franchise.[21] Whereas in celluloid film the inclusion of particles—dust, earth, water droplets—is avoided as an occlusion of the image or purposefully used to obscure and constrain visibility, in stereoscopic cinema particles becomes integral to establishing depth and constructing a tactile connection between the events on the screen and the body of the spectator. Using semi-transparency, partial occlusion, and other stereoscopic curtaining devices, *Pina* trades movement through space for the anticipation of contact in volume and depth.

Ambivalent Contact

The theme of ambiguous touch and anticipatory contact, which are integral to Bausch's choreography, is also put into the service of self-reflexive cinematography in *Pina*. One of the most prominent examples in the film takes place in an early scene from *Rite of Spring*. In this scene, a huddled group of apprehensive female dancers take turns offering a symbolic red dress to a male dancer. One by one, the females approach the male, shaking with fear and extending forward their dreaded offering. At this point the camera assumes the only diegetic point-of-view (POV) position in the entire film, taking on the perspective of the male dancer, who becomes the stereoscopic spectator's proxy. The male dancer's hand is visible in the lower edge of the frame, and the female dancers approach the camera, looking into the lens and thrusting the material toward the viewer. The conventional stereotype of S3D object extension usually assumes an object that is purposefully hurled or proudly presented to the spectator, as an oncoming threat or a delightful attraction. Here, however, the dancers are reluctant in their offering of the object, as if fearing the prospective tactile intrusion.

When one petite dancer approaches the screen, the male hand suddenly extends forward (into the space of the scene), trying to accept the offer of contact. The female dancer cringes and recoils in terror, and the male hand hesitantly lowers. This entire exchange, framed through the male figure, speaks to a structure of reluctant submission and thwarted desire that similarly underlies the rhetoric of stereoscopic vision. Although director Wenders' decision to select the male body as the film's only POV stand-in for the camera may not have been deliberate, the effect is noteworthy. The S3D camera is a heavily gendered device, frequently described as a heavy and demanding object—a powerful tool, but a clumsy dancer. Moreover, the parallax index of stereoscopy (the distance between the two recording cameras, used to simulate the distance between the spectators' two eyes) is based on the eye distance of the average Western male.[22]

The treatment of the camera in *Pina* raises a broader question of what kind of power dynamic is implied in the rhetoric of stereoscopic cinematography. The question becomes especially relevant in relationship to another self-reflexive moment later in the film. This time, the film takes advantage of a particular S3D effect colloquially called "miniaturization." If the distance and convergence between the two binocular cameras occurs at a wide enough angle, objects will appear as miniatures or toys (one *American Cinematography* article describes it as "elephant" vision).[23] In one scene, *Pina* uses this effect to turn the stage and dancers of *Café Müller* into tiny miniatures, dancing inside a constructed model of the set. One of the company's artistic directors places his hand into the model, moving a tiny chair, like a puppeteer or giant. As a possible analogy for S3D filmmaking, the scene demonstrates the pliability of the three-dimensional image, its ability to be maximized or miniaturized at will. Where the device of stereoscopic curtaining suggested depth open for exploration, the device of POV framing and miniaturization work to tame the volume of the image, making the promise that eventual contact with the voluminous image will remain in the spectator's control.

Throughout this article, I have occasionally been complicit in the rhetoric of immersive tactile experience that is promoted (if not always achieved) in discussions of S3D cinematography of *Pina* and other similar films.[24] However, it is important to note that this promise of palpable proximity is carefully managed and constructed, and it is ultimately fragile. For much of the filming, the camera used on the set was an incredibly bulky arrangement, so large and heavy that it could only be placed among the remote theatre seats; Wenders called it a "remote controlled monster."[25] Even when a smaller portable camera rig was developed for the shoot and brought onto the stage, one has to keep in mind that a small stereoscopic camera set-up is still frequently twice as heavy as the smallest single-camera arrangement of similar image resolution. Second, because of its process of capturing a double image, binocular videography restricts movement. Sharp or swift movements threaten to re-align the two captured images, because the speed of sampling cannot keep up with the movement of the camera, and later post-production software cannot properly realign the mismatched blurred images across the rapid pans.[26] This does not mean that stereoscopic cinematography precludes fast or sharp movements. It does, however, mean that these movements can produce unpredictable or distorted depth results, and that they may insert noise or chaos into the arrangement of space on the screen. How such properties of S3D can be applied toward avant-garde and experimental kinetic effects remain to be explored, especially in their potential for innovative digital cinema-dance. There is potential to play with depth cues, to disrupt the continuity of space, and to arrange objects in ways that contradict their familiar everyday relationships. But in the rhetoric of mainstream S3D cinematography—including *Pina*—ambiguity and disorientation are seen as undesirable threats to the order of the image.[27]

If Bausch's choreographic work often focuses on the thin line between pleasurable and aggressive contact, a similar line is central to the rhetoric of stereoscopic spectatorship. The undesirable status of radical or discontinuous S3D aesthetics is often framed by appeals to the fragile and delicate status of the spectator's vision. As *Pina*'s director of S3D cinematography (the late Alain Derobe) notes: "3-D is not made to be a copy of reality, but an interpretation that is good for the eyes of the spectator."[28] Above all other topics frequently noted in writings on S3D cinematography, the imperative to protect the spectator and to avoid violating the spectator's vision is both the most frequent and the most ardently stressed. Cinematographer Benjamin Bergery instructs his colleagues: "Like a good doctor, a stereographer must remember the golden rule: 'first, do no harm' to the audience's eyes."[29] 3D instruction guides warn cinematographers against causing the audience

strain or discomfort, such as the following warning: "It is important to remember that 2D can *look* bad, but 3D can *feel* bad."[30] And one popular stereoscopic manual stresses that many strategies that are pleasant in 2D filming can become agonizing in 3D, including familiar ways of framing the image: "The borders of the frames are not frontiers anymore; rather, they are dangerous places where images can be painful."[31]

Like a performer, the S3D spectator's body needs to be trained to see, but not exerted or exhausted. Among cinematographers the spectator's eyesight is perceived as being easily damaged, quickly frustrated and harmed.[32] The imperative of stereoscopic cinematography is to create contact that is gentle and caring, not abrasive and violent. As such, the interplay between distance and proximity in *Pina*, its anticipation of tactility and simultaneous limitations of movement, also speaks to the balance between contact and restraint at play in S3D production rhetoric. Dziga Vertov, whose account of early cinematography began this article, imagined the movie camera as an instrument that could "carry" the viewer's eye around a choreographic arrangement or an everyday public scene. The camera would organize the elements of a scene, perhaps because, for Vertov, the spectator's eye could not reliably navigate the complexity of visual impressions in their most "advantageous sequence." In this sense, contemporary stereoscopic cinema returns to the stage of early film history, still fascinated with kinesthetic dynamics but intent on choreographing the fallible medium of vision.

NOTES

1 Dziga Vertov, "We: Variants of a Manifesto," *Kino-Eye: The Writings of Dziga Vertov*, trans. Kevin O'Brien, ed. Annette Michelson (Berkeley: University of California Press, 1984): 16.

2 See Erin Brannigan, *Dance Film* (New York: Oxford University Press, 2011); Jenelle Porter, *Dance with Camera* (Philadelphia: Institute of Contemporary Art, University of Pennsylvania, 2010): 11-28; Lauren Rabinovitz, ed. *Points of Resistance: Women, Power & Politics in the New York Avant-Garde, 1943-1971* (Chicago: University of Illinois Press, 2003).

3 Anthony Lane, "Theatre on Film," *The New Yorker,* 11 December, 2011, http://www.newyorker.com/arts/critics/cinema/2011/12/19/111219crci_cinema_lane?currentPage=all

4 Miriam Ross, "Spectacular Dimensions: 3D Dance Films," *Senses of Cinema* 61 (December 2011), http://sensesofcinema.com/2011/feature-articles/spectacular-dimensions-3d-dance-films/

5 Pina Bausch choreographed and directed her own dance-film, *The Complaint of an Empress* (1990), by piecing together brief vignettes that take place in and around Wuppertal. The organizational structure of Bausch's film, and even some of her chosen locations, such the city's suspension railway, park, traffic islands, and a swimming pool, are directly incorporated—without any acknowledgment—in Wenders' film.

6 Hanns-Georg Rodek, "Interview with Wim Wenders," *Media Forum Film: International Film Conference* (29 June 2010), http://www.pina-film.de/en/about-3D.html

7 For a film about the *Kontakthoff* community project with teenagers, see Anne Linsel and Rainer Hoffmann, dirs. *Dancing Dreams*. First Run Features. 2010.

8 According to Wim Wenders, whose account of shooting this scene is included in this collection, the director asked the dancers to treat the camera as a very dear friend, ostensibly intending their gaze toward the movie-theatre spectator to be one of emotional recognition and intimacy

9 Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century* (Cambridge, MA: MIT Press, 1992): 125.

10 André Bazin, "The Ontology of the Photographic Image," trans. Hugh Gray, *Film Quarterly* 13.4 (Summer, 1960): 8.

11 Ibid., 6.

12 André Bazin, "Will CinemaScope Save the Film Industry? (1953)", trans. Bert Cardullo, *Film-Philosophy* 6.2 (January 2002), http://www.film-philosophy.com/vol6-2002/n2bazin13: Garrett Stewart, *Between Film and Screen: Modernism's Photo Synthesis* (Chicago: University of Chicago Press, 2000).

13 David Campany, *Photography and Cinema* (London: Reaktion, 2008): 94-119; David Green and Joanna Lowry, eds. *Stillness and Time: Photography and the Moving Image* (Brighton: Photoworks, 2005); Karen Beckman and Jean Ma, eds. *Still Moving: Between Cinema and Photography* (Durham, NC: Duke University Press, 2008).

14 David Germain, "Review: *The Hobbit* Suffers from Story Bloar", *Salon* (December 11, 2012), http://www.salon.com/2012/12/11/review_the_hobbit_suffers_from_story_bloat/

15 Colin Covers, "Review: *The Hobbit*: Epic Failure", *Minneapolis Star Tribune*, 13 December, 2012, http://www.startribune.com/entertainment/movies/183364261.html

16 J. Jordan Gilbert, "The Curtain on the German Stage: Its Introduction and Early Use," *PMLA* 53.3 (Sep. 1938): 716-717.

17 Brooks McNamara, "David Douglass and the Beginnings of American Theater Architecture," *Winterthur Portfolio* 3 (1967): 129

18 Nicole Fayard, "Stéphane Braunschweig's Theatre-Machine: Structuring Space on the Contemporary French Stage," *The Drama Review* 49.1 (Spring, 2005): 135-137.

19 Samuel Weber interprets Benjamin's quote alongside a discussion of the curtain as a distancing veil in *Theatricality as Medium* (New York: Fordham University Press, 2004): 148-149.

20 Bernard Mendiburu, *3D Movie Making: Stereoscopic Digital Cinema from Script to Screen* (Burlington, MA: Focal Press for Elsevier, 2009): 39.

21 Ross, "Spectacular Dimensions."

22 Tim Dashwood notes that the standard parallax index for the cameras, set for 65 mm, is calculated around the "average male adult." Dashwood, "A Beginner's Guide to Shooting Stereoscopic 3D," http://www.dashwood3d.com/blog/beginners-guide-to-shooting-stereoscopic-3d/

23 This effect is mentioned in the *American Cinematographer's* profiles of the film *Pina* and S3D filmmaking more generally. For examples see Benjamin Bergery, "Immersive Dance," *American Cinematographer 92.9* (September 2011): 48, and Bergery, "3D on a Budget," *American Cinematographer* 92.11 (2011): 61.

24 See examples in Ross, "Spectacular Dimensions."

25 Wenders in Rodek, "Interview."

26 Bergery, "3D on a Budget," 67. Wim Wenders discusses this in relation to *Pina* in Rodek.

27 See Benjamin Bergery on digital noise and polarization in Bergery, "Immersive Dance," 52; Bernard Mendiburu on limits and "pain zones" in Mendiburu, 21-36; and Tim Dashwood on disparities in Dashwood, "A Beginner's Guide."

28 Alain Derobe in Bergery, "Immersive Dance," 46.

29 Bergery, "3D on a Budget," 60.

30 Dashwood, "A Beginner's Guide.

31 Mendiburu, 92.

32 Bergery, "Immersive Dance," 47; and Mendiburu, 20-23.

BARBARA KLINGER

BEYOND CHEAP THRILLS
3D Cinema Today, the Parallax Debates, and the "Pop-Out"

"3D is a waste of a perfectly good dimension."
—Roger Ebert[1]

CONTEMPORARY 3D CINEMA has spawned divided opinions among experts and the public alike, inciting vigorous discussion, rampant speculation, and anxiety about its status in the mediascape. Will today's 3D last or, like its predecessors, fail to become an industry standard? Is it a genuine revolution in filmmaking or a gimmick used by studios to shamelessly raise ticket prices? Will this technology ever provide an acceptable viewing experience or will audiences continue to be shackled to uncomfortable glasses and subjected to eyestrain? These and other issues have been driving recent conversations about 3D film, making it among the most contentious technological developments in twenty-first century media.

I would like to pursue one of these other issues as it gets to the heart of 3D cinema as a style: the matter of how the illusion of depth that constitutes the third dimension is employed. This issue has spawned a set of deliberations that I refer to as the "parallax debates." Commentators on 3D cinema often pit the technology's provision of depth behind the screen, known in technical terms as positive parallax, against its projection of depth in front of the screen, known as negative parallax. As we shall see, critics tend to prize the former as aesthetically and experientially superior to the latter. While I will explore these debates, my goal is to move beyond their polarizing terms in order to pursue a fuller and more finely grained understanding of what is arguably 3D's signature element—the "pop-out" or "emergence" effect produced by negative parallax.[2] Rather than focusing on negative parallax's perceived deficits, I argue that it operates as an influential and multifaceted element of the film text, affecting core aspects of cinema today. Among other things, 3D's frontality accentuates certain traits of classical and contemporary Hollywood style and storytelling; identifies a film's world and genre; and forges transmedia relationships between sources and their adaptations, as well as between films and their corporate sponsors. My study does not embrace a particular aesthetic that prescribes how 3D *should* be used; instead, I analyze to what ends it *has* been used.

To investigate the textual functions negative parallax performs, I will discuss a variety of films, from blockbusters to art-house cinema; to make this diversity manageable, I will concentrate on live-action, feature-length narrative and documentary films released in 3D in 2011 and 2012. This period is crucial to the contemporary history of 3D cinema, as it saw the proliferation of 3D films in the United States and abroad. This proliferation was enabled by a surge in the number of 3D-capable theatres (encouraged, in part by *Avatar*'s [2009] success), which prevented the kind of bottleneck in release patterns that previous 3D films had encountered in theatrical markets.[3]

Before proceeding further, though, what exactly comprises the parallax debates? And how have they affected the assessment of 3D's most familiar technique of expression?

Positive versus Negative Parallax

Both positive and negative parallax are optical illusions over which directors have control, making them part of an artistic decision-making process that helps to determine a film's aesthetic and effect on audiences. As such, 3D fans, critics, filmmakers, technicians, and scholars often appraise these tools of depth. For some fans, negative parallax simply *is* 3D cinema. It is the element with which 3D is most famously identified (e.g., the often cited scene from *House of Wax* [1953], in which a paddle ball is hit repeatedly at audiences) and which shapes audience expectations about the experience. If a film today lacks sufficient projectile moments, these viewers feel cheated and consider it a failure.

However, stronger trends in the commentary express different sentiments. One blogger writes, "I think I am with most real 3D enthusiasts. I believe that negative parallax… is more of a novelty. Whereas positive parallax… is really where the magic of stereoscopy happens… you immerse yourself in the story and often in a different world."[4] Remarks of filmmakers, scholars, and mainstream film reviewers concur in various ways. *Avatar* director James Cameron, perhaps the best-known critic of overt negative parallax, argues that "subtle depth" is clearly more artistic.[5] Kristin Thompson states that she prefers "the depth behind the screen to the depth in front, which tends to be distracting" and dislikes having "projectiles coming at [her]."[6] Since Roger Ebert experienced spears being thrown at him in his first encounter with a 3D movie—*Bwana Devil* (1952)—he has been "attacked by arrows, fists, eels, human livers, and naked legs." These events create "a fatal break in the illusion of the film."[7] Philip Sandifer calls negative parallax "a grammar of allure" that, similarly, is not based "on narrative or story"—in fact, it "overwhelms the story and subverts the narrative."[8] While disagreeing with such "Cassandras of 3D," Thomas Elsaesser nonetheless suggests that filmmakers avoid using "3D as a tool of the cinema of attractions," as a "technique for propelling objects toward us." Instead, he exhorts them to employ 3D "as an element of a new and comprehensive cinematic narrative, one embedded in flowing, elastic… space."[9]

Such remarks begin to reveal the underlying reasons why pundits often reject negative parallax as a serious part of 3D's aesthetic. Today's use of this aspect of 3D seems to be a throwback, defined through an unpalatable mixture of spectacle and low-brow pleasures. On the one hand, negative parallax recalls the cinema of attractions, a stage in early film history in which cinema was devoted more to exhibitionism and sensation than to narrative coherence. This cinema "displays its visibility" and its willingness to "rupture a self-enclosed fictional world for a chance to solicit the

attention of the spectator."[10] The last shot of *The Great Train Robbery* (1903), in which an outlaw, out of narrative context, faces and points his gun at the audience, provides an example of such a sensationalistic break. In this sense, negative parallax disrupts on-screen universes and prevents audience immersion. The fact that those who dislike this form of illusion experience it not only as narratively disruptive, but also as a physical assault emphasizes its inappropriateness. On the other hand, the out-of-screen effect recalls low-budget 1950's 3D films, such as *Bwana Devil* and 1954's *Creature from the Black Lagoon* (which features the title monster's amphibious claw reaching for the viewer), that are seen as exploiting the effect for cheap thrills and quick profits. When showcased today, this device seems like an outdated and opportunistic reversion to a by-now campy—an amusingly artificial and exaggerated—cinematic past.

From this perspective, negative parallax has to be minimized or excised altogether for 3D to achieve sophistication. By contrast, positive parallax is seen as the great dimensional hope of 3D cinema. By illuminating a scene's depths and drawing the audience into the space and story, it presents an apparently more mature, aesthetically pleasing cinema. Depth and audience immersion translate into a more realistic and engaging 3D film, preferable to the strident breaking of the spell that pop-outs, as descendants of the creature's wayward claw, engender. Indeed, some respected directors have shunned the more obvious manifestations of negative parallax to avoid associating their work with a tactic of such ill repute. Hence, despite being a science fiction/horror film—genres traditionally ripe for the deployment of out-of-screen elements—Ridley Scott's *Prometheus* (2012) emphasizes screen depth and "flowing, elastic space." As A.O. Scott writes in his review of the film, "The 3D is unusually graceful—your gaze is absorbed rather than assaulted—and you are pulled into a world of lovely and disconcerting strangeness."[11]

However, the lines between these types of parallax are not so easily drawn. As Wim Wenders' documentary dance film *Pina* (2011) aptly shows, positive parallax offers spectacle as well. Investing heavily in positive parallax and avoiding the "emergence effect" almost altogether, Wenders demonstrates just how extravagant staging in depth to an unreachable horizon can be. Less systematically, blockbusters also display lavish uses of 3D deep focus shots, particularly in cases where CGI landscapes or climactic action scenes are meant to induce spatial awe as part of their impact, as in *Transformers: Dark of the Moon* (2011), *The Avengers* (2012), and *The Hobbit: An Unexpected Journey* (2012). Deep focus has long been associated with spatial realism, given its crystal clear reproduction of all planes of action. However, even *Citizen Kan*e (1941)—a film famously associated with this kind of cinematography—features elaborately staged deep focus compositions that are distractingly eye-catching. In 3D and 2D cinema alike, the hypervisuality associated with the cinema of attractions assumes many forms.

Moreover, the parallax debates reveal the role of taste in deciding whether or not these "look-at-me" moments entrance or repel critics. Attitudes toward negative and positive parallax correspond, respectively, with typical judgments about low and high culture, in which excess and show-stopping spectacle cannot compete with restraint in the realm of good taste.[12] That each mode of parallax has a different cinematic heritage similarly infused by taste helps to naturalize these judgments. With deep focus as an historical touchstone, positive parallax has a more distinguished lineage, while low-brow 1950's 3D comes back to haunt the pop-out's reappearance today. This connection is only magnified when horror films and other genres with little cultural capital deploy the pop-out in a manner that "threatens to puncture…eyeballs"[13] or when distinguished directors use it sparingly. Negative parallax is thus caught up in already established taste formations and cultural hierarchies that help to determine its aesthetic assessment.

Coming to grips with prevailing evaluations of 3D is necessary to understanding how it is positioned in the cultural landscape. In the case of the aesthetic opposition between negative and positive parallax, this positioning offers a picture that is both too tidy and too sweeping. As we have seen, both negative and positive parallax can evoke arresting visions of spectacular space. In addition, although negative parallax is particularly exhibitionistic because it appears to break the fourth wall, scholars generally acknowledge that "attractions" have long been part of narrative cinema. These attractions are not anomalous; they are normative elements of many films, from musicals featuring glittering song-and-dance numbers to blockbusters offering bravura CGI effects. Similarly, while negative parallax may always have a degree of hyperbolic expression, its routine appearance in 3D cinema makes it a formal and narrative convention and a part of moviegoers' horizons of expectations. Perhaps the most significant problem with the parallax debates, though, resides in the taste formations upon which they are based. Dismissive responses toward negative parallax as clownish artifice limit inquiry and result in an unacceptable paradox: a demand for the near or complete abolition of one of this technology's primary registers of expression.

As I will argue, the emergence effect is neither a "waste of a perfectly good dimension"—a superfluous addition to cinema's tool kit—nor an element with a uniform articulation or function. While filmmakers may deploy it to shock and surprise audiences, it is also not simply an affective device; it has extensive textual functions. We can begin to approach both the routine and meaningful roles that negative parallax plays in contemporary cinema by examining its activity in the context of classical and contemporary Hollywood style, particularly in relation to mise-en-scène, where its impact is perhaps most noticeable. In fact, given the importance of this stylistic kinship, mise-en-scène will continue to be an area of concentration throughout my analysis.

Airborne Objects

Looking back at the notable entertainment phenomena of 2011 as the New Year approached, the *New York Times Magazine* provided a partial list of "Things that Popped Off the Screen at You in 3-D this Year." Some items included a twirling beer bottle cap, a spinning red-white-and-blue shield, brainy Smurf's nose, Sacha Baron Cohen's face, and tiny flecks of Voldemort as he dies.[14] This piece suggests that such items, while acting as mnemonic devices, take on a life of their own, appearing detached from the films in which they appear.

Granting that pop-outs have memorable solo moments, they also have more subtle and intimate connections to a film's stylistic palette, as well as diverse articulations. Among other contributions, through various means, they magnify the prominence of mise-en-scène and the prop. Mise-en-scène is generally defined as composed of the theatrical elements of cinema, including setting, lighting, costume, and figure behaviour and movement (a broader category than acting that captures the visual impact of any kind of character). Within the mise-en-scène, the prop operates "actively within the ongoing action"; if a prop appears recurrently, it can become a motif that defines character, setting, story, and/or themes.[15] Thus, the use of a gun in a Western moves the action forward, while defining traits of the character wielding it.

Both positive and negative parallax have the capacity to amplify the visual and narrative

importance of mise-en-scène. Besides *Prometheus* and *Pina*, recent live-action films interested in plumbing the screen's depths as a consistent aesthetic have included Werner Herzog's *Cave of Forgotten Dreams* (2010) and Martin Scorsese's *Hugo* (2011). In thus employing positive parallax, these films rely on existing strategies of 2D composition and cinematography—namely deep focus—to depict documentary or narrative action. Because of its greater capacity for depth illusionism, 3D can dramatize space itself more extensively than 2D, inviting audiences to scour the setting's visual contents, whether they be the labyrinth of the Paleolithic-era Chauvet Caves in southern France featured in Herzog's documentary, the public locales in which Wenders shoots some of dancer and choreographer Pina Bausch's numbers, the view of Paris at night through the railway station's clock tower in *Hugo*, or the alien landscape in *Prometheus*. When critics discuss 3D's immersiveness, they are referring to the depth cues produced by the receding spatial design characteristic of sustained positive parallax.

As the end credits roll in Ang Lee's 3D film about storytelling, *Life of Pi* (2012), they feature a series of individual drawings of all of the props that have been central to the film. These include a pencil, water bottle, life vest, and netting that Pi uses as he attempts to survive at sea on a raft after a shipwreck. This playful inclusion serves as a reminder of how large sagas depend on small items to construct their stories. In negative parallax, the prop, an often overlooked aspect of narrative, emerges from the mise-en-scène to come literally to the fore. Contemporary 3D films provide countless examples of pointed or thrusting flying objects that appear to breach the proscenium. *Pirates of the Caribbean: On Stranger Tides* (2011) has its swords, *Captain America*: *The First Avenger* (2011) the title character's flying shield, *Cave of Forgotten Dreams* a Paleolithic spear, and *Men in Black 3* (2012) its lethal alien dart. In *Abraham Lincoln: Vampire Hunter* (2012), a film that prolifically deploys negative parallax, one of the film's pop-out props—Lincoln's axe—serves a number of purposes. Coated with silver to upgrade its use from the rail-splitting that marked the future President's humble beginnings to the vampire slaying he undertakes, it distinguishes him from others who use guns against the creatures, advances the narrative as he slays a succession of vampires, and fuses his historical persona of "Rail Splitter" with the fantasy version of him that the film presents. The prop thus assists characterization, story action, and the larger goal of recreating Lincoln as a foe of supernatural forces.

Props operate similarly in 2D films and, at times, filmmakers employ showy means to accentuate them. There is, for example, the elaborate crane shot Alfred Hitchcock uses in *Notorious* (1946) to reveal a key—clenched in a character's hand—that might lead to evidence of a Nazi nuclear plot as well as to romantic secrets harbored by the film's central characters. Particularly in films that mobilize extreme negative parallax (or projectiles), the third dimension provides a new way to make props into visual mainstays that define the look and experience of films.

Although 3D is often equated with hurtling objects, negative parallax assumes other forms in contemporary cinema. Floating elements of mise-en-scène—especially props from the film's setting and those linked to its figures/characters—comprise perhaps the most familiar variants. *Pina* offers the subtlest of "floaters" in the form of an undulating curtain that briefly and barely grazes the screen's exterior. The snow falling in Paris in *Hugo*'s opening similarly gracefully migrates from the setting into the theatre. Some floating objects, such as *Green Lantern*'s (2011) Power Ring, which transforms test pilot Hal Jordan into the titular superhero—move further into the viewers' visual field, appearing right before their eyes. Like projectiles, floaters advance the narrative action, while

FIG. 1 *Harry Potter and the Deathly Hallows 2* (David Yates, 2011): Voldemort's disintegration.

underscoring an object's or an event's importance. But, in contrast to the more percussive nature of the projectile and its shock effects, floating aspects of mise-en-scène impart an altogether different impact, a kind of lyricism and awe.

For instance, in *Harry Potter and the Deathly Hallows*: *Part 2* (2011), Lord Voldemort's demise is temporally extended and visually emphasized by the cascading of his bodily debris into the movie theatre (FIG. 1). Negative parallax delicately enunciates the terms of this utter destruction—an interesting countrapuntal end for a relentlessly terrifying über-villain. With different measures of percussion, awe, and lyricism, films have always found ways to underscore the significant finality of this type of event. In the silent era, a major character's death might be expressed by acting gestures—the clutching of a heart, an arm raised against a forehead, an agonized expression. In later film history, a hail of bullets and the slow-motion riddling and falling of bodies would suffice to foreground the moment in a complex mixture of forcefulness, wonder, and musicality. Again, because of its out-of-the-screen presence, 3D today musters a particularly arresting expression of mise-en-scène and the climactic action it supports.

There is yet a third variation of negative parallax worth mentioning—what we might refer to as covert negative parallax. *Hugo* provides a model instance of this (FIG. 2). To gain more of a sense of in-screen depth, Scorsese places a character or an aspect of mise-en-scène just in front of the

FIG. 2 *Hugo* (Martin Scorsese, 2011): Covert negative parallax and the impact of receding depth.

screen plane (or the zero point of parallax). Although the object/figure seems to be positioned in the frame's foreground and within the screen space, its actual position lies outside in slight negative parallax. This placement yields a sense of spiraling, almost endless depth to the shot. Hence, when the title character visits a bookstore, the almost invisible negative parallax established by the books in the extreme foreground provides a sense of dramatic, receding depth to the rows of bookcases and space behind him. Although Scorsese employs other modes of negative parallax in *Hugo*, his stealth use of the subtlest form of this technique not only provides a greater illusion of depth than positive parallax could alone, but also allows him to avoid associating *Hugo* too extensively with the pop-out's reputation as bad art.

In its integrated place in cinematic mise-en-scène, negative parallax thus functions through different manifestations that include and move beyond the flying objects with which it is famously and infamously identified. As I have argued, it also operates within a recognizable lineage of stylistic and narrative techniques drawn from classical Hollywood cinema, though simultaneously creating a "super" mise-en-scène and a starring role for the prop. Whereas audiences might not recognize a crane shot, they cannot help but notice, at least in flying and floating instances of this technique, that objects approach them from the screen, appearing to break the fourth wall. As negative parallax is both tethered to classical tradition and invests in a heightened visibility and often kinetic frontality, 3D makes a spectacle out of norms, while embracing them.

This duality raises the possibility, as William Paul contends in his essay on 1950's 3D films, that 3D has an ambivalent relationship to classical cinematic norms; this ambivalence makes 3D an "aberration" that may challenge this system of filmmaking, but only at the price of its own failure to survive.[16] However, once the field of inquiry is opened to the contemporary visual regime, 3D appears less the outlier. Contemporary Hollywood film abides by what David Bordwell calls rules of "intensified continuity." Here, classical cinema is not "broken," it is updated by more pervasive principles of audio-visual flamboyance that lend visibility to its typically more invisible style.[17] This visibility expressed, for instance, by a dynamic series of penetrating camera movements to establish space, is de rigueur in blockbusters and many other kinds of films. Extending Bordwell's point, this mode of cinematography is not dissimilar from 3D in the kind of depth cues and dramatic rendition of space it offers. At the same time, films such as 2D *Snow White and the Huntsman* (2012), which employ 3D artists in their making, feature striking frontal effects (i.e., evil Queen Ravenna's swirling robe erupts magically into scores of black birds that flood the frame). This suggests, from a different angle, the reciprocity, the mutual influence, that exists between 3D as a mode of expression and contemporary filmmaking tropes. Assertions of 3D's technological exceptionalism or singular incompatibility with standard cinematic narrative and style have to be tempered by recognition of its staunch place in a larger, dominant visual aesthetic dedicated to self-conscious hyperbole. Contextualized within a modern stylistic ethos, hyperbole continues to define negative parallax in its other functions as well.

Worlds and Genres

Films create worlds—highly detailed, multilayered, and self-enclosed universes—that, through mise-en-scène and other elements, provide "rich, fully furnished ambience for the action."[18] By establishing mise-en-scène and space through extreme depth cues, positive parallax is inextricably bound to world creation. While literally opening up these self-enclosed worlds, the pop-out does so in a manner that further articulates the story's universe. The fleeting, ruffling curtain in *Pina* not only plays with the proscenium's limits, it helps to create the film's avant-gardism. *Pina* continually features self-reflexive stagings of Bausch's dances, wherein frames-within-frames call attention both to the stage as a performance space and to its filming, which provides yet another frame. The curtain flirts with the edges of the stage and the film screen in a vision that is thus consistent with the rest of the film. In a more familiar setting for world creation—the blockbuster—Harry Potter films are pervasively marked as fantasies. When a dragon's head pops out in the final film, it helps to create and to reinforce this story world. The same is true of all instances of negative parallax, whether they show a scientist poking a Paleolithic spear at the audience in Herzog's documentary, Uncle Sam's pointing index finger in *Captain America*'s end credits, or pot smoke drifting out from the screen in *A Very Harold & Kumar 3D Christmas* (2011).

The relationship between negative parallax and film world creation leads directly to questions of genre. Film theorists and critics have long recognized the link between certain genres and technological developments, especially before the technology achieves diffusion and is still regarded as spectacle (e.g., early Technicolor and musicals; early Cinemascope and Westerns). Jesko Jockenhövel remarks that the implementation of 3D in American narrative cinema follows the same logic, as it is deployed in spectacle-heavy genres such as horror, science fiction, fantasy, action-adventure, and animation.[19] Today, though, as huge Hollywood budgets have mainstreamed what used to be considered pulp forms and prestige directors such as Scorsese and Scott have joined the 3D ranks, the correlation between pulp Hollywood genres and 3D is no longer as straightforward as it once seemed. Still, live action films that are non-prestigious variations of horror and comedy (the latter an often overlooked mode of 3D) are more likely to use overt negative parallax. They are therefore also more likely to reignite the "class" distinctions between excess and restraint that characterize 3D's reception.

Such films seem to take the "kitchen sink" approach to projectiles, launching everything at audiences. On closer inspection, though, the demands of genre and accompanying audience expectations influence these choices. Items that emerge from the screen become part of the iconography that define a film genre and fulfill its contract with viewers. For example, *A Very Harold & Kumar 3D Christmas* represents the comedy franchise's first 3D entry. Its use of negative parallax secures the film's identity as a sub-category of comedy (the stoner variation) and enhances the already outré and self-knowing parody characteristic of the series' previous installments. Along with the drifting pot smoke, beer pong balls, and drug-induced hallucinations cross the proscenium, exhibiting expected consciousness-altering substances and ensuring misadventures. 3D is put to other over-the-top uses that parody the technology itself. In one scene, Harold remarks to a 3D television sales-

person, "Hasn't the whole 3D thing jumped the shark by now?" The salesperson replies, "You don't understand! [The new 3D] makes *Avatar* look Avartardish!" When the person then faces the audience and points his fingers enthusiastically at them, holding the pop-out pose for effect, Harold asks him who he is addressing. The film's display of certain items in prominent negative parallax thus affirms its generic identity, its continuing adherence to the franchise's absurd self-conscious play, and its winking mode of address to audiences—a trait shared by comedies as diverse as *Annie Hall* (1977) and *Ferris Bueller's Day Off* (1986).

In a similar self-conscious vein, *Fright Night* (2011) demonstrates how negative parallax works in films that mix horror and comedy. The film's 1985 predecessor also blends these two genres. In the earlier version, a teenage boy seeks the help of an over-the-hill TV host of a horror program called *Fright Night* that shows reruns of bad films. Like the Las Vegas occult performer who will take his place in the remake, the host does not believe in the undead phenomena with which he is associated. Nonetheless, in each film, teen and lowbrow celebrity join forces to defeat a vampire. Both narratives are self-reflexive, since they involve the "show-within-a-show" concept; both are also campy, due in part to their fond embrace of exaggerated forms of artifice—grade B movies on TV and over-produced Las Vegas acts. These characteristics produce a comic tenor that pervades a narrative otherwise focused on scares.

The 2011 film's veritable riot of projectiles provides another means of enunciating horror-comedy: it creates both the mayhem and "boo" moments customary in horror and the sheer excess that induces humour. Things thrust into the audience's space include elements of horror iconography such as blood spatters, a grotesque vampire head, pointy weapons, a cross, and the remains of vanquished vampires. Because the end credits repeat every proscenium-breaching element, the obvious exploitation of negative parallax lends a further self-knowing comic dimension that recalls 1950's 3D. This approach to pop-outs is also part of the language of adaptation that informs this remake, a point to which I shall return.

Directors of other kinds of 3D films often exploit the mischievous tendencies of the pop-out for comic relief. In the fantasy film *Hugo*, Scorsese portrays Sacha Baron Cohen's character, the Station Master, as ridiculously pompous and despotic. Looking for any sign of trouble, he and his Doberman Pincher patrol the Paris train station at the heart of the film's setting. As they do, their noses occasionally protrude from the screen. This effect contributes to the Station Master's comical grotesqueries, while drawing intertextually from the actor's well-known impersonations of buffoons (e.g., Borat). These moments also provide a completely different tone than that characterizing *Hugo*'s opening, in which a Paris of yore appears through a veil of snow falling gently into the audience's space. Fantasy is the major key of the film, comedy a minor key; negative parallax helps to engineer the variations between these and other generic keys in the process of building the film's world.

The elements of mise-en-scène that appear to enter the theater are instructive for thinking about how the newest iteration of 3D participates in establishing and confirming story worlds and genres. Through the mobilization of these elements, 3D becomes not only a new way to sell or to experience films, but also, once again, a striking means of renovating and reifying cinematic identifiers. Further, negative parallax is not a one-note phenomenon; it is a flexible technique that can create diverse tones and emotional appeals to audiences.

Transmediation: Branding and Adaptation

Perhaps the most significant aspect of the contemporary mediascape, transmediation describes a situation in which a story "unfolds across multiple media platforms, with each new text making a distinctive and valuable contribution to the whole."[20] This phenomenon has arisen from the expansion of corporate ownership of the media, which gives companies a commercial incentive to repurpose their stories in other forms. In the course of this transfer, stories are continually reshaped to suit their new media homes (as novels become films that become video games and so on). To maintain signs of ownership, transmediation involves branding; because a story migrates across media, it also involves adaptation. While the relationship between 3D and transmediation is too complex to address fully here, we can at least glimpse the place 3D's signature element occupies in this context. Negative parallax both acts as a branding device that focuses attention on corporations and plays an expressive role in rewriting the source text.

Audience members may not give much thought to opening credit sequences. As these sequences identify the companies responsible for a film's production, they seem simply to be a prelude to narrative action. However, as Paul Grainge has pointed out, in this competitive media market, the corporate logos that represent a studio's "institutional signature" have "acquired a dynamic function in the cultural economy of filmed entertainment."[21] To maintain this dynamism, the visual design of logos shifts historically to respond to the times. If we consider the centrality of corporate logos in relation to 3D cinema, we can see how thoroughly logos are integrated into a film's overall design. Through negative parallax, company titles typically float delicately or more boldly toward the audience, promoting studios and other companies involved in production. Hence, as *Thor* (2011) begins, the logos of Paramount Pictures and Marvel Entertainment and Studio appear to come off of the screen. Like all credit sequences, these opening corporate salvos brand films under their banners, while often displaying a movie's membership in multiple media folds. While *Thor* is tethered to Paramount and Marvel studios, the credit sequence's colourful, comic book style graphics also emphasize the film's roots in Marvel Comics. In brief, but visually catchy terms, the film is identified as the property of these companies and the marriage of two mediums.

Although other kinds of 3D films employ floating credits, because of the financial stakes, blockbusters may be more invested in this use of depth illusionism. In visually foregrounding the names of media companies, such openings advertise them in no uncertain terms. Further, because of their dimensionality, floating titles introduce a film's 3D effects, setting the stage for more to come. Since company credits tend to float rather than fly, their self-promotion seems textually appropriate rather than ostentatious. Like most floaters they too purvey a kind of lyrical quality, making their presence additionally appealing. In this way, negative parallax operates on a micro-level as a promotional device for business concerns, engaging in a familiar alliance in the advertising world—the fusion of aesthetics and commercial imperatives.

Captain America, another Marvel comic book made into a 3D film, provides insight into a mode of branding that goes beyond credit sequences. Captain America's shield is a trademark of the character; he throws it with great force to deflect attacks and to launch his own. Through this identification of character and prop, the shield also becomes an insignia of the comic books, company, and transmedia alliances. The comic books' graphic design often dramatizes Captain America's hurling of the shield by having him aim it at the frame's foreground with as much dynamism as possible,

FIG. 3 Transmedia in action: Captain America's shield in flight in a toy advertisement, the film, and the comic book.

that is, straight at the reader. In the 2011 film, the hero's tossing of his shield is often depicted via pop-outs; negative parallax provides a way of cinematically mimicking the frame composition of the comics. At the same time, merchandising for the film and the comic books offers Captain America's "Flying Shield" as a toy for purchase; some promotions for this toy present the shield's throwing capabilities in similar visual terms (FIG. 3).

In this and other 3D superhero films, projectiles and floaters (like Green Lantern's Power Ring) join other elements, such as costumes, in forging significant links between the mise-en-scène of transmediated texts, merchandise, and everyday life. In this sense, negative parallax multitasks: it promotes corporations, signifies product placement, indicates adaptation across media, and represents things ready for play. That which is brought before the viewer's eyes is consumable not only in the field of illustrated sources and media screens, but also in the marketplace and the arena of make-believe.

As we have seen in the remake of *Fright Night*, in which numerous elements of mise-en-scène are lobbed at audiences to simulate the original's self-aware generic mix of horror and comedy, *Captain America*'s iteration of a key moment of graphic design from the comics assumes a significant place in adaptation. Negative parallax becomes a means of rearticulating aspects of the original through the unique register of 3D's frontal depth capabilities, simultaneously transfiguring and paying homage to the source.

Like other elements involved in adaptation, negative parallax can be deployed to more heavily transform a source. To return to a hallmark scene from the last Harry Potter film, director David Yates alters Voldemort's death from its presentation in J.K. Rowling's novel in telling ways. In the novel, Harry and Voldemort circle each other with wands, exchanging threats and revelations. Before they finally utter their spells against each other, a "red-gold glow" illuminates their faces as dawn approaches; when the spells are spoken, "golden flames" erupt between them. Voldemort falls "backward, arms splayed, the slit pupils of the scarlet eyes rolling upward. [He hits] the floor with mundane finality, his body feeble and shrunken… Voldemort was dead… and Harry stood… staring down at his enemy's shell."[22] Although the confrontation is already cinematic in its vivid description, the film realizes it in compatible, but different terms. The scene is shot in a chilly, almost monochromatic, grey. The wand attacks between the two characters convey brightly coloured currents that stand out against this background. Once Harry strikes his fatal blow, Voldemort's bodily debris floats toward the audience. In the silence that follows, the sun rises.

The film's grim, washed-out colour palette not only portrays this moment's somberness, horror, and import, it allows the wands' currents to stand out dramatically against the gray. These choices track the novel as they tensely render this showdown through references to flaming colours. Changes made, from the different timing of the sunrise to the excision of any "mundane" presentation of Voldemort's body, are part of a more muscular artistic license. The character's demise is emphatically presented through negative parallax, as well as by the subsequent appearance of dawn to signify that a new world has begun. Cinema's style, including its third dimension, and the demands of the action/fantasy blockbuster, offer a way to spectacularize Harry's triumph over his nemesis, while providing a sense of finality and justice (his enemy does not simply fall down dead, he slowly explodes).

As pop-outs identify the corporate parties involved in filmmaking, help to create the consistency of a brand across media forums and into everyday life, and furnish the cinematic terms informing adaptation, they play a role in the commercial, textual, and experiential aspects of transmediation. In these different spheres of cinema's contemporary existence, negative parallax performs a substantial amount of labour, providing further insight into the unexpected complexities of 3D's frontal dimension.

The Future of an Illusion

In exploring the stylistic functions of negative parallax in recent 3D films, I have concentrated on the heightened visibility it brings to mise-en-scène. Negative parallax is the cinematic equivalent of the exclamation point in language, lending forcefulness to that which is articulated and soliciting the audience's special attention. As the pop-out accentuates elements of the mise-en-scène, it influentially shapes films in terms of their style, narrative, world, genre, and transmedia relationships. Negative parallax's particularities in this regard—its out-of-screen effects—distinguish it from other techniques, but it is not a rogue illusion. On the one hand, as I have argued, it belongs to an expansive history of cinematic techniques of emphasis, each with its own contribution to style and effect. Although critics involved in the parallax debates often discuss the pop-out's ruinous effects on film and the film experience, this illusion is a variation of stylistic tools that directors have employed since cinema's early years. On the other hand, negative parallax and 3D are part of recent

visual experiments in storytelling and spectacle, from stylistic mainstays like lightning-fast, highly choreographed camera movements to accepted venues of presentation like IMAX. Neither of these connections guarantees that today's 3D will survive, but they do indicate how unexceptional its signature element is in some regards.

The historical record of 3D, where it has cyclically appeared and disappeared rather quickly, unable to gain traction as a broader mode of production, suggests that 3D cinema itself may not have a long shelf life. However, if history fails to repeat itself and if we subscribe to prevailing attitudes about 3D, positive parallax appears to be the technology's future; from this perspective, in-screen depth is key to 3D's artistic and commercial institutionalization. Indeed, as Elsaesser writes, filmmakers working with digital 3D are striving to make it an "invisible rather than a visible special effect" so as to naturalize its "spatial vision, making it increasingly indiscernible."[23] Should this state of affairs come about, the overt negative parallax that many see as little more than a carnival sideshow will cease to be a part of 3D's aesthetic. Taste formations can be powerful factors in determining the fate of media technologies.

While negative parallax may ultimately be an endangered technique of illusionism, some speculation about a more promising future for it can be drawn from the flurry of films produced in 3D during the last few years. If negative parallax becomes regularized not only in film but also in other media (e.g., television, video games, advertising), the pop-out may become less stigmatized. It may join the ranks of other technological developments in film, such as sound, colour, and widescreen, which have become such familiar parts of the viewing experience that their novelty has vanished. A more likely scenario for the time being is that directors will continue to employ the pop-out in ways that confirm the high culture/low culture divide, developing depth behind the screen as a marker of a more apparently restrained and critically acceptable aesthetic and launching projectiles at audiences in what are considered to be lowbrow genres. Films like *Hugo* indicate another path. Scorsese employs negative parallax across a spectrum of possibilities, favouring more subtle expressions and compartmentalizing overt expressions as comic relief. Covert negative parallax may thus become standard, while more ostentatious displays are relegated to tonal shifts.

Yet, a host of considerations suggests that the pop-out may never settle into a single groove: its identity as a signature element of the 3D experience, its multifarious operations in relation to film style, genre, and other crucial aspects of cinema, its articulation of a cinema of attractions that has long been integral to film, and its existence in a climate of ongoing visual experimentation. In all of its flamboyant frontality, negative parallax could remain a productive aspect of 3D cinema that continues to vex the boundaries of Hollywood's stylistic codes of visibility and invisibility and, in the process, to stoke the rhetorical fires of the parallax debates.

NOTES

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RON BURNETT

TRANSITIONS, IMAGES, AND STEREOSCOPIC 3D CINEMA[1]

> If one thinks of 3D not as part of a cinema of attractions, not as startling you or throwing things at you from the depth of space, but as the vanguard of a new cinema of narrative integration, introducing the malleability, scalability, fluidity, or curvature of digital images into audiovisual space—doing away with horizons, suspending vanishing points, seamlessly varying distance, unchaining the camera and transporting the observer—then the aesthetic possibilities are by no means limited to telling a silly story, suitable only for kids hungry for superheroes, action toys, or sci-fi fantasies.[2]

Digital Transitions

The re-emergence of 3D over the past decade is the product of a large number of cultural and technological changes.[3] These include: the miniaturization of screen real estate with the iPhone and iPad, which transforms the cinema into a distributed medium that is far less dependent on traditional theatres as venues for viewing; the general use of the Internet for social media which further blurs the lines between online and offline life; the advent of HD internet-connected television technology for the home which brings high quality images into the living room; motion capture technology which makes it far easier to integrate animation and live action into movie experiences; the development of lighter and simpler cameras for 3D film production, thus making the medium more accessible; the increasing sophistication and importance of the special effects industry which has basically transformed every aspect of moviemaking; and the development of game consoles like the Xbox Kinect, PlayStation Move, and Nintendo Wii which have contributed to the development of new interactive and embodied relationships between players, images, and sounds.

Many of these technologies including gameplay are based on the use of simulated environments. Screen effects are produced through the use of digital compositing and seamless weaving of animation into every facet of production. *The Life of Pi* (2012) is an excellent example of 3D special effects and animation overwhelming traditional live action.

Digital tools provide viewers with access to image-worlds that are more like visualizations than representations—data shaped into storytelling.[4] This shift to data produced through the sophisticated use of computers, heightens the modern anxiety that humans have conferred too much power onto their technologies and have thereby lost some essential qualities of being human. The combination of powerful machines that can generate image-worlds (and not just images) and the humans who manipulate them has transformed storytelling in all forms of media expression.

It is therefore not an accident that stereographic 3D has grown in importance; in part because a large number of technological innovations have fundamentally changed the expectations viewers have in watching images and engaging with narratives of all kinds. It is not only viewing expectations that have shifted, but also images which are now seen as worlds and environments, places, and spaces that need portals and escape hatches and are driven by problem solving and viewer/participant control over characters and their stories. All of these elements have helped to transform conventional approaches to image creation and viewing and have opened up 3D cinema's potential.[5] I make the assumption in this essay that stereographic 3D has become popular in part because of the convergence of these new technologies. I also assume that new forms of interaction produced through the sophisticated use of tools like the Kinect require different modes of storytelling in other media. I suggest that 3D films represent a substantial shift in direction for filmmakers as well as for viewers and that they help us to map a new terrain of image production and viewership. 3D film is an extension of the desire to move away from presentational forms of expression and towards more immersive experiences. It also represents a shift, although not a major one, in conventional assumptions about the interface between computer-generated images, viewing, and creative engagement. (I would argue that the major technological shift of the last few years is in touch screen technologies like tablets, which bring hand, eye, and body together to manipulate 2D space).[6]

3D cinema has also become popular because of the intersection between gameplay and images but, crucially, it remains a theatrical experience. 3D is more of a hybrid medium building on the changes I have been describing, remediating older technologies in an effort to respond to dramatic changes in audience expectations.

With respect to gaming, its attraction and power is the result of the many ways in which screen and interactor mutually encourage co-creation, navigation, and reconstruction. Games like bowling on the Wii or playing baseball on the Kinect, driving a simulated car, or role-playing in a game like *Journey* (a videogame developed by Thatgamecompany for the PlayStation 3) evoke control and levels of participation that the cinema cannot ignore but will have trouble trying to reproduce. Nonetheless, 3D cinema comes close enough to immersion for the spectacle to mirror some of the strengths of gaming.

One of my central interests is that 3D cinema technologies have engaged with this complex cultural shift by working on new relationships between foreground and background images—a heightening of traditional forms of mise-en-scène and a theatricalization of the cinematic experience. This ever-changing movement among different levels of depiction challenge conventional approaches to viewing and to communication. Films like *Pina* (2011) by Wim Wenders and *Avatar* (2009) by James Cameron, push hard at the boundaries and restrictions of screen space reaching out to viewers in an effort to explore the limits and potential of interaction.

Videogames are not the only disruptive force at work here. As the process of image production has become more collaborative and democratic, the general openness of Internet networks has

made it possible for everyone to create and distribute their work. These new disruptive activities ranging from participatory video, to sharing images with Instagram, to distributed video networks (YouTube) have their own challenges, because it is almost impossible to curate such massive output. Notwithstanding these challenges, we are in an age of "rich media" where the integration of media based technologies with every aspect of human activity has just begun.[7] The integration of multiple technologies into everyday life means that viewers need the explosive theatrical impact of 3D. In other words, stereoscopic 3D is not a passing phenomenon but the next step in the evolution of the cinema and of our culture.

Pina

Ironically, 3D cinema does not provide the viewer with significantly more information than they would receive from a 2D film. Rather, the sensations of depth and distance are heightened in 3D, but the fundamental illusions of space and perspective so essential to 2D are retained through careful data manipulation. This flies in the face of logic because it seems as if 3D enhances and enlarges the scope of images as well as their range. However, as Wenders found out when he was making *Pina*, ultimately the same challenges that exist in 2D are replicated in 3D.[8] These include camera use and position, mise-en-scène, lighting, sound, and character development. Many of the traditions of 2D cinema are being simply transferred to 3D and while there are obvious dissimilarities, viewers are still caught in their seats, so to speak, but with some major differences. Among the most important of these differences is that computer generated images (even those in a "documentary" like *Pina*) are by their nature very detailed. The details and the form become part of the narrative, something that Cameron explores in *Avatar*.[9]

I suggest that 3D increases the viewer's cognitive awareness and the ways in which space and time are experienced through images. It opens up new pathways for viewers to explore the manner in which images gain their aesthetic power, especially with respect to light, shape, form, and sound. 3D encourages new relationships with narrative, and in the case of Wenders's film, innovative shifts in perceptions of the human body in motion within image-worlds. Some of the power of 3D comes from a combination of special effects that make it possible for spectators to explore and scan screens rather than to simply watch them.

Does 3D change the fundamental ground or foundation that has always existed in the production and viewing of the narrative, documentary, and experimental cinema? Are we dealing with new forms of expression based in a richer use of light and depth or in a simple extension of the aesthetics of 2D? Does 3D result in a greater dematerialization of the visual field for viewers than occurs with 2D?[10]

The differences between 2D and 3D reside in the layered aesthetic that is woven into every shot in 3D. The layers are both a physical function of 3D effects and cinematography and a consequence of wearing glasses to watch images shot by cameras with two lenses that are meant to mimic the distance between human eyes.[11] This aesthetic does not produce a more deeply involved spectator, but rather one who is searching within the images and scanning their layers to find points of entry and exit. Scanning is a very quick process, one that does not necessarily lead to accuracy on the part of the spectator or to simple forms of identification. This suggests that 3D may fragment the conventional experience of images and explains why a 3D film on the rock group U2, for example, feels simultaneously so present and yet so distant. The action seems close to the eyes but more in the sense of a dollhouse effect (miniaturization) than in terms of real proximity. Ultimately, 3D recreates the world in diminutive form, which is the dilemma of all cinematic images, but is also a source of creativity. For example, this is one of the central topics of *Hugo* (2011) by Martin Scorsese. Increasing the distance of the separation between the two lenses that are used to shoot images further heightens the dollhouse effect. Wenders uses this effectively in *Pina*, so that in one scene it appears as if the dancers in the film are literally moving about in a dollhouse-like café.[12]

As noted earlier, one of the most important characteristics of traditional cinematic forms is in the relationship between foreground and background. In 3D, the foreground is the stage for the background, largely because of perspective but also because of the unique sense of depth in 3D. Of course, among other differences, 3D dissolves the gaps between movement and proximity much more smoothly than would be possible in 2D but this creates other problems, particularly in the picturing of the human body. In *Pina,* this challenge is faced in a brilliant manner. Wenders dispenses with the need to "represent" dancers in motion and simply "captures" motion and then reconstitutes the scenes in the editing process and in a very effective use of voice-over and interviews. He then seamlessly blends studio based and on-location shooting, so that the dancers in his film often appear to be floating in space. Ironically, this highly stylized film gives the appearance of a hyper-real duplication of bodies in motion. The bodies in *Pina* are restrained by the spatial limitations of the technology, location, and the screen, but nonetheless, the film gives the appearance that those limitations have been transcended.

Pina focuses on shaping bodies in motion into 3D forms, largely because of Wenders's sensitive use of 3D cameras. Dancing to a rich soundtrack, the bodies we see on the screen flow between the metaphoric and the real, but are never really located in either. This may well be one of the foundational characteristics of 3D images in general which generate interstitial spaces where the dynamism is defined by the conflicts between frame, stage and the physical characteristics and constraints of cinematic environments.[13] Touch is absent in 3D cinema, but the field of view makes it seem as if objects can be grasped. This is not dissimilar to the way live theatre works and Wenders explores this issue within *Pina* much as Bausch herself did in the performances she choreographed.

Pina is an example of the tensions that exist between conventional uses of light, colour, and surface textures in 2D and the demands 3D makes on depictions of shape and movement. It is also a film that balances somewhere between conventional narrative/documentary techniques and the use of 3D to enhance theatricalized forms of presentation and representation.

As I have mentioned, 3D films are shot with cameras that have two lenses. To shoot with 3D cameras requires a subtle understanding of how the distance between the two lenses will affect the look and depth of the images. Slight increases or decreases in the distance between the lenses will produce different kinds of spatial distortions, as figures grow smaller or larger. Wenders plays with these effects and uses them in *Pina* to study the human body as projection, as theatrical composition, and as moving body and then as figure for narrative.

So much of the rhetoric around 3D is about enhanced experiences produced through technological innovation and some of that is fair and right. But, much of 3D is still steeped in representational strategies that do not allow for shared control which are key features of games, social media and many forms of new media. Co-creation implies distributed responsibilities among viewers and creators and a sharing of outcomes. This was something that Pina Bausch understood because her

work in its abstractness and visual metaphors opened up a space for audiences to project their needs, feelings, and fears onto the performers in a reciprocal experience of affect and effect. Her space is the live stage and as with all live stages we witness what happens in three dimensions, and the border between performer and viewer can sometimes be crossed.

All forms of digital media depend on screens, but since stereographic 3D comes the closest to theatre of all digital forms of contemporary expression, it is an added burden for filmmakers. That burden was one of the key challenges Wenders undertook to explore, both within the structure of *Pina* and during the interviews he conducted with participants in the film. He tried to bridge the gap between live performance and the mediated nature of screen experiences. This tension pushes the film even further into an exploration of the limits of technology while at the same time raising the level of what 3D cinematography can accomplish. It is also Wenders's existential answer to the challenges posed by Bausch in her own work.

Pina researches and investigates how 3D cinema is about *exploring* not only the layers that make it technically possible and visually rich, but also how the interaction of depth with viewpoint distributes information across the layers that define its visual field.[14] A couple of observations: 3D is not significantly more interactive than 2D cinema. Greater depth produced through the many layers that make 3D possible does, however, affect the space for cinematic exhibition and exposition. I am talking here about cinema theatres and in general my comments do not reference caves and other more performative spaces or installations, which use various physical constraints and viewer positions to generate the illusion of participation. However, the amplification of the visual field in 3D needs to be examined in the context of further discussions on the kinesthetic effects of viewing with glasses.[15]

Postproduction and Special Effects

The thrills that come with viewing 3D today mirrors the excitement in the nineteenth and early twentieth centuries. Stereographs were very popular; for example, one company in the US produced 25,000 images a day for the 300 million stereographs that they manufactured over a fifty-year period.[16] We need to more fully examine the attractions of stereo images from an historical perspective. For example, the feeling that there is an enhanced experience is explained in the literature on 3D, as if 3D creates a greater sense of tangibility, as well as "optical and haptic feedback" in the experience of viewing. It is uncertain whether this claim holds true and certainly requires further scrutiny.[17] Interfaces remain the key to 3D, both as designed spaces and also as a way of operating within an environment of constrained frames. 3D tries to overcome the flatness of the frame, but only succeeds temporarily. Tangibility and feedback come from processes of co-creation, in which spectators help to produce the illusion that they are in control, when they are really partnering with the technology.[18]

The "presence" of 3D images, comes from a combination of increased intensity produced through a heightened sense that the illusory space of 2D has finally been cracked. This is aided by sound, augmented by the use of special effects produced through motion capture and other technologies. This raises other important questions about the use of special effects in the cinema, which I have described elsewhere as painting with pixels.[19]

The special effects in 3D are truly spectacular and are a marriage of the ambitions of Méliès[20] with those of Cameron. In the digital age, special effects transform images into malleable and almost sculptural objects. Keyboards, monitors, programming, and most importantly specialized software, transform studio-based filmmaking into an infinite playground where creators play with the characteristics of images in an almost symphonic manner. Studios with their green and blue screens become staging grounds for projected outcomes, none of which may be visible at the time of shooting. Digital composition (or compositing), brings together all of these elements and turns the final outcome into a complex matrix of effects, images, and sounds. It is like corralling the different instruments in a large orchestra to produce a coordinated sound. All of this complex input and output is built on a foundation of simulation that drives images further and further away from the studio as a space of production and into postproduction as the foundation upon which image-worlds are built.

In 3D the impulse is to create more and more layers, to probe and perhaps to match the complexities of reality with the imagination of creators, but crucially within the terms and conditions of the image-worlds being generated. This contradictory desire to simulate in order to arrive at a greater sense of reality is of course the primary impulse of all art. But, in the world of special effects, simulation is driven by the paradoxical desire to transform images produced within the confines of software programs and to move them from the artificial universes they inhabit into approximations of what may happen if those worlds were real.[21]

The key word here is "approximation." Everything about 3D is approximate and while this is true for images in general, 3D opens up new ways of building and experiencing image-worlds in what I will describe as "approximate" screen based efforts to match expectations about reality with artifice. This has been most fully realized by Cameron with his film *Avatar* to which I will turn in a moment. Approximate, proximate, and distance are three terms that signify the complexity of 3D digital media and the challenge of understanding their aesthetic direction.[22]

In the analog cinema, a camera that slowly tracks towards a figure in the distance is physically engaged in the production of closeness. The layers that the camera moves through are spatial, physical, and temporal and are constrained by the nature of the lenses and the use of lighting. In the digital 3D cinema an artificial and software based camera approximates movement. In the world of special effects, camera movement is a function of algorithms that approximate movement on real sets. In fictional narratives produced in 3D, camera motion is dependent on both real time shooting in motion capture studios and further postproduction work using computer graphics to enhance or provide some environmental context for the story. Movement in 3D shooting is a challenge because if the camera moves too quickly the images will become distorted. This constraint explains why so much 3D cinema looks theatrical, but it also poses questions about proximity and what it means to engage with screen experiences that are in fact distant because of their form. In Marshall McLuhan's terms, 3D is a "cold" medium. Proximity is always in question in 3D and is not a given.

As I mentioned earlier, 3D filmmaking tends towards a dollhouse effect. The illusion of depth further heightens the artifice and makes the artifice into a crucial part of the content. This is similar to what happens in animation and in the CGI production of 3D in games. Artifice becomes part of the narrative and the thrills of watching go beyond the story and into the rabbit hole of joyous play with forms.[23]

At the same time, it is clear that the worlds being created are artificial, digital, and developed within the confines of computer screens and other very sophisticated technologies. Artifice quickly

becomes distant, constructed, and even further removed from any relationship with viewers. Or, put another way, we digitize reality in order to remanufacture it (relight, redesign) for the purposes of the narrative but also for aesthetic effect. This process (processing) has always been an important part of the cinema but in 3D, it is *the* cinema and is a large part of the content of digital films.

Film and filmmaking always work backwards from the fragmentation of reality in production to the spectator, whose job it is to complete, solder, and unite elements of the experience into something resembling a coherent story. This is why films and their actors are taken so seriously, "leaking" far beyond the theatrical frame into the daily lives of participants. The work of audiences is a serious one.[24] 3D stretches this leakage even further because the boundaries of the screen are continuously broken. In fact, from a production point of view, screens are no longer the only constraints to the generation of meanings. From the viewer's point of view, 3D extend screens into a deeper and more illusory sense of proximity. The outcomes of this are ambiguous to say the least, but at a minimum one can say that part of what viewers struggle with is whether what seems so close may actually feel more distant. And ironically, this is also the central struggle that Wenders articulates in *Pina* around the role of dance as a cultural and personal event and as an expressive form that derives much of its power from abstraction and the movement of bodies through space and time.

The distribution of information across conventional screen real estate is driven by narrative (even in the documentary film) and is changed in 3D to information scattered across ambiguous spaces that require scanning, viewing, and continual adjustment to spatial and temporal shifts. In 3D, the frame surrounding the image becomes fragmented and this results in a redistribution of the visual field. The upshot is not perspective in the conventional sense, but something akin to binocular vision that struggles with depth, peering into space to discover the characteristics of the scenes being experienced.[25]

Special Effects as Data

Stereoscopic 3D, as Cameron discovered, requires very complex technologies of production and projection. The data needs many layers of physical and digital sculpting by technicians to move it from information to something resembling a body or a hybrid human or a landscape (especially as Cameron is equally driven by the need to generate intensely realistic visualizations of his imaginary worlds).[26]

There has been a great deal of discussion about the technologies needed to make 3D work, but many of the key components of 3D have been in existence for some time. The difference now is that spectators are involved in manipulating distributed forms of information over many different devices and have become accustomed to trying to access the screens they use on an everyday basis. They also struggle with information flow. Notwithstanding efforts to try to aggregate or curate the information, there is always some additional data on the horizon.

This struggle is one reason why 3D technologies seem to offer a way out of the maze that continual interaction with the 2D world has generated.[27] Data is not knowledge but the continuum that links information, viewing, manipulation, of data and digital forms of expression is very difficult to escape from once caught by its alluring aesthetic assumptions. The struggle to manage information then becomes part of what is described in our culture as "interaction."[28]

3D, even in its documentary forms, is an example of what I will describe as "exploratory" media; that is, media that are not too sure of themselves and are experimenting with images rather than simply using them for utilitarian or narrative purposes. 3D uses prosthetics (eyeglasses) in an effort to soften the complexity of the images that are produced, but cannot rid itself of the artifice that binds 3D to special effects.

I was asking myself the other day whether Robert Bresson would have ever been interested in making a 3D film. His work is, by modern standards, excruciatingly slow both in the mise-en-scène and in the development of the narrative. The early films of Alain Resnais were quite similar to Bresson's. Many of the experimental films of the early 1970s experimented with time, trying to understand its role in the viewing experience by creating static shots driven by voice more than by action on the screen. I doubt it would be possible to maintain a static shot in 3D for too long.

I would suggest in reference to an earlier comment, that 3D films, by virtue of their technological impulses, create spaces of description and narrative that require constant movement within each scene. And, ironically that is the very nature of the Web as seen in 2D on a computer or smart phone. No one piece of information suffices and nothing can really stand on its own. The network of connections overwhelms the specific characteristics of any one moment in time let alone one image or text or word. (This conundrum is at the heart of the crisis around reading and electronic texts.)

The relationships between screen and reality have been superseded with filmmakers trying to break the boundaries between simulation and perception. Metaphorically, as the screen tries to break out of its confines, the space for exhibition shifts into the wonderful yet illusory middle space between screen and viewer. For example, our hands want to reach out to touch the miniaturized Bono on a stage in Buenos Aires in the amazing film made about his U2 concert in Argentina.[29] This middle space is also a middle ground but it is not a place you can plant your feet into and the question that then arises is whether 3D is itself misnamed. Perhaps we are dealing with an inversion of spatial relations with time disappearing and a transformation of what it means to be a viewer?[30]

Or, has the human body itself been altered into a screen and we are merely exploring its vicissitudes, as our imagined and holographic selves search for some common ground? Is 3D proving that the cinema is about dematerialization, notably of images, but also of viewers?

Bono's dematerialized self sits in my mind as an idealized version—Bono 6.4—like some sort of operating system that has moved from its status as manager of data to an invisible mediator of what we do with digital experiences. The U2 film is not about Bono, but about the audience at his concert, their movements, joy, and sheer sense of being, something we can only witness as viewers, but something we nevertheless want to share. 3D creates the illusion that we are, at least to some degree, capable of being part of the event but in a paradoxical turn, we are doubly alienated because seductive proximity leaves little room for identification. Herein lies one of the challenges of 3D. Conventional techniques like point of view, used by filmmakers since its invention do not work with the same force in 3D. Action travels down a series of multiple paths—stories become topographic and viewers search for cues to locate their role in the evolution of the narrative. Traditional identification is replaced with the exploration of multiple points of view and sifting through layers and layers of dense visualizations. The viewer's work then is to filter through different levels of representation and visualization to discover and uncover their own role in the narrative. It is here that the foundational impact of gaming culture plays its most important role. Largely because of games, viewers have become accustomed to turning themselves into avatars, which is

different to identifying with the main character in a film. Games are about sophisticated filtering and the use of often-complex sets of instructions to achieve specific outcomes. Games are also networked and encourage an extraordinary degree of collaboration and conflict. To build an avatar is to create the optimum conditions for interaction without any guarantee of success.

It is not an accident then that Cameron's *Avatar* is about replacement and substitution at all levels from the use prosthetics to the final conversion of death from decay back into life. Cameron, unlike Werner Herzog (whose recent 3D film *Cave of Forgotten Dreams* uses voice over like a traditional documentary), intuitively understands that screens will not do and even 3D cannot replace the need for multiple forms of substitution. This is why Cameron not only invents a new world but creates a specialized language for it and it is why so much of the film centres on translation, not only between machines, but also between cultures.

Avatar and the Aesthetics of 3D

It is always fascinating to read critical analyses of popular films when the writer actually dislikes popular culture, which begs the question, why write about something you hate? James Bowman writes for the journal *The New Atlantis* and his pieces are generally anti-technology and anti-pop culture. His recent article on *Avatar* follows the usual arguments of critics disconnected from the culture they seem bent on critiquing. Bowman describes *Avatar* as a flight of fantasy, dangerous because as with all fantasy films of this genre, it is both escapist and dangerously full of illusions, not only about society but also about the future. Interestingly, he claims that the film does not follow the Western tradition of mimesis, that is, it makes no claim to imitate reality and because of this, it has no merit as art.

Bowman also says that the only difference between *Avatar* and other films of the same type is the use of 3D, as if 3D and its explosive growth are not part of an important aesthetic shift, as well as a transformation in how stories are told. Bowman even criticizes Cameron's development of a new language for the indigenous people of Pandora, the Na'vi whom Bowman describes as monkeys. Here is what he says: "The natives of Pandora are giant blue monkeys with sophisticated fiber optics in their tails and the natural world they inhabit is filled with floating mountains, huge dragon-birds whom the inhabitants ride like horses, hammer-headed hippos the size of houses, and other fantastical creatures too numerous to mention and impossible to exist on Earth."[31]

Of course, the "natives" are constructions and of course they do not exist. As with all artifice they are the products of Cameron's rich imagination, but in Bowman's world imagination is actually a dirty word. Bowman is one of many film critics and cultural theorists who found *Avatar*'s design to be a combination of colonial attitude and war mongering, but made no effort to understand its genealogy or historical context.[32]

To me, *Avatar* is an exploration of disembodiment in contemporary culture most fully expressed through the use of avatars in the gaming world. Various massive, multiplayer online games, (MMOG) take place in a range of worlds similar to the one on Cameron's mythical Pandora. Along with standard console games and mobile games used with smartphones, one could make the claim that contemporary societies are profoundly involved in the construction, maintenance and promotion of avatars and artificial worlds.[33] The power of self-presentation and self-representation is most fully illustrated through the construction of virtual personae in online games (including the one that the company Ubisoft developed for *Avatar*)[34] The range of possibilities is endless, as the avatars created in the virtual worlds gamers inhabit, become more ubiquitous and complex. Cameron not only borrows from the aesthetics of MMOG's but he structures the film in much the same way as many games structure their narratives.

Avatar is an experiment in stereoscopic 3D as much as it is an exploration of light, depth, and narrative. It is an experiment with images that have a rather wispy and dematerialized feel, like the brilliant Cheshire cat in Tim Burton's, *Alice in Wonderland* (2010). Wispy, because 3D is perhaps the most ephemeral of forms, where most of what is seen comes from an intense process of viewer *projection*—the body (our bodies) as medium.

As I have said, 3D creates an intense feeling of pleasure in viewers largely because it is so ephemeral, not because it approximates reality or even makes a claim to reproducing the real. The illusory closeness of the images is dependent on the glasses viewers wear. It is also a function of the desire to be in the image and to be a part of the experiences the images are generating at both the presentational and production level. The sense of closeness is almost entirely the product of the spectator's desire to pull closer to the screen and to create a mental container for the projected images.[35] These mental containers are very fluid making it difficult for viewers to constrain their desire to be part of the worlds they are viewing and creating. Cameron more than any other contemporary filmmaker (except perhaps for Terence Malik) understands the profound nature of these interactions and restrictions.

The boundaries that divide one set of meanings from another in a 3D film like *Avatar*, make it clear that there are no firm and fast rules that would allow a system to be devised to capture those meanings as the images flow and float past the viewer's eyes. As noted above, the 3D screen is a vehicle through which many pictures are overlaid on top of each other so to speak, in an instant. The intensity and breadth of this layering makes the experiences of viewing a deeply mediated one. Projected 3D images transform and overwhelm "everything" that is filmed. 3D images take an already mediated set of sign systems and build in even more mediations and greater complexity. Allusions to "reality" are completely overwhelmed by objects and environments that have no clear set of references in the lived experiences of viewers. The pictorial qualities of 3D stretch the viewer's sense of the real, much as the conventional theatre or opera does.

3D in its modern incarnation uses generative images that are about depth, distance, and a more profound sense of perspective. 3D continues the long Western tradition of exploring and trying to enter into worlds entirely made of images. (See the work of Bruno Latour, especially *Icononclash*[36]) 3D cinema extends, enhances and sometimes rediscovers the Renaissance exploration of line, shape and colour. That is why *Avatar* is such an important example of the medium's growth. Of course, its core story has been told many times, but crucially not in this way. The film is an exploration of a new frontier and aside from 3D, its real innovations lie in the use of motion capture technology, to create not only a synthesis of the real and imaginary, but also synthetic worlds that have credibility.[37] Contemporary motion caption technologies are the foundation upon which image-worlds are built. The juxtaposition of live shooting and wire-framing movement to produce 3D animation profoundly alters the temporal and spatial framework upon which so much of the cinema has been built over its history.

Contemporary 3D cinema is in its early days as a medium and in its exploration of the power of storytelling. Cameron got much of his inspiration for *Avatar* from his underwater explorations of

the wreck of the Titanic. Cameron is really interested in creating new languages for conventional ways of seeing and describing the world. He did not need to invent a new language for the Na'vi, but he did. He did not have to shoot all those beautiful and magical scenes of Pandora, except that if you have ever swum off an ocean reef, you would have noticed many of the same colours and shapes and why not recreate, enhance, even overwhelm, their original aesthetic, if you can?

In this context, what does the word avatar mean? Avatars are about substitution, which is about substituting for something that is missing, be it a body or a mind or a story. Avatars do not replace their progenitors. That is, unless you decide, like Cameron did, that his main character had to be transformed from a human into a Na'vi, through a death and rebirth ritual that mirrors the history and contradictions of the cinema itself.[38]

Let me switch terminology for a moment and suggest that *Avatar* is actually a commentary on the illusions of religion and on the impossible dreams of immortality that have haunted humans since they began to paint on the walls of caves. *Avatar* is about that inner world, our inner world that we keep alive in order to stay alive. It is the reverse of the Platonic cave, where those who are blind to reality need to be saved. Rather, the film explores those who have reconciled themselves to their fate and who have created a world that is a reflection of their weaknesses and strengths. In other words, the Na'vi represent the dream worlds of viewers who are caught by the allure of technology yet are also fearful of its impact.

Avatar is also the quintessential expression of the extent to which digital media have changed both the content and form of contemporary cinema. For example, the 3D projector that shows the film "buffers the left and right image and projects them in alternation at a rate of 144 frames per second presenting three 'flashes' of each frame."[39] One of the technical contradictions of Stereoscopic 3D is that viewers see only about 35% of the light that they would see while watching a conventional 2D film. One would presume, given the dimness, that there would be less to see or that the 3D characteristics of the film would be less effective. Quite the opposite is true.

How does Cameron achieve the depth of the mise-en-scène and the range of colours, textures and differentially lit scenes? He creates what is in essence a very watery world that is full of liquids and soft, deeply textured objects, where the characters move across the screen as if gravity has disappeared. This is not a world made for humans, though they are exploiting its natural resources. Everything about Pandora such as the planet's gases, flora, and fauna are jewel-like and are constructed in a painterly fashion. In the midst of this phantasmagoria, Cameron does not try to hide his use of digital effects. In fact, he provides viewers with as many entry points into the artificial world of the Na'vi as he can, but it is through the visible interaction of artifice and acting. *Avatar* is as much about Cameron's love of the cinema, as it is about the story he has created, but ultimately the joy and excitement of the film comes from how different everything looks and feels—a constructed world that joyfully celebrates its plasticity!

Cameron's original script for *Avatar* has this description of the creation of avatars for Pandora:

> The Consortium is trying to bridge the cultural gap with the aboriginal population, which has been difficult to communicate and negotiate with. They have recently started a program called AVATAR. They take DNA from a Na'vi, and from a selected human volunteer. On Earth, in company genetics labs, they create an in-vitro embryo, which is a genetic composite of the alien and human donor. The recombinant embryo is grown in-vitro during the flight to Pandora, which takes 3 years (ship-time/ 5 years Earth time... it's a relativity thing). In that time it reaches near adult size, since the locals mature fast. When it is "born" (or more properly de-canted) as a post-adolescent, it looks like a Na'vi, and can live comfortably on Pandora, but it has enough human neurophysiology to be used as an Avatar, or surrogate body.[40]

The idea of a genetic composite is a metaphor for digital culture itself, which is always dynamically shifting the hybrid realities it generates.

Surrogacy

Avatars both represent surrogacy and embody what they replace. To me, this is one of the key characteristics of digital technologies in general and also one of their most important contradictions. In games, digital images are overlaid with the digital tools needed to navigate through their structure and space. In the cinema, surrogacy has always been at the heart of the identification process, but now the architecture of the cinema incorporates uses of light, figure, and movement that celebrate the separation of aesthetics from its roots in the human body. In other words, digital technologies introduce so much flexibility to the creative process that the gap between representation and depiction and between meaning and expression, breaks down. The cultural and scientific foundations for building surrogacy have never been stronger for creative artists as well as for viewers.

The shape and form of the human figure becomes a function of the narrative and of technology. The transformative nature of digital tools and the sophistication of modern cameras have broken the barriers that normally divide objects and representation. In fact, we are no longer dealing with representation, but instead have entered an era of visualization, since anything visualized can in fact be generated. There are so many ways in which image-worlds can be produced that images have no clear roots and are more akin to the dispersed and often incoherent nature of dreams, than representations of the realities to which they are meant to refer and which they are meant to duplicate.

And, this is where stereoscopic 3D further extends and intensifies the breaks and fissures that now regularly rupture conventional relationships in images between space and time and between objects and their referents. The artifice of 3D is so overwhelming that every image can be sculpted into anything. All of this can be done through the application of specific algorithms that by their very nature are not visible to viewers. So, there appear to be no hands behind the camera, even no humans behind the effects. Digital and 3D images have a life of their own that seems to be independent of their creators with an autonomy that challenges authorship. This begins to explain the intensely spiritual way in which Cameron portrays the Na'vi. If materiality is impossible because the medium of the cinema resides in an interstitial space between reference and visualization, then all that is left are belief systems that cannot be verified, other than by the force of belief itself.

The new power of images rests upon their distance from the everyday lives of viewers and the often-desperate attempts by spectators to shape this immateriality into something tangible. Surrogacy is one possible response to the immaterial and to the spectral. With respect to the changes in cinema and culture, surrogacy may well be the overriding characteristic of the new media forms of the twenty-first century and the crucial foundation for the transformative power of stereoscopic 3D.

NOTES

1 A few of the analyses and commentaries in this essay are drawn from my personal website. http://rburnett.ecuad.ca

2 Thomas Elsaesser, "The 'Return' of 3-D: On Some of the Logics and Genealogies of the Image in the Twenty-First Century," *Critical Inquiry* 39 (Winter 2013): 22.

3 Jay David Bolter and Richard Grusin, *Remediation: Understanding New Media* (Cambridge, MA: MIT Press, 2000).

4 See Lev Manovich, "What is Visualisation?" *Visual Studies* 26.1 (2011): 36-49 for a fascinating historical overview on technology and visualization.

5 See a recent essay by Barbara Klinger for more discussion of this issue. "*Cave of Forgotten Dreams*: Meditations on 3D," *Film Quarterly* 65.3 (Spring 2012): 38-43.

6 Much has been made of the iPad's possible influence on the future of reading and writing. Many of the fears about the disappearance of physical books are justified just as the worries about the future of newspapers needs to be taken very seriously. See David Parisi, "When Screens Touch Back" *FLOW* 17.01.17 (2012), accessed 29 December 2012, http://flowtv.org/2012/11/when-screens-touch-back.

7 See Limor Shifman, "An Anatomy of a YouTube Meme," *New Media & Society* 14.2 (2012): 187-203.

8 See his discussion of making *Pina* in this issue of *PUBLIC*.

9 See William Brown, "*Avatar*: Stereoscopic Cinema, Gaseous Perception and Darkness," *Animation: An Interdisciplinary Journal* 7.3 (2012): 259–271.

10 The cinema was dominated for a hundred years by a certain kind of theatricality, mise-en-scène, in which a set or a scene, something visible, determined the structure of shots and the actor's role in them and most importantly the director's creative vista. Now the actor and the director must imagine the scene they are in to a far greater degree than ever before, which is why production processes like pre-visualization and post-production have become so important. In the literal sense there is now no scene. In a sense, because special effects are so important to the cinema in the twenty-first century, the process of production is more akin to the creation of animated films which is why the cinema is now a hybrid or mixed medium.

11 Lev Manovich, *The Language of New Media* (Cambridge, MA: MIT Press, 2001). In this, and subsequent work, Manovich has charted some of the transformative effects of digital technologies on the production of images in the cinema.

12 Born in Solingen, Germany, in 1940, and trained both in Germany and in the United States, Pina Bausch is a contemporary German choreographer and a major innovator of modern dance. She is the founder, director, and choreographer of the internationally recognized "Tanztheater Wuppertal" company in Germany, a role which she has occupied since 1973. Recently, in August 2008, Bausch received the Goethe Prize of the city of Frankfurt; the film director Wim Wenders delivered the "laudatio."

13 Henry Bacon, "The Extent of Mental Completion in Films," *Projections* 5.1 (2011): 31-50.

14 See Sean Cubitt, "*Avatar* and Utopia," *Animation: An Interdisciplinary Journal* 7.3 (2012): 227–237.

15 See Sarah Atkinson, "Stereoscopic-3D Storytelling: Rethinking the Conventions, Grammar and Aesthetic of a New Medium," *Journal of Media Practice* 12.2 (2011): 139-156.

16 See Leon Gurevitch, "The Birth of a Stereoscopic Nation: Hollywood, Digital Empire and the Cybernetic Attraction," *Animation: An Interdisciplinary Journal* 7.3 (2012): 239–258.

17 Sara Roegiers and Frederik Truyen, "History is 3D: Presenting a Framework for Meaningful Historical Representations in Digital Media," *New Heritage: New Media and Cultural Heritage*, ed. Yehuda E. Kalay, Thomas Kvan, and Janice Affleck (New York: Routledge, 2007), 67-78.

18 Jeffrey Kim, Elan Lee, Timothy Thomas, and Caroline Dombrowski, "Storytelling in new media: The case of alternate reality games, 2001-2009," *First Monday*, June 2009, accessed 10 June 2012, http://frodo.lib.uic.edu/ojsjournals/index.php/ fm/article/view/2484/2199.

19 Ron Burnett, *How Images Think* (Cambridge, MA: MIT Press, 2005).

20 Matthew Solomon, *Disappearing Tricks: Silent Film, Houdini, and the New Magic of the Twentieth Century* (Champaign, IL: University of Illinois Press, 2010). Solomon references both the theatrical stage and historical notions of magic, to comment on the importance of Georges Méliès to the history of the cinema.

21 Stephen Prince, "Through the Looking Glass: Philosophical Toys and Digital Visual Effects," *Projections* 4.2 (2010): 19–40.

22 See Balazs Toth, Tamas Umenhoffer, Laszlo Szirmany-Kalos, and Mateu Sbert, "GPU-based Ambient Occlusion and Indirect Illumination," *CEPIS UPGRADE*, XI.6 (2010), p. 5.

23 Ron Burnett, *ImageWorlds*, forthcoming.

24 Andrea Sabbadini, "Cameras, Mirrors, and the Bridge Space: A Winnicottian Lens on Cinema," *Projection* 5.1 (2011): 17-30.

25 For a contrary point of view see, Gerald Sim, "When and Where Is the Digital Revolution in Cinematography?" *Projections* 6.1 (2012): 79–100.

26 See Steven Shaviro, "Emotion Capture: Affect in Digital Film," *Projections* 1.2 (2007): 37-56.

27 Rick Altman "Whither Film Studies (in a Post–Film Studies World)?" *Cinema Journal* 49.1 (2009): 131-135.

28 See Tom Abba, "As We Might Watch: What Might Arise from Reconsidering the Concept of Interactive Film?" *Journal of Media Practice* 9.1 (2008): 19-27.

29 See Veronica Morley and Katrinka Somdahl-Sands, "Music with a Message: U2's Rock Concerts as Spectacular Spaces of Politics," *Aether: The Journal of Media Geography* (Winter 2011): 58-74.

30 Aymar Jean Christian, "Joe Swanberg, Intimacy, and the Digital Aesthetic," *Cinema Journal* 50.4, (2011) 11-135.

31 The Journal can be found at http://www.thenewatlantis.com Bowman's article is in *New Atlantis*, Spring 2010 p. 77, accessed 29 December 2012, http://www.thenewatlantis.com/publications/ avatar-and-the-flight-from-reality.

32 The best article I have read on *Avatar* was written by Daniel Mendelsohn in the March 25, 2010 edition of the *New York Review of Books*. Mendelsohn explores the belief systems of James Cameron, which centre on the use of machines to enhance human strength and power. Mendelsohn also comments on the relationship between *Avatar* and the *Wizard of Oz* linking the new worlds that both films discover as a foundational thematic in all of Cameron's work.

33 James Der Derian "Now We Are All Avatars," *Millennium: Journal of International Studies* 39 (2010): 181-186.

34 For Ubisoft's description of the game, see http://www.ubi.com/US/Games/Info.aspx?pId=7792 .

35 See Ron Burnett, *Cultures of Vision: Images, Media and the Imaginary* (Bloomington: Indiana University Press, 1995), Chapter One.

36 Bruno Latour and Peter Weibel, eds. *ICONOCLASH: Beyond the Image Wars in Science, Religion and Art,* (Cambridge, MA: MIT Press, 2002).

37 See Daniel T. Levin and Caryn Wang, "Spatial Representation in Cognitive Science and Film," *Projections* 3.1 (2009): 24-52.

38 The cinema's simultaneous desire to reflect reality and transform the real has been a source of conflict between realists and storytellers since the cinema was invented.

39 "REAL D 3D Theatrical System A Technical Overview," http://www.edcf.net/edcf_docs/real-d.pdf

40 Retrieved 22 April 2012, from http://web.archive.org/web/20100525105437/http://www.foxscreenings.com/media/pdf/JamesCameron AVATAR.pdf

WIM WENDERS

A FILM FOR PINA
Keynote of the Toronto International Stereoscopic 3D Conference

I'm here because I think
that the story and the experience I can talk to you about
is somehow relevant to what you must be interested in,
otherwise you would not be here: 3D
As you know it stands for "3 times more difficult."
(Don't worry, I'm not here to discourage you,
on the contrary.)

I have been lucky.
Appropriately enough, I was triple-lucky.

Today, the big question about 3D is:
What sort of film can fit the new technology?
How can you fill the promise of the new language?
What "product" (for lack of a better word)
do you have to come up with to do justice to
this challenge named 3D?!
"Can I do this movie in 3D
to improve its commercial chances?
To get more attention?"....

I told you: I was lucky.
I did not have to face these tough and sort of unpleasant questions.
For me, it was the other way around.

I had a film that I wanted to do, badly,
but I felt I just did not have the proper tools to do it.
I wasn't even looking for a third dimension.
It was not even around as an option!
I just felt I was at a loss, as a filmmaker,
and I needed a solution.

Let me explain my luck
and tell my story.
Some of it might sound anecdotic
but I promise you I'll make it relevant
in the end.
(Germans are efficient…
We might not be blessed with a sense of humour,
but we can make up for it!)

Here we go:
I had known Pina Bausch since 1985.
I even had been lucky in the first place
that I met her, because:
I had nothing to do with dance.
It was not for me!
Ballet? Include me out!

in 1985 I was in Venice, Italy, with my girlfriend,
and there were posters all over the city
for a retrospective of a German choreographer,
Pina Bausch,
at the old and beautiful LA FENICE THEATRE.
My girlfriend wanted to go.
She had seen some work by Pina Bausch before,
and she was convinced I absolutely needed
to know this.
I could not care less.
I wanted to stroll around in Venice, have some
ice cream, a romantic dinner by a canal…
Go into a theatre and watch other people dance?
Come on!

We did go in, of course.
In life I am less stubborn than in my profession.
So I caved in.
The piece was called CAFÉ MÜLLER.
I expected to be bored.

Instead I found myself on the edge of my seat
after 10 minutes, my heart beating.
And I was crying helplessly.
Something grown-up men rarely do. (In Germany)
I was weeping.
I was touched like I had never been touched
by anything happening on a stage.

What I saw there, moved me deeply.
I troubled me, amazed me, but most of all:
it concerned me.
What I had thought impossible—in the context
of dance—had happened!
This spoke to me in a very powerful way.

When the piece was over,
(it only lasted 40 minutes),
it felt like I had visited a whole universe.
I realized that this (unknown) woman
Pina Bausch had shown me more about men and
women then the entire history of cinema had.
And all that without a word,
with nothing but movement, body language,
and dancing.
I might be exaggerating a bit,
and the history of cinema has a lot to offer
about the relations between men and women,
but that's how it felt: mind-blowing.

We prolonged the stay in Venice
and I saw all the other pieces in that retrospective.
And I was able to meet Pina Bausch.
We sat in a café and talked for a while.
That is: I talked, believe it or not,
(I'm not known as a talker,
contrary to the impression you might
have today…)
Pina didn't say much, she listened.
And she looked at me.

I felt I had never been looked at like that.
She was looking right through me,
as if she could read my mind, my heart,
and my soul.
I didn't feel naked, though,
like other eyes might have made me feel.
This pair of eyes was investigative, but not cold.

So I kept talking. Blabbering, probably.
And among the things I said,
I also foolishly (and spontaneously) mentioned
that we should make a film together.
Pina looked at me, but did not respond.
I wasn't even sure if she heard me.
Maybe she thought that was so preposterous
that she'd rather not answer.
I let it hang…
and spoke about something else.

But there was a connection between us,
definitely.
In a strange way, from that first meeting on,
I felt like Pina was the older sister I never had.

We were born 50 kilometers apart,
Pina a few years earlier than me, during the war, me right after it.
We spoke with the same accent of this "Rhineland."

We met again a year later, when I visited Pina in Wuppertal, the city where her company was based since 1973.
Which was strange, because in that same year I had shot a film in that town, *Alice in the Cities*, which had been highly important for my life as a film director.
Of course we did not know about each other then…

In that second meeting Pina was a bit more talkative, and she asked me:
"Last time you mentioned a movie.
That is interesting…"
She had heard me.

We kept seeing each other over the years and became friends.
I saw a lot of her premieres
or met her somewhere in the world,
because Pina and her company toured all over the planet.
The subject of a film kept coming up.
Then Pina made a film herself, the only one she ever did, *The Lament of the Empress*, in 1990.
That was the only year I was unable to help her, or be there, because I made a film, all over the world, all year long, *Until the End of the World*.

The result of Pina's film was amazing, in my book, but she herself was not so pleased with the experience.
She felt uneasy about the camera,
and much more comfortable with the stage situation.

So the question of a common film came up again, more serious, as time went by.
If it had been me to suggest it in the beginning, it was now Pina who insisted.

I took it seriously now and started thinking about how to capture her work.
How to film dance, or more accurately,
her "Tanztheater," dance theatre.
And I soon realized I was in trouble.
Trying to imagine how to put her work on screen,
I simply … failed.
I just did not know.
It seemed to me that there was an invisible wall between what Pina put on stage,
her very physical, intoxicating,
contagious, joyful,
sometimes painful, personal work,
and what my cameras could capture.

Pina also showed me the recordings that had been done of some of her plays, for television,
(on some of which she cooperated)
and she was not so pleased with them.
"We have to do better," she said,
"I'm sure there's a better way!"

The pressure was on.
As a friends I could not possibly disappoint her.
But I felt I just did not have the tools to do justice to her work.
Something was badly missing.
Either in my craft, or in my imagination.
But there's only so much a camera can do in front of a stage.
You can put it on a tripod,
you can put it on tracks,
you can put it on a crane,
even with a remote head,
you can put it on the shoulders of your cameraman, handheld,
or you can use a steadycam…
None of it seemed to solve my problem.

Dancers of the Tanztheater Wuppertal Pina Bausch, *Nelken (1982)*, Haniel spoil tip, Bottrop 2010. © 2011 Neue Road Movies, photo by Donata Wenders.

In my despair, I turned to film history
and saw all dance films I could lay my hands on.
But the more I saw the clearer the picture became:
there was a problem between DANCE and FILM.
That invisible wall was not just in my imagination.
It was definitely there.

I had to be honest with Pina and tell her.
There was no use hiding anything from her,
anyway, she could see right through any lie.
She was not astonished about my statement
that I did not know how to do it.
It almost felt like she had expected it.
But she did not give up.
"We'll have to find out!" she said.
"There's got to be a way!"

I thought so, too.

I figured I just had to dig deeper,
in my own imagination and in my craft.

Over the years,
Pina's request became more urgent.
And I understood why:
Her work was very fragile.
Dance theatre is a very ephemeral medium.
It only exists when you perform it.
You cannot write it down, like Shakespeare,
and pass it on to another company to do it…
It only works in this one configuration,
this one troupe of dancers
and this one choreographer.
Pina developed a new piece every year,
that was months and months of work,
they toured like a rock 'n' roll group,
all over the planet.

She was running a huge company.
This was a lot to handle already.
But on top of that,
Pina felt she needed to keep her entire
body of work alive.
So she also played and re-rehearsed and
re-cast her older pieces,
and by now there were 30, later on 40 pieces.
This was a true Sisyphus work
to keep them all in the repertoire
and to literally keep them all alive.

That's why Pina was so determined
and felt like she just needed to find
another language,
a valuable way to film her pieces,
to preserve them, "guard" them in a different way
than live performances…
That was her (vital) interest in our collaboration.

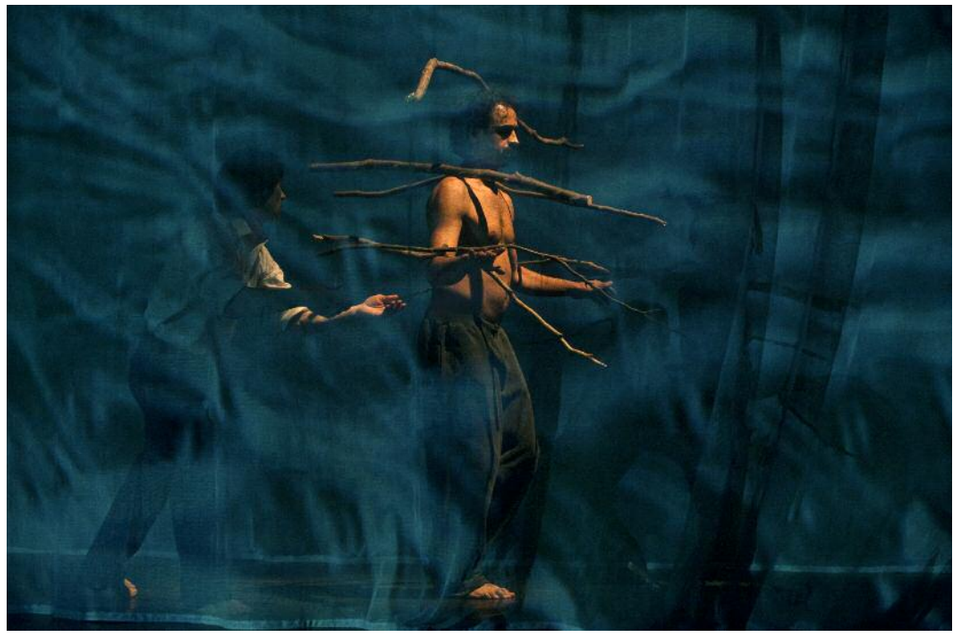
Mine was still the same as in the very beginning:
I wanted to find out about her look,
the way Pina looked at the world,
but especially at her dancers.
What enabled her to do her unique work
that nobody in the world
had done like that before.
Pina had really revolutionized dance,
and ballet, anyway,
had put that entire world upside down,
or rather on its feet.
Before her, dancers had been "performers,"
playing parts in pre-existing or pre-shaped
choreographies.
Dancers were highly trained athletes,
extraordinary bodies,
removed to a world of their own.
Pina had given dance back to common humanity.
Her dancers were young and old,
often way too old for any other dance,
let alone ballet company.
They were skinny and way too voluptuous,
small and way too tall.
They were from all over the world.
Plus: they were dancers and actors.
They spoke on stage,
they did a lot, that actors would do.
But they did a lot, too,
that only dancers could do.

My interest was to make a film about her eyes,
show (and understand) that look of hers at work,
which had turned dance
from an aesthetic experience into an art form
that actually reflected our world,
our hopes and anxieties.

As much as Pina mistrusted language,
she trusted her eyes.
She was a passionate and patient observer
like I had never seen one.
And she had an incredible gift,
and really specialized her entire being
in watching and reading and deciphering one thing:
Body language.

Now, us movie directors fancy ourselves
as being somewhat specialists in that field.
We have actors in front of our camera,
sometimes even famous actors,
and what's called their "presence" in front of
the camera is nothing but their body language.
We tell these actors what to do,
we direct them—more of this, less of that—
so we have the impression
that we know something about the business
of body language.

Watching Pina work
and seeing how differentiated and detailed
and rich her knowledge of this language was,
I realized I was almost an analphabet
in the grammar and the vocabulary
of body language.
And so were my colleagues.
Pina had gone so much further!



Jorge Puerta Armenta and Rainer Behr, solo by Jorge Puerta Armenta from *Bamboo Blues (2007)*, Wuppertal, 2010. © 2011 Neue Road Movies, photo by Donata Wenders.

Her method of developing a play was amazing.
Around the given subject of the new piece
she would start by developing a catalog
of hundreds of questions,
some very general, some very personal,
some very detailed,
some just words…
and give them to her actors/dancers,
and let them give her answers,
but not in words, with the spoken language,
but in their own language,
the language of their bodies,
with gestures, movement, dance…
They were not allowed to talk.
And Pina would look at the answers
and ask for more precision,
to be more specific, more detailed,
and she would ask the same question,
or a refined one, the next day.
And she would persist, for weeks,
until she had a whole
"anthology of body answers,"
often hundreds of hours,
and out of these she would then compose
her pieces.

So that's why I was so touched by her work.
It had not been imposed on the dancers,
they had found it in themselves, in their answers,
and those had started in their bodies to begin with.
That's why I related to Pina's work so physically,
so existentially:
it had come out of life, out of experience
it had not been forced onto the dancers.

With that method, or approach,
came another peculiarity of Pina's work.
She abolished all sense of "character"

Dominique Mercy and Michael Strecker, solo by Dominique Mercy in remembrance of *Bandoneon (1981)*, Rotter Tunnel with graffiti by Brazilian artists *Os Gêmeos*, Wuppertal, 2010. © 2011 Neue Road Movies, photo by Donata Wenders.

or "role-playing."
Her dancers/actors were led
to be radically themselves,
drop all disguises,
show and reveal their innermost selves.
Pina's work was also about "identity."
Who we are,
when we are stripped of all defenses.
Her dancers all carry their own names on stage.

To get back to my chain of thought:
there we were,
with our mutual interests in a common film,

- finding a language to preserve the pieces on her side
- watching her eyes at work on my side

and those were easily compatible.
But: we were without a clue how to do it.
Each time we saw each other,
Pina asked me: "Do you know now?"
and I answered: "Not yet, Pina."
This went on for years.
Eventually she just raised her eyebrows when
she saw me, and I shrugged my shoulders.
It was almost like a slapstick routine between us,
and we laughed.
But it was quite serious, after all.
I would have dropped everything and anything
to do this film with her.

And that could have been the end of the story.
I could have kept on thinking that I had to
find it in myself,
the way to tear down that invisible wall,
that missing language for dance…
and Pina could have relied on me for an
eternity to discover it one day.

I did not, and I would never have found it
in myself.

Instead I found it one sunny day in a place I
had expected it least,
and had certainly not looked in: in technology.

At the festival in Cannes, in May 2007,
U2 was playing live on the famous Festival stairs
and the additional attraction (as if it needed one)
was a film very ingeniously called *U2 in 3D*.
I went there, not expecting much.
I went there for the music.
I had a film in competition,
and in Cannes you can use all the relief from
pressure you can get!
So I sat down in the Grand Palais
and put these glasses on, for the first time.

Instead of a quick entertainment break,
I was in for something big.
I had one these "revelations"
that you don't have too often in your life.
It completely took me by surprise:
From the first shot on
a door opened up in the screen.
Actually, the screen disappeared.
It made room for something that took place
before it and behind.
I was invited into space, into a space adventure
actually, that would not lose its grip on me for
years to come.
And that will not end today, either.

So from the first moment on
I thought one thing:
Eureka! This was what we had been looking for!
This was the language for our film!
It seemed so obvious!
How could I have missed it,
not have thought of it!
The dancer's realm was space,
with every gesture, every step, every movement
they were exploring it, delving into it.
And here was a tool that gave access to it!
My craft had just been given an extra dimension!
Not a small thing, not a gimmick!

I mean, for a hundred years cinema had
invented splendid tricks
which I loved and cherished (and still do)
to overcome its huge deficit.
It had always made us believe
that "space" was actually available on the screen.
By moving the camera on tracks, on cars,
on helicopters,
by dropping it from planes, by letting it float
and fly
(Abel Gance had swung a camera through a room
hanging on a rope, in 1927!)
cinema had created the illusion
that it had a grip on "space."
That we were, indeed, on a "space odyssey."
But it had always ended up
on a two-dimensional screen.

Anyway, this all ended for me one sunny
day in May 2007.
I didn't have much eyes for the film,
I even didn't want to see its flaws,
the figures of Bono and Edge that looked
like cutouts,
the jerky movements sometimes,
the wrong editing rhythm…
after all, this was a predecessor to something
bigger to come.
I just saw the possibilities
and the affinity.
This medium (and I took it for granted it was
going to be one)
was made to represent dance,
to bring out its best.
And somehow I even felt
it was also going to work the other way around:
dance was going to bring out the best in 3D…
music wasn't necessarily its best subject.

As soon as the screening was over I called Pina
and told her: "I think I know now how we

could do it!"
I did not need to say more…

Soon afterwards we started to actively conceive of the film and to prepare it.
For Pina the most important thing, of course, was: Which ones of the plays can we film?
There were forty-something to choose from.
We only could pick four!
More was impossible for one season.
The pieces needed to be put on the agenda of the theatre.
If they weren't rehearsed and played publicly, we would have no stage, no sets, we could not film them.
The first possible moment for the company (with their long-time planning) was the fall and winter of 2009.
We chose the four pieces,
CAFÉ MÜLLER, SACRE DU PRINTEMPS, KONTAKTHOF and VOLLMOND,
which was in itself a heart-breaking process, as we had to rule out so many others.
So then we had the backbone of a film, and a start date.
We were in late 2007,
and I had enough time to find out if my 3D idea was holding water or was just a pipedream.

In 2007, 3D was not really on the map of the cinematographic landscape.
There was not much to be known about it.
Rumours of equipment, of things to come.
I was fishing around in the dark.
It seemed way too early to want to do a live action film.
The only movies that were starting to come out were animation films, some of them really well made,
and a couple of unspeakable horror films that rightfully carried the name of their genre.
Nothing I could possibly show to Pina to support my wishful thinking of the new language.
I had to find somebody who would know something…

You can't even begin to understand how lucky I was!
I asked my neighbour.
Yes, the man living next door to me in Berlin.
A Frenchman who was teaching in Paris, as a Professor at the École Nationale Supérieure des Art Décoratifs.
François Garnier is his name.
At some earlier point, over a glass of wine, he had told me he was writing something about 3D,
and was involved in developing and designing 3D virtual spaces.

It turned out that he knew a lot about 3D, practically and theoretically,
(actually he was working on his doctoral thesis about it)
and François had actually made a couple of experimental short films in 3D for theme parks and museums in France.
And he had worked on these adventures with a man who had constructed the stereo rigs for those films himself:
stereographer Alain Derobe.

François and I went to Paris
and he introduced me to this man with the unknown profession.
And that was my greatest piece of luck.
I met a white-haired man in his early seventies who had for a long time been a D.P. in French cinema
and who for the last twelve years had dedicated his life
to the exploration of stereoscopie
and the development of 3D equipment.
This Alain Derobe had practically made all the rigs himself that were available in Europe at that moment.
And not only that he knew the technology.
Here was the only man in Europe who understood what I had in mind.
Because he had not only been passionate about 3D for years already,
he was most of all passionate about the physiology of seeing.

He loved 3D for what he hoped (and knew) it was going to be able to do one day.
So when I told him at our first meeting:
I am not convinced with the sort of three-dimensional representation we can see at the moment.
I want you to tell me if there is a 3D to invent that would feel so effortless and genuine that you would forget it after a few minutes.
I do not want 3D to be the attraction of my film,
I want Pina Bausch's dance to be the attraction.
The 3D I am dreaming of will be pleasant to the eyes,
it will not hit you over the head,
it will never feel like a rollercoaster ride.
It must feel natural and unpretentious.
Sincere! The opposite to gimmicky.

Alain hesitated a long time before he gave me an answer.
And his answer was a question:
"When do you want to do this?"

At that moment we had more than a year to go.
I told him so. He nodded.
"But there will be a lot of work."

I did not really understand what he meant.
I only understood when we did our first test, out in the streets of Paris somewhere.
It felt like the Lumière brothers breaking out their first camera and shooting people exiting from the factory.
The only thing was: we did not have to hand-crank our cameras.
They were digital.
It felt exciting!

An assistant was running around producing some sort of movement in front of the camera.
Waving his arms, turning in circles, gesticulating.
After all, we wanted to eventually shoot dancers.
The hour of truth came when we watched our material a couple of hours later.

On the screen, the arm-waving assistant was a four-armed Indian Goddess.
He also had lots of legs when he was running.
The space was there, alright,
but the shocking news was:
this technology could not represent movement well!
For dance, for the elegance of Pina's art, that was just as important as space.
I could not possibly show these tests to Pina.
She would have been appalled.

For the next few months we experimented.
And shot, and tried, and did everything in the book to improve on that deficit of 3D.
Obviously, shooting with 50 frames, or 48 was the solution…
We tried it, and projected it ourselves with our two beamers.
It was too good to be true:
Impeccably smooth and elegant movement.
But Alain immediately dampened down my excitement.
We could shoot in 48 frames alright.
But we could never project it commercially.
All cinema beamers in the world were normed to run at 24 frames.

Later on, we found out that even James Cameron

had unsuccessfully tried to go up against
that norm.

We tried other things.
Experimented with other shutter speeds.
Compared the effect of focal lengths on
stroboscoping.
Used some motion blur in post-production.
Avoided too stark contrast…
And slowly got better results
and made progress.
One thing was obvious:
any small default shooting on film, in 24 frames,
was multiplied, even potentiated in 3D.
When there would a little stroboscoping on film,
it would be massive, and unacceptable, in 3D.

Alain met Pina, we saw her new piece together,
he was very moved,
and Pina felt more confident about this 3D thing.
She had never seen anything,
and she did not want to see anything else
than her own dancers.

We were finally confident and ready
to show her.
For late June of 2009 we prepared a huge
series of tests that we were going to do on
Pina's own stage, in Wuppertal,
with her dancers, over several days,
and a big live screen on which Pina could see
for herself
what I so far could only describe to her
and what I had promised her was that new
language we had been looking for.

We packed a truck in Paris
with all the equipment for this first "acid test."
We were sitting in our office in Berlin
to discuss in which order we were going to
record what,
when the phone call came.
The unimaginable had happened:
Pina had died the night before.
From one day to another.
Unforeseen. Suddenly. Tragically.
Apart from her son,
nobody had been able to say good-bye to her.
None of her dancers,
and for some of them she had been the centre
of their lives,
they had worked with her for thirty years.

We pulled the plug,
called our French co-producer, the financiers,
the crew,
and called the film off.
There was nothing else to do.
For twenty years we had dreamed of it, together,
there was a concept for a film with Pina Bausch,
for a film about her look at work.
Without Pina,
none of that was possible any more.

In a tragic way, it seemed,
we had hesitated for too long to make this film,
or rather had waited for 3D for too long.
Then again, to soothe my regrets and my pains:
we could not have done it any sooner.

Weeks passed.
There was a very moving memorial service
for Pina.
The company was in disarray and in a state
of shock.
But the dancers decided to continue
and to fulfill all the obligations
that the company had undergone with Pina.

So they decided to start rehearsing the pieces
that Pina had put on the agenda for our film.
And that was the turning point:
These four pieces that Pina had wanted so
much to be filmed
and to be preserved in that new language
(hopefully in an adequate way)

Aleš Čuček and Tsai-Chin Yu, *…Como el Musgulto en la Piedra, ay si, si, si… (2009)*, Wuppertal, 2010. © 2011 Neue Road Movies, photo by Donata Wenders.

were going to be performed,
maybe for the last time.

It was the dancers who pointed it out to me:
We performed, even on the night when we
learned about Pina's death,
we played in tears,
but we knew it was what Pina would have
wanted us to do.
She meant it when she said:
"Dance, dance, otherwise, we are lost!"
For her, dancing was the answer to all letdowns
and struggles of life.
Dance was her weapon.

Canceling the film was the wrong thing to do,
it slowly dawned on me.
We could no longer do the film with Pina that
we had planned.
But together we could do a film for Pina!
It would be an homage to her,
but also a way for all of us to say goodbye,
and thanks,
and to deal with the loss and the grief.
After all, it needed to be a film for the living
in order to come to terms with Pina's death.

So from one day to another
we jumpstarted the film.
And we were ready just in time
to shoot the plays.
We did not know yet what else to do.
These plays on their own would not constitute
a film, far from it.
But there was no concept yet
to replace everything we had planned to do

together with Pina,
with her in front of the camera and behind.
The film that needed to be done was now, in effect, much more to be invented on the spot.

We shot three of the plays in that fall of 2009.
For each of them we had four
public performances
and two days with the ensemble alone,
without an audience.
On the days with audience,
we had to shoot from a huge "Technocrane"
with a remote head that allowed for wide shots
from the centre of the theatre
and to enter the stage up to the middle of it.
The crane and its platform filled half the theatre,
so only the tickets for the other half
could be sold.
And of course we had to know the pieces
by heart
to know at each and every moment
where to be placed with our camera to have
the best possible angle to bring out
the architecture of the choreography,
and to never be in the way of the dancers.
In the public performances we could not
interrupt, of course.
Our takes were up to an hour long.
(Two of the plays last two hours and a half…)

3D needs a lot of light.
The mirror rigs (and we only worked with
the mirror)
eat a good f-stop of light.
So a great challenge was to boost the light in
a way that it did not interfere or change Pina's
lighting concept.
Even if there was more light, the pieces had
to look exactly the same.

For the film, we were aware of that,
we only needed short excerpts of each piece.
But as Pina would have wanted it,
we covered the plays meticulously,
in their entire length.
And I am now editing the full length version
of each play.

We had two stereo rigs going at the same time.
The one on the crane and one parallel one
that shot either from the balcony or from the
side of the stage.
For Alain, the stereographer,
that was an enormous amount of preparation.
During the shots we could not interrupt or
change anything.
So he had to set up each rig for all possible angles.
Both were able to change the interaxial
(or interocular) distance, thereby shifting the
convergence, the plane of the screen,
forward and backwards,
which would put the dancers either on the
plane of the screen
or behind it or in front of it.

Each rig had eight electrical motors
that ran simultaneously.
Everything was on remote control,
f-stop and focus anyway,
and was monitored by the D.I.T.—the Digital
Imaging Technician—during the shots,
and he could supervise and change
all internal parameters
like contract, colour, aperture,
of course simultaneously and in total synch
for both cameras.
It was high pressure work.

On the days without the audience
we could actually enter the stage
and place the crane on it
or right in front of it.
I could also interrupt and repeat sections
that we were not able to capture well in the
public performances.

We had learned a lot of things from our tests.
Lateral movements and panning of the
camera were a complete no-no.
There was stroboscoping right away.
Only if we followed a dancer's move
very precisely,
the camera could pan with them laterally,
but really had to be glued on to them.

We refrained from changing lenses.
3D only works well in a focal range
that corresponds to our human vision.
In camera terms that means a wide to
normal angle.
We finally decided for the 10mm lens as
our main vision.
Only occasionally, for close shots,
we went to a 14mm.
That was for a Sony 1500 camera, with a 2/3 chip.

Zooms were out of the question.
Today the technology exists to use a zoom lens,
at the time, in 2009, it was impossible.
And we did not want it, anyway.

I also found out, when doing my first editing
in 3D, at the end of the first days of shooting,
that switching focal length between shots
was perceived as unpleasant.
Our eyes only have one fixed lens and one
angle of vision, anyway.
And we had determined
that 3D felt the best, and the least intrusive,
if we imitated with two cameras,
as good as possible,
what two eyes are doing,
and how they are working.
Eyes never change angles and focal length.
So we shot the entire film, more than 90% of it,
with one set of lenses.
And as two lenses are never the same,
we carefully compared lenses until we found
the perfect matches.

We had also learned that slowly moving in
with the camera
was a very natural thing to do
and represented a human point of view
of somebody who was attracted and therefore
moved closer.
Very slight lateral moves of the camera
were fine as well,
they shifted the perspective a bit
and helped creating space and depth.

On that first phase of the filming,
we only shot on stage, only three plays,
the fourth and last one was planned for the spring.

And then we paused.
We had no clue how to continue.
I started editing, curious of how the material
that we shot so far, would cut. And hoping
that it would somehow reveal a continuation.

During those months, on Christmas of 2009,
Avatar came out.
It did put 3D on the map in a big way.
I was so grateful,
because finally our film, too,
was taken more seriously.
Before, most people who knew about our project
thought we were plain crazy.
And the most frequent question was:
Will the film also come out "normally?"

Avatar changed that.
I don't know how you think about the film.
I thought it was a masterpiece,
a grand vision like they rarely happened
in the history of cinema.
Of course, it had flaws, especially in the script.
When I saw the film for the first time,
I was very excited over two thirds of it and
then quite disappointed that it turned
into another … war movie, after all.

It had so many (dramaturgic) chances to go another, more surprising, peaceful or anti-violent way.
Well it didn't.
But the world that Cameron had created was amazing,
and I loved the film for that.

Little did I know then
that nothing was going to follow it.
Until today, I am waiting.
Cameron had put up the bar very high,
but ever since, nobody tried to jump over it.
They all walked safely underneath.

In terms of 3D, I saw,
that he had had no secret weapon
that we did not know of.
All computer-generated stuff
worked very smoothly.
The blue Na'vi moved elegantly and beautifully,
but the real people in the background
moved like our assistant at the time:
There were some four-armed goddesses
on that planet.
Cameron just cut so quickly it would go
largely unnoticed.
And he had a story to pull him through.
We did not have a story, yet…

We had preserved three of Pina's plays,
like she had wanted.
How could I still approach my angle…
to film her look at work,
now she was no longer with us.

As I was editing it hit me:
These dancers were still there,
and some of them had Pina's look rest on
them for years and years,
day in and day out…
They could tell me!
And not as interviews.

This was going to be a film without interviews,
I had promised Pina.

All I had to do was employ Pina's own method.
I would ask the dancers about the nature
of Pina's look,
what she saw in them that they were not even
aware of,
when she saw the best in them,
when they felt closer to her than ever before,
or after, etc…
and they would answer in their own language,
dancing.

I proposed that to them and they all agreed.
Each and every one of them eventually showed
me their answers.
It was not improvisations—I had made that
a condition—
(I would not have been able to judge this)
it was material they had worked on with Pina,
that Pina's eyes had been on,
and that had been used, or not, in previous plays,
or had been eliminated in the editing process
for a piece.

For these "danced answers" we did not have a
stage anymore,
let alone sets.
So I decided to take them outside,
into the city and the adjoining landscapes.
(Pina's own film only encouraged me to do so.)

I had more freedom for these solos, or duets,
and was able to find a particular place
for each and every one,
that could bring out the best in every answer.
Of course I did not interfere with the
chorographic part of it.
But I could now show them from all sides
and could have my camera dance with them.
On stage we had respected the fact
that Pina wanted her pieces to be shown
from an audience perspective.

We did the second stage of our shoot
in the spring of 2010.
The last remaining piece, KONTAKTHOF,
with the ensemble, of course,
but also with a staging Pina had done with
senior citizens as well as with teenagers.

Outside, in Wuppertal and the Ruhr district,
we shot the first set of "danced anwers."
Our equipment was much lighter now.
Instead of the dinosaur crane,
we could now shoot on a steadycam rig
that Alain had constructed for us.
The cameras were lighter and smaller now,
—we used Sony P1s—
even if they were technically identical with
the bigger 1500s before.

For the beginning, the middle and end
of the film
we worked with the entire ensemble
who performed a "line" from the piece
CARNATIONS,
first on stage, then coming out of the theatre
into the city,
and then on the highest point in the Ruhr district,
a bleak black mountain of slag.

And I shot with each and every one of the
dancers what we called our "silent portraits."
I will tell you more about those later.

After this second leg of our shoot
I went back to the editing room.
Finishing a first rough cut,
I realized I needed a few other elements
for the film
and in the summer of 2010 we shot one last time.

Our budget didn't allow for much anymore,
so we had to scale down the equipment and
the crew once again.
We shot strictly on steadycam,
this time with the even lighter Sony EX3.

As these cameras allowed to record on-board,
there was no more need for exterior recording
devices.
We were really down to a documentary-size
crew of six people.
In spite of this, we shot about one third of the
film this way.

Among my "missing pieces" were more solos,
but also a scene that involved a model of the
stage of CAFÉ MÜLLER
that Pina's art director and stage designer
Peter Pabst had built for us.
In our tests we had come upon the
"miniaturization effect" that occurs under
certain conditions when shooting with a wide
interocular distance.
People then look strangely miniaturized,
which usually is an unwanted phenomenon,
but we wanted to use the effect on purpose
and had already shot a wide view of the stage
of CAFÉ MÜLLER.
We now added a scene
in which two of Pina's dancers from the
original production of the play
look at the model and talk about the origin
of the production.
And inside the model
we see the miniaturized stage…

The most exciting thing of this one year
long 3D experience
had not been our complicated dance shots
—some of them also choreographed in
complex ways,
with hundreds of crane and camera moves
for takes as long as one hour—
the most exciting thing was the simplest,
those "silent portraits."

I had shot medium-size close-ups of each dancer,
just sitting in front of the camera,
without words, without sound,
and my only indication had been:

You are on your own,
you're all alone,
just resting in yourself,
and after a while, on your very own timing,
you will find a way to look into the camera,
as if it was a friend,
somebody very close,
who you are very familiar with,
and certainly not afraid of.

For each of these portraits
I sent the whole crew away,
so I was just alone with each dancer,
sitting behind the camera,
looking at the little 3D control monitor on
my lap.
That was unbelievable!

It surpassed everything I had expected so far
from 3D.
I had dreamed of dance to be shown adequately,
and beautifully, and as naturally as possible,
but all of a sudden,
something else emerged, in front of these two
eyes of our camera:

There was a person in front of the camera,
and in front of me,
but also eventually in front of the audience!
A real body.
Not just a shape, a cutout,
like in a hundred years of cinema before.

There was "volume."
Roundness,
No longer a flat surface,
like in any close-up I had ever seen before,
but a true "presence."
There was the aura that you only see
when you are confronting somebody
and really RECOGNIZE him, or her.
When you can reach out and TOUCH,
not only with your hands.

You can also touch somebody with your eyes,
when he (or she) is there.
When there is a YOU and a ME.
I and THE OTHER.

That is a situation we only know from life,
not from cinema.
In movies, the screen itself, the flatness of it,
creates an abstraction.
I am always her here, sitting here,
inside me, inside my reality,
and whoever is on the screen is apart from that,
even if the story creates the strongest
identification.
We know that.

We have SPACE around us.
That is what our perception needs to give us
a sense of reality.
The flat screen only has an illusionary space,
an emotional space (in a good movie)
we can immerse in it for two hours,
but it is essentially the same space a painting has,
or a photograph.

When I sat in front of these actors/dancers
just a couple of metres away, behind the camera,
alone in the room with them,
I was still talking to them, they looked at me,
I gave them some last direction,
we shared the space of the YOU AND ME,
—or the I AND THOU as Martin Buber called it—
and then I stopped talking and left them
on their own
and looked at the little monitor,
that I was holding, after all, in my hands,
like I had been holding lots of computers or
iPads or screens,

I realized with an immense shock
that some of the mystery, the intimacy,
the uniqueness of a human encounter
that we never ever granted the movie screen
to possess
or to be able to carry and capture…
that some of that was there, in this three-
dimensional image.

I must say: I was, again, unprepared.
We had been using this technology for
weeks already,
and had started to "understand" it,
learn how to move the camera,
learn how to deal with "depth,"
but this sheer presence of a person,
without choreography,
without sound,
without story,
almost without purpose,
was… mind-blowing.

I had not seen that in any film before,
not in any 3D film, that's for sure,
and not even in our own shots.
How this medium was able to actually transcend
(in the very sense of the word)
the realm of cinema,
of cinematic representation,
and create (or imitate, I'm not sure) "presence,"
human presence, in body and soul…
that was shocking.

The most outrageous, though, was, or is:
the present perception of 3D is going
in the opposite direction.
It is all taking place in the realm of fantasy,
and the actors on the screen are more
devoid of reality than any actor in any old black
and white movie.
Johnny Depp and Penelope Cruz in *Pirates of the Caribbean* for instance
(I could pick many other examples)
are not "there"…
they do not exist,
with all the gimmickry around them
they are strange, human-like creatures,
"body snatchers" like in that film by
Phil Kaufman.
And that goes for everything that comes
packaged in the 3D envelope
of the Major Studios.
They have taken this language,
this amazing new medium,
and … kidnapped it,
stolen it, mutilated it beyond recognition,
so none of their audiences could possibly
conceive of it as a tool
to represent … reality.
Human reality.
Our planet.
Our existence.
Our concerns.

But: I am convinced that this is what 3D was
invented for
and what it can do.

Remember:
when digital technology came up in movies,
in the early to mid-1990s,
it first appeared in commercials,
very expensive video clips
(we all learned the word "morphing" from a
Michael Jackson video)
and in expensive special effect shots
to basically blow up everything.
Remember:
when we all watched 9/11
most of us first thought it looked like movie
scenes we had seen before.
The word "digital" had a strange smell.
It smelled of "manipulating," "cheating,"
messing with reality and with the truth.
But a few years after "digital cinema" appeared
to us under that aspect,
digital technology single-handedly saved the
documentary form
and single-handedly reinvented it.
The documentary was dead,

expelled from movie theatres for more than
a decade.
Today, there are hundreds,
thousands of good and important
documentaries every year
that would not have been made,
could not have been made,
without these digital tools.

All I am saying is:
the very same thing is happening with 3D.
It got out of bed on the wrong foot.
People think it is strictly a fantasy tool,
owned by the Big Studios.
And the studios have no interest whatsoever
in proving the opposite.
They have no interest in developing 3D
as a "language."
They just don't take it that seriously!
As long as it rakes in the money,
they are happy to not explore it
in any other way
than as an attraction in itself.
But 3D can do/can be so much more!

I go to see most of these movies,
I know what I am talking about.
Some are totally demented,
they are about… nothing.

But 3D deserves so much better.
It deserves to be taken seriously!
It should/it will/it must
become the very language of future
reality-based movies.
Documentaries as well as fictional films.
It is so absurd that the notion of a "fictional
film" means, for more and more people today,
that it is not related to any reality.
That is a cultural disaster,
a tsunami wiping out our imagination.
Stories are rooted in myth,
and myth is distilled from human experience,
from life.
Stories are not recycled versions of other stories
that are already formulated from previous
stories.

That is the present state of the blockbuster
cinema.
I am getting carried away.

3D has a totally unexplored affinity to … reality.

I had stumbled upon this, by sheer luck,
so to speak.
It had been possible
because Alain had put the tools into our hands,
because these amazing people, Pina's dancers,
had been willing to share this work of grief
with us,
and because they had been prepared,
through the years of working with Pina,
to let go of any role-playing, of any parts,
and just be themselves, as much as possible,
on stage just as well as in front of a camera.

3D belongs into the hands of documentary
filmmakers,
of independent writers, directors, authors,
of people willing and able to forget limits, rules,
formulas, recipes,
and enter a whole new age of cinema,
where there is more…
connection.
Existential connection.
Believe it or not, 3D has that connecting power.

I have been lucky,
to come back to my opening line,
because I discovered 3D out of necessity,
because dance needed it,
because I had a subject with a strong affinity to 3D.
3D was able to bring out the best in dance,
something that was hidden to cameras before.
And in a strange and unexpected, unintended way,
dance brought out the best in 3D,
something that was also hidden before.

For all of you who intend to use the medium
in the future
I wish you will take it seriously,
not just as an attraction,
I hope your subject needs it,
and has an affinity to space and depth and
volume and presence.

But my deepest desire, my urgent request,
is that you have an interest in the act of seeing,
in the physiology and psychology
of what our eyes and our brains do together,
in unison
in the most amazing perfection,
to create space, depth, volume and presence.
Every day, now, "in life,"
when you go outside of this beautiful theatre
into King Street,
when you go home and see your friends,
or kids, or neighbours.
Your eyes and your spatial perception are
miracles.

That is what 3D tries to imitate
and could become:
a miraculous new perception of life.
There is still a long way to go,
this is an adventurous road
and territory that is still largely unknown.
Go for it!

11 June 2011

VIEWS & REVIEWS

COLUMN: IAN BALFOUR

On the Intractable, Now and Then

Is the intractable still what it used to be? Have the very possibilities of change and the massive resistances to change, undergone real transformations? Has change changed?

One hears a lot these days, too much really, of the "tipping point." That notion, popularized by the rather unprincipled Malcolm Gladwell (who speaks to some unsavoury groups if the fee is high enough) is often enlisted of late, beyond Gladwell, to highlight specially how a relatively small number of even ordinary people, (i.e., non-politicians, non-billionaires) can effect changes with far-reaching consequences for entire countries and populations. In tandem with the new discourse of the tipping point, some have argued, with an air of scientificity, that all that is required to make a difference for a given populace is to mobilize a concentrated 10% of the people.[1] Whereas the 10% "rule" is revelatory and must now and then have held sway, as a general rule it cannot hold up, not least because often there are or can be diametrically opposed or divergent positions held by more than one group of approximately 10% of the respective grouping. And on some issues there are, *pace* liberal and conservative mainstream media, more than two sides to some stories, more than two alternatives for a course of action. Moreover, this model only works within a single, circumscribed polity: a town, city, province, state, or country. It cannot be mapped easily onto to a conflict between nations or groups of nations. The agonistic relation there is utterly different, as are the dynamics of interactions among nations at a decisive remove from the main conflict. Even algorithms would come up short.

Much has been made, and rightly, of the potential for social media networks to do or help do almost instantly or quickly and in a non-governmental way what could only have been accomplished, decades earlier, in slow, clunky fashion, or to do things that were formerly not accomplished for lack of popular support. The jury is still out on just how crucial social media were for springing the Arab Spring but there is no denying it was an important, if not quite determining factor, in shaping possibilities on the ground, day to day: a supplement that in retrospect looks to have been close to necessary. The possibilities built into social media seem almost inherently democratic and populist yet the content of populism can in its turn be almost all over

the map, from left of centre to hard or soft right. (Somehow centrism, paradoxically, rarely seems populist.)

For a long time there were certain historico-political configurations that were manifestly bad, even evil, widely recognized to be such and yet they persisted against a good many odds. They seemed intractable. South African apartheid was an extreme example of one such institution that for decades and decades was all but universally thought to be immoral, unjustifiable, and worse. It persisted long after worldwide denunciation and not a few practical measures effected against it. Today the principal example of the intractable is the ongoing debacle of the Israel-Palestine standoff. Its resolution has to be the most pressing and desirable matter in our global-historical moment. It is not as if the twain between East and West (the terms are clumsy) would all of a sudden meet but a viable solution would diffuse conflicts and tensions in the region and across the world. Geopolitics would be vastly different and better, overnight, and for the future.

In the South African case the forces that kept apartheid in place were in the first and last instance economic, aided by ideological encrustations dating back to the "scramble for Africa" and longer. Economic interests and (literal and other) investments propped up a regime of institutionalized and legally codified racism. The divorce between the explicit principles (democracy, freedom) and self-serving economic imperatives on the part of many regimes around the world—liberal, neoliberal, and more—with an "interest" in South Africa was staggering. The eventual but perhaps not quite inevitable demise of apartheid can be ascribed to a large number of factors having to do with boycotts, international financing, divestment campaigns, dynamics in regional politics, changes in the Soviet Union, and perhaps most tellingly the deleterious internal effects (economic and other) of oppressing the black and coloured populations that undermined, in the end, even white capital from operating smoothly on its well-oiled wheels.

No amount of Internet petitions, Facebook pages, or tweets on behalf of the Palestinian cause is going to persuade Israel's regime to change its course, especially not while the United States props up the country's government. It has come to be a curious instance of ideology in action, since it is apparent that the unswerving US support for Israel is by no means clearly in its economic or strategic interest. Far from acting now in concert with a wide array of Western and client nations, the US has virtually isolated itself in its blanket support of Israel, as in the recent UN vote on statehood for Palestine, for which the US could garner the support of only a handful of nations including Canada (via its albeit unrepresentative, toady government) and a handful of countries, some with populations the size of small towns (Palau, Nauru). One could perhaps have understood at some earlier moment of history why it made sense for the US to have Israel as a strong ally.

But that was then and this is now. If the US were to switch allegiances, Israel would be utterly isolated and would have to compromise far more than it has been prepared to do so in recent decades. What would be the downside for the US? Some temporary loss in trade with one country and diminished arms sales? Perhaps not even that. In the end, it might well be that sheer economic interest in the US comes to trump ideology—even Republicans might see *this* economic light. For decades the US has implicitly acknowledged the wisdom of the discrepancy between *de facto* alliances with oil-rich Arab and Muslim states and the set-in-stone rhetoric about it being the staunchest ally of the Israel.

And yet on what Palestinians sometimes call "the Situation" remains on the ground intractable or all but. Neil Hertz, in his bracing *Pastoral in Palestine*, charts well the aporias of cyclical vendetta violence, the pitched ideological

battles over even ancient history, and the sense of impossibility infusing daily life and the foreseeable future, given the asymmetries history has, to date, stacked against the Palestinians.[2] If world sympathy seems overwhelmingly on the side of Palestinians, that constitutes somewhat cold comfort, if way better than nothing, for those caught in the ongoing struggles that fly in the face of the vaunted tradition of Judeo-Christian morality, among other things. Richard Falk, a former UN Special Rapporteur on Palestinian human rights, sees impossibility too almost everywhere he looks, yet it is explicitly the Derridean sort of impossibility that recognizes it as a provocation and a challenge; a call to action without the remotest guarantee of success.[3] In addition to the traditional tactics learned partly from the anti-apartheid (think the BDS, the Boycott, Divestment, Sanctions movement) he advocates a multi-pronged grasping at straws, ruling out not even appeals to religions, which in practice have had their practitioners vehemently and violently opposed to each, for their doctrinal commitments to justice and compassion. One needs to expect and not expect the unexpected. In the end, though, it may be that the amoral forces of US globalized capital, finding itself so at odds with its putatively heartfelt ideology, will sway the day and do the right thing for, mostly, the wrong reasons.

Beyond this most intractable instance of the intractable in contemporary politics, the newly digital globalization does seem like it allows us to reconsider the once rightly debunked "domino theory" invoked to explain, putatively, how if Vietnam turned completely to communism, that would then have inevitably led to the communization of all its neighbouring countries, one by tumbling one. No such inevitability pertained then, nor does it now. But examples certainly can travel faster now and not in easily predictable fashion. The Arab Spring demonstrated both the possibility and the non-inevitably of a domino effect. And now the dominoes do not need to be stacked right next to each other. It helps, though, if they are within electronic reach. George Eliot's narrator at the end of *Middlemarch* reflects that the "growing good of the world is partly dependent on unhistoric acts." She could not have predicted the political scenes that preoccupy the world today, when the unhistoric acts would best be articulated with countless historic—not necessarily personal—ones for the force of justice to prevail.

1 RPI News, accessed 17 February, 2013, http://news.rpi.edu/update.do?artcenterkey=2902.

2 Neil Hertz, *Pastoral in Palestine* (Chicago: Prickly Paradigm Press, 2013).

3 Richard Falk, "How to Live Together Well: Interrogating the Israel/Palestine Conflict" in Elizabeth Weber, ed. *Living Together: Jacques Derrida's Communities of Violence* (New York: Fordham University Press, 2013), 275-292.

EXHIBITION REVIEW:

ALFREDO CRAMEROTTI
University of South Wales, UK

ALTERNATIVA
On the Idea of the Model

ORGANIZED BY THE WYSPA INSTITUTE OF ART. GDAŃSK, POLAND
25 MAY–30 SEPTEMBER 2012
WWW.ALTERNATIVA.ORG.PL

The series of exhibitions, publications, and artistic events under the common denominator of *Alternativa* started in 2010 as a two-year pilot program aiming at the establishment of a recurring large-scale, politically-informed curatorial practice in a former Gdańsk Shipyard. It is neither an art biennial nor an annual festival, but a hybrid cultural format whose distribution is accomplished across several channels. As such, *Alternativa* is less a new model for artistic production and distribution than an attempt to critically discuss the idea of the model itself. What is interesting in approaching the idea of a model is that it can "suspend" meaning; the model incorporates the relational and professional space that lies before the making of a work, which stands on behalf of something else, namely, the work and its circulation that will occur later. By refusing to open up (to a representational claim) it can keep history, and history-making, in suspension.

Materiality was the title of the main exhibition presented in the Hall 90B of the former shipyard. The curatorial team, comprised of Leire Vergara, Inês Moreira, Arne Hendriks, and Aneta Szyłak (the latter also Artistic Director of Wyspa), staged an exhibition that attempted to illicit questions about "the matter" in the clash between art and knowledge. Starting from the consideration that artists have always been struggling with the immaterial and material forms of artistic practice, the exhibition investigated how different generations of thinkers and cultural operators have reconsidered their approach to materiality, and in turn, its political history and meaning. The project emphasized the need for the return to material stability, approaching the field of the political from the perspective of a tactile and concrete point of view. There was a vast backdrop of theoretical approaches to bite from. Rather than absorbing the works or the theories underpinning them, one could approach the exhibition as a process for the appraisal of a model. My response takes the form of delineating four types of models that correspond to four artistic positions that struck me as the most compelling.

Model 1

The "pornography of the hammer" proposed by Partizan Publik and Arne Hendricks is a striking example of the deconstruction of a model. In *Academy of Work (Gastev's Workshop) (*2012) they unravelled, conceptually as well as physically, the ideology of the Central Institute of Labour, an adult school funded in 1917 in Moscow. The term pornography aptly sums up the emphasis of the material tools of production, both in the Soviet era and in the installation presented. The work was a re-staging of sorts of one of the rooms of the Institute, stripped down to bare essentials: the structures for production, along with documentation of the original site through newspapers and books excerpts. The Institute was the brainchild of engineer and poet Aleksei Gastev, under the attentive eye of Lenin; it was a perfect example of the epigenetic, i.e., how the environment influences the genetics in an (r)evolutionary sense. The stated aim of the Institute was to transform farmers into workers through a "social machine," which combined the power of engineering with the seduction of poetry. That is, to my reading, how to promote an ideology of labour through aesthetics effectively, intended as the process of gathering information through the senses and transforming it into experiential knowledge. The idea of the Institute,

with its potential and its contradictions, presented a strong parallel with the current generation of neoliberal politics through the creative industries. Genius, in that sense.

Model 2

FIG. 1 Mateusz Herczka, *Functional Programming for Space to Marry Objects* (2012), installation view. Photo: Courtesy of Alternativa.

Mateusz Herczka's *Functional Programming for Space to Marry Objects* (2012) (FIG. 1) established a close connection between an object (artwork), a building (setting), an industry (context) and a conflict (history) using the very layout (that is, a model) of the exhibition for its scope. Suggesting an intimacy of an almost sexual nature between the various elements of an exhibition (the artwork, the setting, the context, etc.) and highlighting the process through which the "building matter" comes together, Herczka plunged into the realm of the materially absurd. The artist designed some solutions to "solve" the logistic, structural and aesthetics obstacles to "marry" a traditional family chapel with the industrial building that hosted it. Herczka physically coupled a full-size wooden chapel to a concrete pillar of the exhibition hall. The goal was to achieve a proper ritualistic union between human and object. Confused? So was I. In retrospect though, it was a further example of the processes of amalgamation between humans and materials to which I, too, am subject daily: getting in the car to go to the office, or queuing up at a supermarket checkout. Only that, in most of the cases I do not recognize the sexuality, and subtle perversion (of coupling myself with an object), of such actions since they are ubiquitous and thus invisible. By applying the principle of aesthetic appreciation of the ritualistic union between human and object to contexts such as praying and mass production, Herczka revealed the model of behaviour that people obey in subtle ways.

Model 3

FIG. 2 Hiwa K, *It's Spring and the Weather Is Great So Let's Close All Object Matters* (2012), installation view.
Photo: Mateusz Herczka. Courtesy of Serpentine Gallery London.

Hiwa K's installation, *It's Spring and the Weather Is Great so Let's Close All Object Matters* (2012) (FIG. 2), made of musical instruments and stepladders looked like child's play in the best sense of the term: simple, resonant, and effective. But it was not for children, nor for play. Without denying the complex design of both utilitarian and aesthetic objects, Hiwa K managed to build juxtaposition into a multilayered work that spoke out of necessity and desire, death and language, human nature and collective contract. The work linked the "place of elevation" as the dedicated space for both the possibility of free speech, and the last word from the condemned. This act of elevation was not only a material solution for both acts; it defined the model for both acts. I found myself

linking this model (of free speech and subjugation) to daily occurrences of my life. When transcoded to the Internet, the model suddenly becomes apparent, with the plethora of social networks and platforms for critical evaluation, visibility and control. This is also the case when transferred to the work/business organization model, the context in which people strive, fight, survive, or succumb. Overall, the piece was playful and seductive, until I realized how disturbing it was.

Model 4

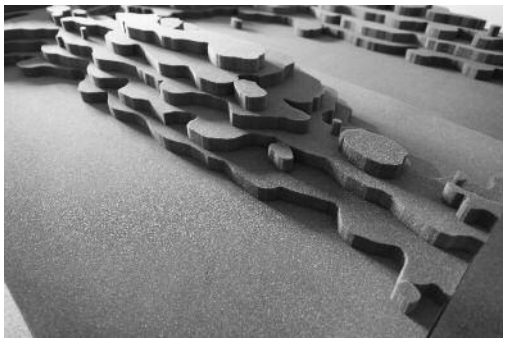


FIG. 3 Lawrence Abu Hamdan, *The Freedom of Speech Itself* (2012), installation view. Photo: Courtesy of Alternativa.

A voice recognition pattern ("voice print") sculpted in 3D, *The Freedom of Speech Itself* (2012) (FIG. 3), was the installation by Lawrence Abu Hamdan. Picking up one of the more subtle, yet scientifically fascinating, current technologies of biopolitics, Hamdan uncovered a politically and humanitarian knot that mostly escapes attention. Voice recognition patterns are used for immigration analysis by border control forces in Western countries and by police officers within nation states. It is not only about having the freedom to say what one thinks (which is never granted, and always in a process of becoming) but also to choose the way one is heard. Since it is not only dependent upon the speaker but also upon the listener, socially and politically this is a far more troublesome matter. Accent tests (LADO, Language Analysis for the Determination of Origin) are routinely applied in EU border immigration interviews to see if the speech matches the "standard" accent of the claimant's declared origins. Such a standard depends on how a government defines administrative and cultural borders. However, phonetic borders shift continuously and change with time. For instance, my fellow Italians struggle to grasp my origins since my accent has changed from living abroad for many years. I would fail a test for the standard accent of my alpine region. As a model for speech, the voice provides, in principle, a possibility to be a vehicle of information but it is immediately withdrawn by societal and political structures as a channel of communication. Hamdan's work was a socio-linguistic "experiment" that defined socio-political indexization. Both the cultural practice and the artwork are scary.

* * *

There was a lot to take in from the exhibition and rather than enumerating the rest of the other works, I am going to take a conceptual detour to give an impression of my general experience in Gdańsk. To start, there is a difference between a representation and a model—to make an artwork that "represents" something is to declare a concrete aspiration with an abstract example. To make a model for that something is an abstract aspiration but with a material set of examples. I stated at the beginning that *Alternativa* was less a new model for artistic production than an attempt to critically discuss the idea of the model itself. As the relational and professional space that lay before the making of a work, the model is therefore an act of translation—not of language, but of context. Taking matter from one context and translating into another, using aesthetics as a tool of translation, as if a dictionary for converting one language into another. In this perspective, *Alternativa* seemed to demonstrate that art has meaning only when it points beyond its own structure and relationships—to realize possibilities around and within the viewer's own self.

EXHIBITION REVIEW:

MEGHAN BISSONNETTE
York University

Frida & Diego installation view. Photo: courtesy of the Art Gallery of Ontario.

FRIDA & DIEGO: PASSION, POLITICS AND PAINTING

CURATED BY DOT TUER AND ELLIOT KING
ART GALLERY OF ONTARIO, TORONTO, CANADA
20 OCTOBER 2012–20 JANUARY 2013

Moments before proposing to the young Frida Kahlo, Diego Rivera, while looking at her paintings, says: "I could never paint like this… I paint what I see, the world outside. But you, you paint from here," as he gestures to her heart.[1] This intimate scene from the 2002 film *Frida* repeats one of the common tropes in the Rivera/Kahlo story: the oppositional nature of their work. The film also serves as a reminder that biography is still a central driving force in the cult of the artist, even more than four centuries after Vasari published the *Lives*. The Art Gallery of Ontario's recent blockbuster exhibition, *Frida & Diego: Passion, Politics and Painting*, featured drawings, prints, paintings, three-dimensional objects, and studies, as well as an overwhelming amount of supplementary information including text panels, film, audio recordings, a computer interactive station, and a host of documentary photographs. It was one of the few exhibitions to bring together these two artists, and the aim, according to the literature accompanying the show, was to "[explore] the affinities as well as differences that shaped the dynamics of their relationship and distinctive œuvres."[2] Yet the themes of their works, such as Mexican culture and left-wing politics, were overshadowed by their life stories, their tumultuous relationship, and the dichotomy between his public works and her private works. Furthermore, despite the focus on both Kahlo and Rivera, the popular fascination with Kahlo was evident in the exhibition, reaffirming her cult status that had previously been facilitated by fashion magazines, films, and biographies.

Walking through the gallery I was impressed by the quality of the works, and the inclusion of many canonical pieces that I had previously only experienced in books. Highlights included many of Kahlo's self-portraits (*Self-Portrait as a Tehuana [Diego in My Thoughts]*, 1943 and *Self-Portrait with Cropped Hair*, 1940), her enigmatic *The Love Embrace of the Universe, the Earth (Mexico), Diego, Me, and Señor Xólotl* (1949), and her meticulous still life paintings with fruit, most notably *The Bride Frightened at Seeing Life Opened* (1943). For Rivera, standouts consisted of major works such as *Flower Festival: Feast of Santa Anita* (1931), but also lesser-known works, for instance, his studies of indigenous people (*Day of the Dead*, c. 1936). His early works showed the degree to which he assimilated the lessons of Manet, Cézanne, Impressionism, Post-impressionism, and Cubism. But his later landscape works (i.e., *Sunset 2*, 1956) provided a glimpse into the artist's mindset at the end of his life. An exhibition comprised solely of major works lacks interest, and here major works balance so-called minor works, especially prints and drawings, to capture the depth of their artistic practices. Facilitating an understanding of the works, the text panels outlined the major themes throughout the exhibition and provided additional information about Kahlo and Rivera's political involvement. The catalogue essay by Dot

Tuer further addresses the couple's commitment to left-wing politics.

Yet, unmistakable was the particular narrative told through the arrangement of the works and the supplementary material. On entering the exhibition, I was greeted with Spanish music, a photograph of the happy couple, and an introductory text panel that outlined the main themes of the exhibition: Kahlo and Rivera's volatile relationship, their Marxist politics, and the contrast between his public works and her intimate works. In that first room, two photographs, one of each artist, and two portraits painted by Kahlo—one a self-portrait and one of Rivera—suggested that this exhibition was as much about these larger-than-life people and their personalities, as it was about the work.

The first few rooms featured the work of Rivera—his early paintings completed while in Europe, and his murals and other works done after his return to Mexico. Kahlo does not enter the picture until the fourth room of the exhibition, which was dedicated to her early years. On walking into the room, I immediately faced Kahlo's *Self-Portrait with Monkey* (1938), and a text panel that discussed her mixed heritage, early bout with polio, and her bus accident. It is here that the narrative was made explicit. Kahlo's art is personal and intimate, shaped by her family and early formative experiences, while Rivera's is about the masses and politics, informed by his exposure to the European avant-garde and his political convictions. Aside from the mention of his artistic talent at a young age, there was no discussion of his family or childhood.

This dichotomy between his public and her private work seems to be confirmed in one of the first rooms where they came together. Her more intimate paintings, *My Nurse and I* (1937) and *Self-Portrait Sitting on the Bed (Me and My Doll)* (1937), were placed alongside works by Rivera such as *Maternity* (1954) and *Sunflowers* (1943). Rivera's larger paintings deal with childhood, yet seem impersonal, as if exploring cultural themes. Yet the inclusion of broken dolls in both of Rivera's paintings, for which no explanation was given, suggests something else and goes against the dominant interpretation of Rivera's art.[3]

An underlying theme of the exhibition was the fascination with Kahlo herself, especially her beauty and enigmatic personality. One room devoted to "Photographing Frida" highlighted this with numerous photographs of Kahlo by various photographers. The centerpiece of the room, a short silent film of Rivera and Kahlo, filmed by Kahlo's lover Nickolas Muray, shows Rivera picking flowers for Kahlo, while Kahlo eyes the camera. At times shying away from the Muray or staring directly at the viewer, the artist is acutely aware that she is an object of beauty. Another wall displayed a series of colour photographs of Kahlo by Muray, which emphasize and showcase her bold dress and features. With this room, I found that the tone of the exhibition changed. The images in this room brought Kahlo alive and bear historical significance; however, I found myself asking whether this was necessary to understand her art, or if it was a distraction (albeit a pleasurable one).

With the "Photographing Frida" section and the numerous photographs of her scattered throughout the exhibition, you see the AGO playing with the popular appeal of Kahlo. The tragic details of her life, her difficult relationship with Rivera, her flamboyant dress, her beauty and personality—all reliably draw audiences and provide an access point to her art, which often deals with culturally specific themes that are difficult to understand from a North American point of view. In other words, Kahlo's biography sells tickets. The exhibition displays the same sort of fascination with Kahlo's looks seen in the 2002 film *Frida*, starring Salma Hayek, and fashion spreads in *Elle Magazine* and *Vogue*, which popularized the "Frida Kahlo style."[4]

Subsequent rooms address the work of Kahlo

and Rivera in the 1940s and 1950s and continue to uphold the narrative while also delving into the preoccupations in their later works. Their passion for Mexican culture and their love for each other at the end of their lives were a focus of the last few galleries, but they lacked the cohesiveness seen earlier in the show. On the final wall before the exit photographs of Diego and Kahlo are displayed together, while alive and then on their respective deathbeds. They serve to signal the end of the story.[5]

The cult of the artist remains strong in this exhibition and many common tropes regarding Rivera and Kahlo are apparent: the contrast between his public and her private works, her tragic life circumstances, and their tumultuous relationship. The exhibition eloquently addresses the issues in their art and the politics informing it, but these are overshadowed by the popular appeal of these two dynamic figures.

NOTES

1 Julie Taymor, dir. *Frida*. Miramax/Ventanarosa. 2002. Film.

2 Dot Tuer, "Of Passion and Painting: The Revolutionary Politics of Diego Rivera and Frida Kahlo," in *Frida & Diego: Passion, Politics and Painting* (exhibition catalogue) (Toronto: Art Gallery of Ontario, 2012), 16. *Frida Kahlo, Diego Rivera, and Twentieth-Century Mexican Art* also brought together the two artists, and provides a point of comparison. The works came from the Jacques and Natasha Gelman collection. By focusing on the Gelman's collecting practices, and contextualizing Kahlo and Rivera's work in the context of twentieth-century Mexican art, it avoided mythologizing these artists. See *Frida Kahlo, Diego Rivera, and Twentieth-Century Mexican Art: The Jacques and Natasha Gelman Collection* (exhibition catalogue) (San Diego: Museum of Contemporary Art, San Diego, 2000).

3 Dina Comisarenco addresses the common misconception that Rivera's artwork dealt solely with issues of history and politics. She argues that Rivera, like Kahlo, was shaped by early experiences that impacted his views on birth and death. These included the death of his twin brother at 18 months, his separation from his parents to live in the country at the age of two due to health concerns, and later the death of his first son in 1916. While it is unclear if works like *Maternity* and *Sunflower* were shaped by his life, there is further room for investigation. See Dina Comisarenco, "Frida Kahlo, Diego Rivera, and Tlazolteotl," *Woman's Art Journal* 17.1 (Spring - Summer, 1996): 14.

4 Frida Kahlo was the subject of articles in *Elle Magazine* in May 1989 and *Vogue* in February 1990. These articles focused on her style and featured models wearing then-contemporary fashions that were meant to capture the spirit of Kahlo. See Oriana Baddeley, "'Her Dress Hangs Here': De-Frocking the Kahlo Cult," *Oxford Art Journal* 14.1 (1991): 10-11. Dot Tuer in her catalogue essay mentions Kahlo's "cult status in popular culture;" however, there is no mention of the need to redress this issue. See "Of Passion and Painting: The Revolutionary Politics of Diego Rivera and Frida Kahlo," in *Frida & Diego: Passion, Politics and Painting* (exhibition catalogue) (Toronto: Art Gallery of Ontario, 2012), 15.

5 There is one additional room at the end of the exhibition entitled "Honoring Frida and Diego" with three large Judas figures and Rivera and Kahlo as *catrinas*. This room, however, feels tangential to the main exhibition.

EXHIBITION REVIEW:

RICHARD WILLIAM HILL
York University

THE RETURN OF A LAKE

MARIA THEREZA ALVES AT DOCUMENTA 13
CURATED BY CAROLYN CHRISTOV-BAKARGIEV
KASSEL, GERMANY
9 JUNE–16 SEPTEMBER 2012

Maria Thereza Alves' *The Return of a Lake* (2012) might best be described as a documentary eruption. The artist has a story to tell and she deploys almost every technique of display available to do so. There are dioramas, documentary photographs, sculptures, paintings, newspaper clippings, a book-length catalogue—even live specimens. Many of the representational modes seem appropriated from (or appropriate to) the venue itself: Kassel's natural history museum, the Ottoneum. The work therefore manages to be about many things at once: the story itself, the significance of staging that story in an international art context and the evocative and highly appropriate "excess" of the communicative strategies.

Alves' subject is the stunningly asymmetrical

relationship between one man—the Spanish colonist Íñigo Noriega Laso—and the environment and people of Mexico's Lake Chalco region who continued to be affected by his economic activities in the late nineteenth and early twentieth centuries. These activities included draining Lake Chalco out of existence. For a time, Noriega was the second wealthiest man in Mexico, but it was at the expense of an entire ecological system and the indigenous people who depended on it. Eventually, the underground aquifer became so desiccated that the lakebed sank, with the paradoxical effect that although water is still being pumped to Mexico City, the area is now drawing additional fluvial water and the lake is beginning to return. But even its return is vexed; it is celebrated by some, but causing new problems for residents who have adapted to its absence.

In parallel with Noriega's exercise of force, there has been a battle over representation, fought on the same inequitable terms. Local activists recognize this and one of their strategies has been to build a museum. Alves' installation itself can be read as a counter-exhibition to the first representation of Íñigo Noriega Laso she saw. This was the Museum of Emigration, in his hometown of Colombres in Asturias, Spain. Housed in Íñigo Noriega's former mansion, it dedicates considerable energy to celebrating his colonial "success." Alves has an eye out for colonial propaganda. She has lived in Europe since the early 1990s, but was born in Brazil and grew up there and in the United States. She also lived in Mexico for eight years. In this case it was not difficult to read the exhibit against the grain. She writes, "One section is entitled, 'The Adventure of Íñigo Noriega' and boasts of his private army of 250 soldiers and yet no mention is made of what these men did to the indigenous communities who resisted..."[1]

Alves' installation features three centrally placed dioramas of the lake region, but in terms of its commitments this exhibition does not so much have a centre as a collection of equally important parts. Some are small, like the watercolour illustration of a series of rectangular green areas, set out in a grid on a lake. These are *chinampas,* a form of lake farming long used by indigenous peoples in Mexico, involving the creation of engineered islands on which crops are grown. Two walls are dominated by large, framed colour photographs of indigenous activists from the region. The subjects appear to be in locations of significance to them and they have clearly paused to pose for the photographer. Below these images, heavy fabric is draped against the wall, pulled up into peaks to suggest a mountain skyline. The juxtaposition between documentary photographs and the evocative fabric sculptures is jarring but effective.

Other walls feature equally unlikely combinations. Botanical illustrations are next to low relief models of the facades of Noriega's mansion and the Museum of Mexico City. The latter, a label informs visitors, is run by a descendant of Noriega, who, "says that he is a great man." There is a brightly painted low relief carving of Noriega himself. He is depicted from the chest up, with a haughty expression, despite the flames—hellfire, presumably—that rise up around him. The aesthetic language suggests a retablo, but it seems vengeful rather than votive.

For her book, *Colección de Divulgación* (1987), anthropologist Margarita Loera interviewed a Chalca, Raymundo Martínez, and his grandparents, who were forcibly relocated by Noriega.[2] He insisted that the interview be titled, "Íñigo Noriega Laso: The Destroyer of My Pueblo," but it appears in Loera's book as: "My Pueblo: Its History and Traditions." By retaining the word "my," the new anthropological title simultaneously appropriates and distorts Martínez's voice. Alves published the Martínez family interviews in her catalogue, restoring the original title.

Each of the three irregularly shaped dioramas in the exhibit depicts an aspect of the lake. They are covered with small handwritten labels pro-

Maria Thereza Alves, installation view of *The Return of a Lake* (2012). Photo courtesy of the artist.

viding information about both its past and present. One depicts the lake bounded on one side by urban sprawl from Mexico City, as well as a canal, which is really an enormous open sewer. On the far side of the lake two grey PVC pipes emerge from a large oval opening along the diorama's back edge. The pipes—each marked with a blue arrow indicating that it pumps water away to Mexico City—snake up and enter the wall near the ceiling. As they rise with each joint and bend, they transition to larger and larger gauge pipes. When they reach the wall they have perhaps quadrupled in diameter. The effect is vaguely uncanny not just because of the lively twisting of the pipes, but because one would expect them to diminish in scale as they move away. Instead they grow toward the "real" scale of the gallery.

Another diorama depicts a different canal/sewer and is constructed on a larger scale. Labels state that the canal is elevated twelve metres above the local landscape and in heavy rains its deforested embankments cause flash floods, threatening nearby homes. The diorama is long and narrow; its shape is dictated by the canal itself and the lower-lying territory immediately adjacent to it. It takes a sharp turn at its centre and on the inside angle, the artist has included a cliff face that rises up at this location. On one end the cliff-side tapers away, leaving a narrow gap between it and the elevated canal. There are several tiny houses jammed into this shadowy crevice and the nearby label declares, "The poorest people live here."

The final diorama focuses on the cone of the volcano, into which dives an enormous serpent, its tail flicking up toward the ceiling and termi-

nating in a bundle of transparent fluorescent rods. Bright red ribbons decorate its back, contrasting with the shiny spun-black plastic mesh of its body. In the catalogue, indigenous activist Don Genaro, who was involved in establishing the local museum, describes how the community appoints someone to guard and care for sacred spaces, including the volcano. Genaro says, "I always considered that protecting our patrimony was done for our Volcano, who is the Sacred Lord."[3]

Smaller but no less remarkable are the occupants of a fish tank that sits in a corner of the gallery. These are axolotl, a marvellous amphibian, about a foot long, with short legs and extravagantly decorative external gills. Native only to this region, they are near extinction in the wild due to pollution and loss of their primary habitat, Lake Chalco. As such, the amphibians function in the exhibition both as indexical signs of a unique species—a threatened survivor—and as a metaphor for the many regional particularities that may yet be lost or regained.

All of this fluid movement through time, across boundaries of nature and culture and conventions of display is not a sign of confusion. It is how things are. The present constantly traffics with the past. Nature is constantly read through culture and culture is constantly informed by nature (so many human-made "natural" disasters occur that we ignore their inextricable connection at our peril). And finally, no mode of display can contain or control experience absolutely or forever. Things erupt and return.

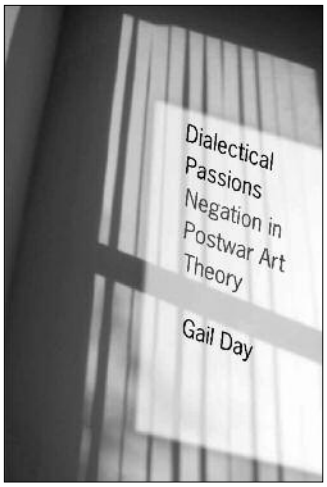
NOTES

1 Maria Thereza Alves, *The Return of a Lake* (Cologne: Verlag der Buchhandlung Walther König, 2012), 7.

2 Margarita Loera, *Colección de Divulgación* (INAH Gobierno del Estado de México, 1987).

3 Quoted in Alves, 178.

BOOK REVIEW:
MATTHEW FLISFEDER, Independent Scholar



GAIL DAY
Dialectical Passions: Negation in Postwar Art Theory
(New York: Columbia University Press, 2011), 320 pages

Gail Day's *Dialectical Passions: Negation in Postwar Art Theory* is a wonderfully enjoyable examination of some of the key figures, debates, and points of intrigue in art theory influenced by the New Left, the fate of which was to became the mere shadow of postmodernism following the so-called "linguistic turn" in the late 1960s. The theory that Day engages has its grounding in political and aesthetic thought that departed from Soviet models in the late 1950s and throughout the 1960s, the new avant-gardes, the influence of Guy Debord and the Situationist International, the *Tel Quel* collective, and later, in the 1970s and 1980s, those radical Marxist and feminist film and culture scholars writing for *Screen*, *Camera Obscura* and *October*. What Day, as

a Marxist art historian, wants to show is that, despite the poststructural shift towards figures of affirmation (Gilles Deleuze's interpretation of Nietzsche, for example), negation "is part of the routine language of art, and arguments about negativity are thoroughly embedded in accounts of culture and the debate on modernity and avant-gardism." And furthermore, that "negation continues to animate approaches to contemporary art," even after the postmodern turn (6).

Postmodernism has been defined in different ways, but Fredric Jameson's explanation is that the postmodern should be understood as that moment *within* modernism when the cultural institutions, canons, museums, and the university, become complicit and coextensive with modern art, thus reducing its radical potential.[1] The postmodern condition may equally be thought in terms of what Slavoj Žižek has proposed as a shift from the *prohibition* to enjoy in modernity to the *obligation* to enjoy in postmodernity. The interpellative call of postmodern authority is not "no!" but "yes!" Postmodernism is that which occurs when *the negation of bourgeois ideology* (the political ethic of modernism, with its vocation to not be commodity) *itself becomes the norm*; or, as Žižek puts it in the title to one of the chapters of *The Ticklish Subject* (1999), when "perversion" is no longer subversion. Here we have, on the inverse side of things, the *affirmation* of negation, which perhaps has done more for the cultural logic of capitalism's persistence.

It is worth considering Day's project in the context of Jameson and Žižek's theories on postmodernism, which both posit the 'end of negation' as one of its institutional and ideological features. What she demonstrates is that the history of the dialectic and of negative thought is still unfinished business. *Dialectical Passions* has as its primary focus a social and political offering of the kind of postwar art criticism that did not succumb to the cynicism of the postmodern. If one of the central aspects of postmodernism is the abandonment of the dialectic, then Day shows that negative thought has continued to add significantly to postwar art and cultural theory (particularly between the mid- to late-1960s up until the end of the millenium), at a time when it appeared to be suffering from a crisis in self-confidence. It is this feature that makes *Dialectical Passions* a worthwhile read.

Former Situationist, T.J. Clark, and the Italian architect, Manfredo Tafuri, are the focus of the first two chapters of *Dialectical Passions*. Despite some of the initial confusion that arises in attempting to decipher the terminology present in Clark's social analysis of the history of art (i.e., "practices of negation"), Day suggests that it is ultimately Clark's search for a method of thinking the *mediation* of art and the social that needs to be taken into account. His project involves trying to avoid thinking politics and history as merely the backdrop to a social history of art and art criticism, and should be read as an attempt to resurface discontinuity, fissures, gaps, and contradictions in art and art history. One cannot help but see the emergence here of a strategy to differentiate Clark from Jameson, particularly as the latter's "political unconscious" sticks to a kind of Althusserian "structural causality" in his analyses of the emergence of ideology and cultural phenomena, which Day seems to want to avoid. The championing of Clark's method, in this way, establishes the kind of critique of Jameson that comes through in later chapters, particularly in challenging his reading of Tafuri, and in the last chapter, where she debates Jameson's claims regarding the rise of social abstraction under the dominance of finance capital and the disintegration of "critical distance" in postmodernity.

Tafuri is considered alongside Clark, also for his challenge to the modern avant-garde, this time in architecture. For Tafuri, "the negativity of the avant-garde should be seen, from the outset, as wrapped up with capitalism's modern coming-to-being, its artistic innovations ultimately play-

ing a role in social restructuring"(80). The avant-garde, for Tafuri, "helped to acclimatize the public to the disruptions of the urban world" (82). In this sense, the modern avant-garde might be seen as a "vanishing mediator"—a prior negation that bridges the old and the new orders. Like the modernizing ethic of "making it new," Day portrays the modern avant-garde through Tafuri to indicate something of the role played by the form of negation found in the latter that failed to mount a fundamental challenge to capital, but instead aided in its efforts to make itself new: as "agents in the internal reshaping of capitalist social relations, avant-gardists' search for new forms, for new ways of making art or designing buildings, played an important role in sweeping away older modes of being." (87). In opposition, Tafuri offers a conception of "completed nihilism:" when the devaluation of bourgeois ideology is pursued to *fulfillment*; towards total disenchantment with the world, at which point it is possible "to engage actively in the creation of values appropriate to the current period" (106).

The second half of the book begins by considering the work of the postmodern art critic, Craig Owens, particularly his essay on the allegorical impulse of postmodernism. Here, Day looks at the antagonism between allegory and symbol as it was developed mainly in the pages of *October* in the early 1980s (the culmination of which is the collection of essays included in Hal Foster's *The Anti-Aesthetic: Essays on Postmodern Culture*). Theorists of the postmodern asserted the significance of allegory as a way of bringing down the dialectic—the symbol was seen as a substitute for dialectical mediation and sublation, "whereas allegory calls up deconstructive discontinuity and deferral" (149). Looking at the way it is used in the work of Walter Benjamin and Paul de Man (drawing on Owens' own foray into postmodern allegory), Day shows the insistence of 'allegorical negativity' that flies in the face of postmodernism—that is, an allegorical negativity that demystifies, and renders visible the "political unconscious" of the symbol, without resorting to the background of a master narrrative.

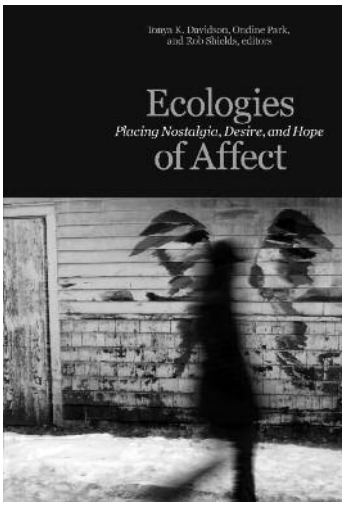
Comparing Jameson to Hal Foster and Benjamin Buchloh in the final chapter, Day challenges the lamentation of the loss of critical distance—a view that saw the waning hope of projects for emancipation. What remains curious for Day is how these figures, committed to the social and political analysis of culture, conceded to the erosion of emancipatory projects. This is perhaps understandable in the context of modernism's absorption into offical culture. It is a perspective, I think, that may have been correct in the early 1980s—with the postmodern rejection of so-called grand narratives like Marxism—but today it doesn't have the same effect, as the ficitious growth produced by finance has hit its limit. The latter signalls the conditions in which dialectical thought has been brought back into prominence. In this respect, *Dialectical Passions* opens up discussion on a significant, although neglected aspect of official postwar art theory; but, it is itself the mark of a signficant historical moment in the present.

NOTES

1 Fredric Jameson, "'End of Art' or 'End of History,'" *The Cultural Turn: Selected Writings on the Postmodern, 1983–1998* (New York: Verso, 1998), 75.

BOOK REVIEW:

JULIA AOKI,
Simon Fraser University



TONYA K. DAVIDSON, ONDINE PARK, AND ROB SHIELDS, EDS.
Ecologies of Affect: Placing Nostalgia, Desire and Hope
(Waterloo: Wilfred Laurier Press, 2011), 346 pages

I suspect the elusive nature of affect—its slippery in-between-ness[1], its characterization as both a set of basic and prior motivational forces[2], and the accretions of bodily encounters[3]—requires nothing less than ongoing and situated attempts to uncover unique affective relations, passages, and interactions using the sharpest theoretical tools at our disposal. As Brian Massumi puts it, analyses of affect require the naming and making conscious of self-perception, "as long as a vocabulary can be found for that which is imperceptible but whose escape from perception cannot but be perceived, as long as one is alive."[4] It is not the thing itself that we can perceive, it is its notable absence from the realm of perception. How then might we engage affects, in all their in-betweenness and in the face of such evasiveness?

The essays collected by Tonya K. Davidson, Ondine Park, and Rob Shields in *Ecologies of Affect: Placing Nostalgia, Desire and Hope* offer recourse and present an intervention into affect studies by approaching affects as virtualities with material effects, which are uniquely tied to the production of place. Guided by the Deleuzean-Spinozist tradition of affect studies, the authors tend toward a materialist approach, rooted in Spinoza's monist metaphysics that strives to understand the thinking and knowing body as always emergent and in an inseparable relation to the material world. In his 1978 lectures on Spinoza, Gilles Deleuze emphasized the distinction between the Latin *affectio* (affection)—a mood or feeling evoked through the interaction between bodies—and *affectus* (affect), "a melodic line of continuous variation" in one's force of existence, one's potential to act.[5] The editors of *Ecologies of Affect* maintain this definition of affect but re-emphasize the relationship between the affective passage—the increased or decreased capacity to act—and myriad relationships and encounters beyond the thinking and knowing body that extend into a social and spatial milieu. The affective passage expands and multiplies, reaches outward through relationships, material and immaterial, human and nonhuman, and is contingent upon the natural world. These emergent relations of bodies and things form through an affective expansion and allure, moving toward but never reaching coherency and they do so as an event within a context, as they are embedded in a situational ethos, the regimes of power enacted through everyday practice and interactions. Conceived in this way, affects and affective relations are deeply political. It is this set of emergent unfolding relations, assembled through affective passages and embedded within relations of power, that the authors of *Ecologies of Affect* are concerned with in this text and which they term an "ecology."

Here we have the central premise of the book: affective passages are formed out of situat-

ed, material interactions and are thus intimately tied to formations of places. Following the work of Kevin Hetherington[6], the authors consider places to be the result of complex engagements of humans, things, and environments, though they exceed their material order: place, writes Allison Hui in her contribution to the collection, is "an immaterial entity arising from the placing, ordering, and representing of material objects…That is, place results from the process of interacting in material surroundings."[7] Otherwise stated, emplacement occurs through the reciprocal engagements of humans with environments, shaped by attachments or orientations—and these attachments are produced through affective virtualities. "Ideal but not abstract, real but not actual,"[8] virtualities are constitutive of emergent spatial and temporal orderings. Although they are immaterial, irreducible to data and unavailable to the various metrics of the social sciences, they are real and knowable, if only through their effects and concrete actualizations (or "virtually real objects," as the authors at times term them, following the work of Rob Shields).[9] The collected authors recognize nascent spatial and temporal orderings through the affective virtualities that are both conveyed by and exceed relations between objects and bodies. Recalling again the definition of affect deployed here, that it is a melodic line of continuous variation in one's life force or potential to act, and that the authors extend this affective passage into a social and spatial milieu, the ecologies of affective virtualities too extend a force or potential, with different, though not discrete orientations.

The book is organized around three of these affective virtualities and their predominant orientations by "considering nostalgia as an affect oriented toward the past, desire situated in the present, and hope as an affect directed toward the future," though, the editors note the overlapping, permeable, and shifting nature of these categories and their orientations.[10]

The collective theoretical language from which the contributors explore the spatial dimensions of affective virtualities is refined and textured in each successive essay. At the intersections of the unique temporalities and virtualities explored in each chapter is the privileged place of affect, as a force not only of individual emotions and orientations but as means to social and political cohesion, disruption and prohibition. Tracing the deployment and circulation of nostalgia, around which the first section of the books is organized, can demonstrate an affective stance toward history that is potentially both hegemonic and counter-hegemonic, as in the case of German *Ostalgie* (Anne Winkler); it can reveal intergenerational dimensions of affect (via post-memories) with the potential to evoke strong connections to virtual places (Tonya K. Davidson); it can reveal through study of memoirs of return that places are marked by material proximities and immaterial intensities (Allison Hui); and, it can uncover a discursive dimension to nostalgia, such as that expressed through music during various historical moments (Mickey Vallee).

In the second section, on desire, we are exposed to the syncretic relationship between actual and virtual embodiments and emotions that draw on nostalgic imagery and escapist desires in Las Vegas (Rob Shields); the singular human and nonhuman formations (termed haecceities by Deleuze) that afford or circumscribe potential action, exemplified by the formation of desire lines, or unplanned pathways, by mountain bikers (Matthew Tiessen); interventions into the material formation of post-Soviet St. Petersburg, galvanized by citizens' emotional relationships to the city, which are constitutive of the virtual city, the ideational field of the urban imaginary (Olga Pak); and the vacillating and reinforcing radical and hegemonic imaginations of suburban life that are made available through children's picture books (Ondine Park).

The final essays offer accounts of hopeful (re)imaginings of place, including hopes that are imposed and resisted, as in the case of middle-class virtualizations of childhood deployed in an effort to manage the virtual "inner-city" surroundings of a youth centre (Bonar Buffam). In other instances, heuristic attentiveness to the recurring image of Che Guevara in disparate protest movements demonstrates the potential of powerful imagery to create spaces of hope whilst simultaneously gesturing toward other, outside spaces (Maria-Carolina Cambre); scalar and temporal disruptions in expectations, specifically through the display of giant puppets in a public space, open up unforeseen and hopeful orientations (Petra Hroch); scarcity, gradations, and variations of hopefulness, unevenly dispersed across a neoliberal landscape are revealed through visual and verbal social mapping (Sara Dorow and Goze Dogu); and artificial islands, as-yet-projected spaces, offer a hope rooted in nostalgia for a time when the world was still available to discoveries (Mark S. Jackson and Veronica della Dora). Together, these essays move beyond static iterations of affect, crystallizations of emotions, or immobile sets of object relations; rather, they offer insight into variable intensities and capacities, the singular, internal vacillations of body and thought as they emerge in relation to myriad external encounters. As the editors emphasize, the collection provides insight into the "flickering syncresis between material and virtual places, between affect and ecologies."[11]

NOTES

1 Melissa Gregg and Gregory J. Seigworth, eds., *The Affect Theory Reader* (Durham, NC: Duke University Press, 2011), 1.

2 Silvan Tomkins, "What are affects?" *Shame and Its Sisters: A Silvan Tomkins Reader*, eds. Eve Kosofsky Sedgwick and Adam Frank (Durham, NC: Duke University Press, 1995), 33.

3 Gregg and Seigworth, 2.

4 Brian Massumi in Nigel Thrift, "Intensities of Feeling: Towards a Spatial Politics of Affect," *Geografiska Annaler B* 86.1 (2004): 63.

5 Gilles Deleuze in Tonya Davidson, Ondine Park and Rob Shields, "Introduction," *Ecologies of Affect: Placing Nostalgia, Desire, and Hope* (Waterloo, ON Wilfred Laurier Press, 2011), 4.

6 Kevin Hetherington, "In Place of Geometry: The Materiality of Place," *Ideas of Difference*, eds. Kevin Hetherington & Rolland Munro (Oxford: Blackwell, 1997), 183-99.

7 Allison Hui, "Placing Nostalgia: The Process of Returning and Remaking Home," *Ecologies of Affect: Placing Nostalgia, Desire, and Hope* (Waterloo, ON Wilfred Laurier Press, 2011), 68.

8 Davidson et al., 7.

9 Rob Shields, *The Virtual* (London: Routledge, 2003), 20.

10 Davidson et al., 8.

11 Ibid., 14.