

Fields of Interaction: From Shadow Play Theatre to Media Performance

by

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Abstract

Fields of Interaction: From Shadow Play Theatre to Media Performance examines the emerging contemporary practice of computational media performance and its genealogy through intersections across shadow play, cinema and computational media. One of the ways in which media performance can be contextualized is by looking at contemporary performance forms that emerge from different traditions and cultures. Computational media performance invites us to look at shadow play and reinterpret it, with performative action and locality of place and community in mind. This research connects interactive media art with Balinese community-based performance practices. This research connects interactive media art with Balinese community-based performance practices. The interactive media art, in this study, is examined with a particular focus on issues that arise from using computational technologies in the context of performance.

This research is concerned with the relationship between computation and performance as a two elementary axes, using hybrid research methodology that integrates artistic process and outcomes, performance theory and cross-cultural study of shadow theatre. My intellectual concerns centre on the significance of collective performance structured around the work of computational media art. I focus on two particular contexts of interactive media art practice: (1) interactive audiovisual installations and (2) media performances. These foci, through the collaborative research of the Computational Poetics Research group, have provided a variety of artistic outcomes.

The composition and presentation of electronic media, using capabilities offered by computation, extend cinema with its ability to braid encoded process with

various media, narrative elements and participants' interaction in the real time of the performance. The "interaction" of performers, partakers and the elements of the work form situated media performance as inspired by the study of Balinese shadow play. The concept of braided processes, drawn from Balinese shadow play, is further investigated through a series of artistic studies and productions that employ improvisation and real-time animation of media driven by the interaction among performers, participants and materials of the work.

Dedication

I dedicate this work to Kenneth Newby, whose tremendous support, encouragement and patience as a partner and collaborator accompanied me on this extended journey.

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Introduction

Intersection of Theory and Practice

Computing technology has had an extensive influence on many aspects of the art-making process; it influences the form of the artifact as well as our engagement with the work of art. Computing technology has transformed creative processes, the materials employed, the relationship of our bodies to artistic creations and our relationship to artistic virtuosity by altering the form of the artifact, and with it the compositional methods. This influence of computing technology can be traced, in one way or another, through almost every art form. The computer's ability to represent a wide range of media signals and organize them symbolically and interactively suggests a potentially rich environment in which many different media can be merged and interconnected into an artistic whole. These media are distinguished according to the way each affects our senses, the kind of signs each employs and the kind of technology in use. For this reason, computing technology continues to make a large impact across different disciplinary fields of fine art and design.

This thesis is an investigation of a particular instance of what can be generally characterized as media performance — mainly the emerging practice of interactive art as afforded by computing technology. The study of the theory and practice of interactive media art is positioned from the point of view of the painter, filmmaker and animator. My initial research

motivation was to study the ways in which cinema and animation could be extended to integrate a real time performance that is afforded by computing technology, predominantly by integrating these forms with performance theory and practice. Animation, cinema and visual arts are not inherently performative in the sense that there is no real-time exchange between artists, the materials of their work and audiences in the moment of performance. I was not interested in special effects for film or in those cinematic techniques enabled by digital-image processing, but rather in the novel approaches that inform the very structure of image, and are created and expressed within the moment of performance. This approach influences the relationship between artist and audience as well as affecting the way the work of art is viewed and presented.

In this study I make an attempt to bridge several parallel fields that comprise the complex and emerging form of interactive media art. For a better understanding of this dissertation it is useful to separate these parallel considerations, which influence both the conception and the production of the artistic whole as well as its theoretical analysis. The first consideration is focused on how this artistic form functions within a socio-political and contextual milieu in which the artistic whole is presented and communicated. The second consideration is placed on the technical knowledge necessary to execute and produce interactive media art within a computational environment. These technical considerations and understandings are necessary in order to enable and further extend the ability to design custom systems that better support the integration of the artistic concepts and practices. The third and final

consideration is placed on the study of related performative practices. These practices do not necessarily employ computing technology but, nevertheless, can be seen as antecedents to interactive media art, and therefore provide a rich historical and cultural background for an understanding of both the philosophical and arguably technical approaches to the conception of this malleable and emerging form.

This research employs both a hybrid research and artistic methodology to accommodate the complex inquiry that attempts to bridge media-performance theory and practice across cultures with developments of computer-based technologies. The perspective of the artist-scholar provides the axis of investigation. The research investigates the emerging practice of interactive media art by drawing analogies from performance theory and practice, improvisation, moving images, animation, music, and shadow play - all integrated with computing technologies.

Practice-based research is formed by the reflective practice of making art - in this case computer-based interactive media art. Theoretical analysis and reflections are developed within a somewhat cyclical and reiterative manner: the creative processes, the artistic methodologies and tool-design outcomes of the artwork are used as a basis of the theoretical conceptions arising from the research. These concepts are further developed in relationship to other related disciplinary forms of knowledge. Once the theoretical concept is formulated it is reexamined and tested through the focused conception of the original artistic work. This is why, in this dissertation, I decided to present a majority of artistic outcomes that are developed throughout this research. Every

new artwork developed within this research is meant to test and deepen the theoretical assumptions, which are formulated within the preceding artistic production and related scholarly framework.

Reflective practice provides a main research strategy, where knowledge is embedded in both the artifact and reflection on the artifact. Knowledge is communicated and documented in relation to the artifact, to the presentation of the concept, and to the related cultural context. Research methodology encompasses the process surrounding the creation, dissemination and contextualization of artwork and artistic methodologies, plus its detailed documentation and archiving.

This research is organized around three elementary approaches. The first is the intention of the artist as researcher; the second is the analysis of the process of creation, and the third is the scholarly contextualization of the practice. This dynamic methodological framework flexes to involve artistic practice, the intention of the artist-scholar, and a scholarly contextualization. (Daniel 2004)

Artists typically do not approach their work as academic research. Once artwork becomes part of the requirement for an academic degree, the artist's intention and approach to the creative and compositional process is influenced, and this influence continues right through the final results.

My core intention is to study interactive media art with a particular focus on issues that arise from using computational technologies in the context of media performance. Computation and performance provide two

elementary axes. My intellectual concerns focus on the significance of collective performance structured around the work of computational media art. In this dissertation I extend my artistic practice and provide a theoretical analysis of two particular contexts of interactive media art: (1) interactive audiovisual installations and (2) media performances.

The aim of this research is successive development of artistic practice with regard to artistic and technical innovation, as well as methodological renewal. Scholarly intention and a concern with the analysis of a process of creation enable a new situation to emerge. The artistic work is situated as a research laboratory where the theoretical concepts are developed, tested and modified, methodological approaches are articulated, and related contextualizing disciplinary fields are located to be further analyzed outside of the particular artistic production. Every artwork developed within this research acts as a research laboratory and as a result embodies this dynamic and reiterative cycle. It is through this iterative process, which is structured to enable a study and analysis of co-dependent influences among these elements that the artistic, technical and methodological innovations are identified and articulated.

As an artist, my research is focused on animation, performance and composition across different media - audio, visual, interactive, responsive - in the context of theatrical performative and site-specific installations and performances. As a scholar I research issues pertaining to media performance, with the shadow theatre tradition as a precedent, as well as contextualize my ideas in relation to the work of others who have contributed to the disciplinary

discourse. In this research shadow play and media performance are analyzed by means of the same dramatic structure that allows improvisation and risk-taking in the moment of performance.

The process of artistic composition, experimentation and evaluation is contextualized within the work of other artists and theorists, and against the setting of traditional shadow-play performance and an extended history of cinema that was continuous in its connection to earlier performative media forms. The contextualizing aspect of this research is in locating media performance genealogy, theory and practice in relation to other disciplinary forms of knowledge.

The ability of computational media to enable interaction, improvisation and performance is explored here in several different ways. Three sets of questions are addressed in this work:

The first set of questions focuses on issues that arise from working within the emergent practice of interactive media art. How is artistic expression mediated through computing technology? How does one design computational processes to empower artistic innovation? Useful approaches, techniques, tools, and methods for composing interaction and performance with media are explored through the development of artistic outcomes. A series of art projects and studies were developed and are presented in this dissertation in order to investigate the computer as an artistic medium. The treatment of the computer as an artistic medium is focused on the technical knowledge necessary to realize the custom design of computational systems that are most

appropriate to the particular socio-political and conceptual characteristics of the artistic concepts. The discussion on the treatment of computing technology as artistic medium and code as artistic material is articulated here in order to reach the technical fluency necessary for the development of computational and interactive media art. This aspect of my research can be also characterized as a study of the technology of Interactive Media Art. The concept of the computer as artistic medium and code as artistic material is not developed with an aim to replace embodied artistic virtuosity with code, but rather to enable artistic and technical innovations, which are driven by an artistic virtuosity and a conceptual framework appropriate to the production of the artistic whole. Specifically the focus is placed on an exploration of the basic elements of computer-based art composition in support of interaction, improvisation, open composition and performance.

The goal is to deepen the understanding of the computer as a medium for artistic expression, as well as to articulate a complex dialogue among artistic language, craftsmanship and cultural communication. In this context the development of code within a computational medium is aimed at designing artistic systems and tools from the ground up in order to capture the characteristics of particular artistic practices that are often not represented in commercial software and hardware applications. The ideas and techniques developed throughout this research are influenced by a process of adopting the encoding of art practice as an artistic methodology in order to take advantage of the computational environment and the emerging media from within that environment. This concept is important as it

allows the development of technologies appropriate to a rich and diverse set of artistic practices. Encoding practice, as artistic methodology, is not meant to replace the artistic practice with code, but rather to extend a particular art practice with appropriate technology, which is developed carefully to serve the particular characteristics of a given practice. The encoding of practice as artistic methodology is comparative to other art methodologies that focus on the question of how to achieve a particular artistic form, and it is comparative to various methodologies of fine arts, such as lithographic method vs. silk screen method or painting with oils vs. methodology of fresco painting. The kind of interactive media art analyzed in this dissertation is only made possible by means of the computing technology and therefore it is necessary to address the technical and methodological issues that arise when artists use computational technology to develop and communicate artistic concepts.

Aesthetic awareness, conceptual intention and practical media skills together contribute to a dynamic synthesis of intellect and abstract thinking. Artistic skill is conditioned by such a synthesis, and in turn has a hand in cultural articulation. The relationships among aesthetics, intention, media skills and techniques are explored through a number of artistic outcomes, which were designed as a part of Computational Poetics research. In these works the technology is developed in relationship to the content and context of the work. The technology is shaped to deepen and extend the meaning of the work and support artistic virtuosity. These outcomes are contextualized through the discussion of the complementary artwork.

With the second set of questions, interactive media art is contextualized in relation to computational technologies, electronic media, film, and shadow play. Computational media performance positioned as a continuous development of shadow play tradition provides us with a form that has a robust and rich history.

The central questions here are: What useful models can be found for emerging technologies in cultural traditions outside of Euro-American contemporary practice? And can the living tradition of shadow play be a source of philosophy and praxis relevant to the creative and compositional process of media performance? This work is carried out in the spirit of an inter-cultural exchange of artistic and creative processes and methodologies across the contemporary shadow theatre (wayang kulit) of Bali and the shadow theatre of Europe and North America as well as its technological extension towards cinema. The inquiry into performative and interactive media suggests affinities with performance traditions that use performing objects as media, such as mask dances, marionettes and shadow puppets. Numerous examples discussed in this dissertation are aimed to provide an overview of methods, tools and techniques for shadow puppet theatre augmented by computing technologies. Shadow play theatre provides a model for electronic situated media performance.

In the third set, the focus is on the creation of a collaborative, improvised and participatory environment that characterizes interactive media art as situated media. What kind of dramatic structure can support the animation of inanimate

objects in an improvised manner for situated media performance? What philosophies and cultural archetypes would underpin such a structure?

The compositional and dramatic model which I characterize as “braided processes” is drawn from a concept of braided narrative structure (Schechner 1985) found in performance traditions cross Asia, which include Hindu, Southeast Asian and Japanese Noh drama, and is particularly used in this dissertation to analyze conceptual, creative and formal aspects of the Balinese shadow play, which I observed in my fieldwork in Bali. This model is further articulated to enable research and design of performative media compositions and live cinema performances also referred to in this dissertation as Cinema of Braided Processes. The dramatic model of braided processes is developed in order to bridge various elements that go into the development of the artistic whole. This concept enables a form of situated media performance that acts as a socially engaged agent, while at the same time, on the cyclical level, allowing an integration of multi-media attributes, computation as a medium for composition, performance and improvisation.

The notion of braided processes enabled me to conceptualize the interaction mediated by computing technologies in interactive media art as a form of ritual performance. Situated interactive media can act as ritual performance—an interface that enables braiding of social and cultural considerations—a process that provides social efficacy and communicates ideas through encoded action. Since performance in the context of computational media art is positioned at the center of this research, performance study and theory provide a

framework for an analytical approach to media performance.

The analysis of and developed concepts from shadow play research are applied to the collaborative artistic research that is developing through the work of the Computational Poetics Research group. The media documentation of Computational Poetics Research artwork is presented on the Fields of Interaction From Shadow Play theatre to Media Performance DVD.

The artworks that comprise the DVD are grouped in three sections. First section entitled Computational Processes for Media Performance features: Illumination Machine (2002), Electronic Sphere (2002), Videojoiners (2002/3), City Mirror and (2004), Metro (2003). Works in this section are developed as a preliminary research in computational methods and techniques for performative systems. Media Installation is the second section and the following works are included: Two Visions (2004), SKIN (2004/05), RiverRun (2004), One River (Running) (2005). Media Performance is third section Gradual Prelude (2005), Reason (2003), Tales of the Universe (2005/06), Cosmicomic, (2004), Colored Bodies (2004), SKIN (2004/05). Media Installation and Media Performance sections present works that provided focal points for Computational Poetics research.

This DVD documentation is not designed to function as a mere compilation of artistic projects. Rather, these works were designed as research tasks, vehicles and outcomes. Therefore the processes of creation and development, final presentation, as well as the contextualization of the work are all of equal importance. These artworks function as a series of

art productions progressively and meaningfully interconnected. The artistic, technical and contextual outcomes within each work influence the settings of the next production. Each production acts as an experimental research

Laboratory where the theoretical concepts are developed and tested through the iterative process which is influenced by the intention of an artist scholar, the study and the analyses of the process of creation as well as the scholarly contextualization of the practice. The method of presentation - the illustrated written thesis is integrated with the time-based media presented on the DVD - aims to enable the viewer/reader to experience the process-oriented and reiterative nature of this research. The cross referencing among the written words, illustrations and different chapters of time-based media presented on DVD forms a complete documentation of the research outcomes.

Theoretical Framework

Interactive art as a distinct field within contemporary arts emerged with the development of computer technology in the last half of the twentieth century, and has been embraced by a number of innovative interdisciplinary artists (Campbell, Rokeby, Char Davis, Lozano-Hemmer, Myron Kruger, David Small, Edmond Coughot). The computer enables the artist to work with a multi-modal fusion of texts, sounds, images, sensed inputs and algorithmic processes, to construct a reactive environment, where the spectator or 'user' - the actor - interacts with and co-creates the experience (Youngblood 1986).

If we view interaction from the perspective of performance, we see that a desire for interactive media has been present throughout history: from rituals, ceremonies, storytelling, theatre and opera, to contemporary electronic media, cyberspace and virtual environments (Ruy 2004, Turner 1982, Schechner 2003). Throughout the history of culture, different societies have developed different strategies for structuring interaction within collective performance. On the surface these techniques are very different than those involved in computation, however, if we analyze the philosophies behind these different ways of structuring interactions, we can envision an interactive art that goes beyond the prevailing notions of computer-mediated interaction.

An important focus of this study is placed on the analysis of the spirit and philosophy of interaction embodied in the tradition of Balinese shadow play. My intellectual concern is focused on how might the formal and social context of Balinese wayang kulit inform performance practices in interactive computer-based media forms? How does the formal structure of Balinese wayang kulit reflect its social purpose and carry significant cultural meaning? And how do computational and media technologies integrate with shadow play performances in Bali? The understanding of traditional performance practices, such as Balinese wayang kulit, in relation to computational media, can add new concepts and dimensions to interactive art design and practice.

In addition to the study of Balinese wayang kulit, an important aspect of this research focused on tracing a an

alternative antecedents to media performance through the discussion on European shadow play, its influences on the developments of cinema, which on many levels acts as a direct precursor to contemporary media performance. The discussion on the developments of cinema is focused on tracing the alternative history of cinema, one that is inclusive of various artworks bridging cinematic media with real time performance.

Within the contextualizing characteristics of this research the notion of braided processes provides the theoretical axis between Balinese shadow theater, a history of cinema and animation (in the West), and contemporary interactive performance using computational media and as such forms the central formal concept in my dissertation.

The objectives of this work are twofold. One is to expand the current thinking around interaction within real-time composition for computational media performance, through adoption of a philosophy of social interaction and improvisatory performance. The second objective is to develop a conceptual and artistic method as well as the computational tools to support the creation, composition and performance of situated media art.

This study connects interactive media art with community-based performance practices, of which shadow play is an exemplar. The emphasis is on social interaction facilitated by computing technology - a 'ritual interface' for structuring aesthetic experience according to a process inspired by the Balinese philosophy of 'desa, kala, patra': space, time, context (Herbst 1997). The conceptual construct of 'desa, kala, patra'

refers not only to geographical space and measurable time but implies significant spiritual, environmental and communal purpose.

The improvisational characteristics of shadow play are beneficial to the study and practice of interactive media art. This characteristic establishes the emergence of a form of open work. To be able to respond to the needs of the community, shadow play performances are fundamentally improvisational. Performances are usually created in relation to some family, communal or religious event; each is unique to the occasion and performers rarely tell the same story twice. Within any given performance, improvisational elements thrive in the way the performers interact with one another, the story, the audience, and the accompaniment. Again the concept of *desa-kala-patra* is significant and provides a useful mechanism for analysis and discussion.

The second characteristic observed in this work is its formal structure and the constraints of performance that enable improvisation. The formal consideration includes the narrative structure, the way the media elements are organized in time and the compositional structure of the screen space. The study of traditional shadow play on a formal level provides models for flexible, performative, and responsive multi-media events.

Interactive technology can be a way to communicate and explore universal human experiences - the stages of existence from birth to death. In the traditional culture of Bali, these universal experiences are acknowledged and shared publicly in shadow plays. These performances are rituals that create a

space and structure where individuals are bound together into communities (Ruy 2004, Turner 1982, Schechner 2003 Van Gennep 1960). These universal transitions and archetypal human cycles, articulated and dignified in the ritual of shadow play, form a central part of the culture.

Interactive media has the potential to play a significant role in building community and democratizing the creation of culture. It is an ambition of this art-based research to develop works that draw concepts from shadow play as performance that grounds itself not only in a specific space and time but also in its community.

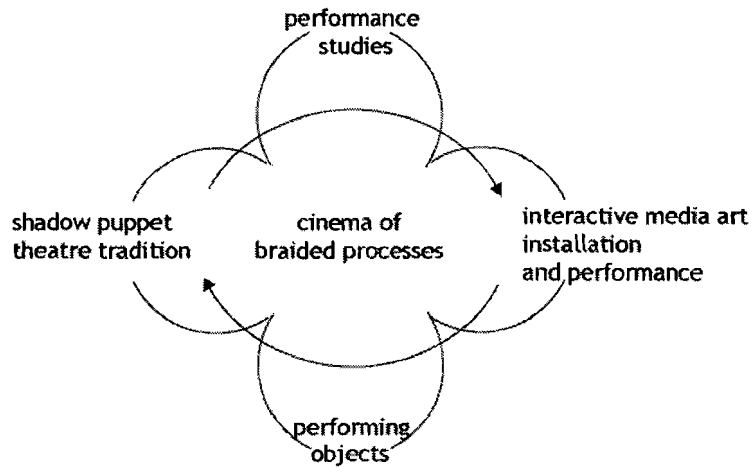


Figure 1 The relationships among the components of the thesis, Aleksandra Dulic, 2005

The above diagram depicts the relationships among the components that make up the thesis work. On the left is the study of shadow theatre in Bali and North America. At the

right, interactive media art-installation and performance. These two areas are combined in the subject of this thesis as a whole that articulates the narrative and compositional structure for situated media performance, which are encompassed in the Cinema of Braided Processes. On the top, the field of "Performance Studies" represents the theoretical analysis of ritual as applied to sacred and secular performance. At the bottom of the diagram, the arc labeled "Performing Objects" represents the technical and applied component of the thesis work.

The complementary motions of the arcs illustrate the two key concerns in this work: (1) to enrich the concept of interactivity in interactive art with a philosophy of social interaction and improvisatory performance deriving from shadow play; and (2) to develop computer-based tools and methods from interactive art and technology to support the concept of a cinema of braided processes, which is discussed in detail in chapter six.

Computational Poetics Collaborative Research

Contemporary computational techniques enable creative and performing artists to enter into new collaborative relationships with encoded systems that carry compositional and performative knowledge of artistic practices. Throughout this dissertation I discuss various collaborative artistic experiments and research carried out by the Computational Poetics Research group. Professor Martin Gotfrit, Professor Kenneth Newby and I formed the group with the idea in

mind that very few artist-scholars have researched computational art practices as a model for new media theory and practice across disciplines. Each member brings the diverse disciplinary approach necessary to the creation of multi-modal interactive media art experiences, and part of this approach is to reflect on the models that emerge from these works on the level of compositional theory as well as on the level of tool design. Computational Poetics Research projects place the artist at the center of the design and evaluation process for composition and technical development - including the tools necessary - for the creation of interactive media art.

Much of the artwork and contextualizing theory is developed in an experimental laboratory setting, where techniques and ideas develop through a process of building systems and codes. The main programming environment we use is Max/MSP and Jitter,¹ interfaced with various sensing systems. Our collaborative efforts are structured around extending the techniques and approaches from interactive music systems to include cinematic and visual media. Our backgrounds are complementary, and we develop work in an integrated, non-hierarchical way.

This collaborative research was initiated by the question of what could one do with film and animation, using the computer as a medium, which would allow some of the freedoms that musicians already encountered in music, with an emphasis on using media in a performative setting.

I bring forward my background in cinema, animation and visual arts. My contribution to the Computational Poetics

¹ Max/MSP is a graphical environment for music, audio, and multimedia. Jitter extends the Max/MSP programming environment to support real-time manipulation of video, 3D graphics and other data sets within a unified processing architecture. Max/MSP and Jitter are developed by Cycling '74 from: <http://www.cycling74.com/>.

research focuses on the dramatic structure that emerges from my study of Balinese and North American approaches to shadow play.

Performance and Media

Fields of Interaction: From Shadow Play Theatre to Media

Performance examines the contemporary practice of computational-media performance and its genealogy through intersections with shadow play, cinema and computational media. In this research media performance is contextualized by looking at contemporary performance forms that emerge from traditions across different cultures. Computational media performance invites us to look at shadow play and reinterpret it with performative action, the locality of the place and the community in mind. This research connects interactive media art with community-based performance practices.

The theory of media performance form that emerges from this research pivots around the idea of braided processes derived from concept of the braided narrative structure (Schechner 1985). The development of the concept of braided processes took place through several research phases that influenced the research outcome. The first phase was comprised of the extensive literature research across different disciplinary discourses that set the grounding for the design of my overall research journey. The main areas of the literature research are focused on the theory and practice of computational media art, contemporary traditions of shadow theatre as well as in performance study and improvisation. Early on the notion of braided processes was conceived and

subsequent research was directed towards extending, deepening and testing that concept both through the field studies as well as through collaborative artwork developed with Kenneth Newby. The second phase of my research was focused on the creation of a series of art studies, which were designed to analyze fundamental technical characteristics of computational media necessary to achieve a kind of technical fluency and understanding that artists need in order to articulate and produce the work of art within a computational environment. The third phase of this research focused on the field studies in contemporary shadow play across Bali and North America. Drawing on the shadow play performance tradition, which I studied in Bali, Indonesia in 2003 and again in 2005, and in North America through the work of Larry Reed in 2003 and Canada Shadow in 2003 and in 2004 this field study enabled me to extend traditional cinematic animation techniques to a situated media performance that provides a reflection on the place, time and context in which the performance is presented. The application and the testing of the concepts learned through these field studies formed the fourth phase of the research. This phase mirrors the second phase of this research in that it was comprised of a series of artistic projects specifically designed to test and analyze various aspects of the concept of braided processes, which was significantly enriched and extended by the field studies. The final stage of this research was focused on analysis and conclusion through reflection on the research process, evaluation and the forming of recommendation. This research journey is reflected in my thesis chapters.

Chapter one: Intersections Media - Action - Place provides a

theoretical framework and identifies the disciplinary fields of Interactive Media Art as situated media analyzed in relation to Performance and Ritual Studies. Ritual performance provides a grounding philosophy for interaction within computational media. Interactive media art and performance carry the potential to provide a place for social reflection, and in that way can contribute to creating coherent communities and culture in complex global societies. In this work, shadow play provides a case study in a traditional media form that is performative. It has a profound connection to ritual, and presents an aesthetic social model of integrated space, time and context - the place of the community.

Chapter two: Interactive Media Art intends to provide the necessary context for understanding the aims and outcomes specific to my research. Here I provide definitions and articulations of key concepts in interactive media art. Concepts such as media, art, interactivity, immersion, and collaboration are explored in relation to objectives of this work.

Chapter three: Computational Processes for Media Performance presents three related studies that were conducted in an effort to understand the question of how to articulate artistic gesture within a computational media environment. The possibilities of the computer as an art medium using code as material, and the encoding of practice as a basic methodology are particularly focused on the issues that surround the technical properties of the artistic expression articulated and communicated by means of computing technology. Electronic Drawings explores composition using multiple correlated voices. Videojoiners

explores animation and transformation of image using camera feed. The third experiment, Metro, explores the technique of random access to a database of video and audio clips, representing a new kind of documentary format. These studies provided me with a collection of techniques that could later be applied to the content and contexts in which artwork is presented.

Chapter four: Cultural Crossings presents my studies of Balinese wayang kulit. I reflect on my experience learning with my teacher, Wayan Mardika, a popular young dalang (puppet master) in Bali. This learning process enabled me to build a complex of relationships with wayang: as performance art, visual art, music art and as multi-lingual literary art - and allowed me to grasp the many-faceted nature of Balinese wayang kulit.

Here I also discuss the contemporary media influences on wayang kulit, and investigate cross-cultural exchanges between Bali and North America through the work of Larry Reid's experiments and innovations in the United States of America, and Sidia's and Mardika's experiments and innovations in Bali.

Chapter five: Genealogy of Shadow Theater in the Context of Cinema follows a lineage of interactive media traced through ancient screen-based performances of projected light and shadow; the invention of cinema through various technologies of vision, including camera obscura, photography, and motion camera; technologies for projections of light, such as magic lanterns, halogen lamps, film and video projectors; viewing boxes, and various kinds

of scientific toys for capturing movement and optical games. These developments of technology for shadow projections are explored in relationship to its performative potentials. In this chapter I discuss the work of the Canada Shadows ensemble, whose multimedia shadow theatre was inspired by cinema, and draw from an interview with Canada Shadows' Hank Bull.

Chapter six: Braided Processes focuses on the dramatic principle shared by media performance and shadow theater. My main concern is what happens in the improvisational context among the participants within a given performance. The dramatic model of the cinema of braided processes is developed to accommodate artistic composition that integrates computation as a medium for composition with performance and improvisation. This model is drawn from the study of the contemporary tradition of shadow play. The analogy between shadow play and computational media performance in the cinema of braided processes forms the basis of the idea of situated media performance.

Chapter seven: Performing with Animation and Media looks at the notion of braided processes as applied to real-time interaction, media improvisation and animation within situated media performance. This chapter presents live-media performances of the Computational Poetics Group in relation to similar work developed by Pierre Hébert.

Chapter 1: Intersections Media — Action — Place

Intersections can be places of danger or creativity where traditions and histories coexist, multiple narratives and new cultures emerge. These points of contact can be thought provoking, generative, spiritual, purposeful or accidental. Intersections allow cultures to come together and give rise to novel hybrid performance media arts, practices and structures. Citizens of different traditions, ethnicities and religions can act together and reshape one another in a complex dynamic. This enquiry analyses the intersections of multicultural community action, media performance and direct embodied experience that constitute a location in time and space - the place. Place can be recognized as an elemental quality of being human. Place recalls cultural memories. Place creates narratives and cultures. Places can provide an articulation of cultural identity, an understanding of shared desires, and as a consequence can benefit communal cohesiveness.

¹ The illustrations are provided throughout the thesis work, exemplified both by the work of others and my own artistic contributions.

This chapter provides a theoretical framework and identifies disciplinary fields that inform this study. Here I contextualize interactive media art from the perspective of the current sociopolitical milieu of Canada and reflect on the role it can play in communal and cultural expression that then contributes to the articulation of complex relationships among socio-political, cultural, traditional, economic, and

historical contexts of groups and communities from which the work emerges. ¹ Interactive media art is approached as an art of response, where embodied performance forms an integral part of the artistic whole. In this study performance in the context of computational media art is positioned at the center and performance study and theory provides a framework for an analytical approach to theorizing what interactive media art is and what it might become.

Here I approach ritual performance in order to understand the potentials for interaction within computational media. Ritual is a process that provides articulation of social and communal values and embodies ideas through encoded or 'scripted' performance. While performance study is concerned with rituals as processes or performative actions that underlie social dramas and theatre, my concern with ritual draws from performance study but is focused on interactive art and media performances mediated by computing technology. The ritual space/time within contemporary post-industrial and technologically saturated societies in my work becomes material for the work of interactive media art. The design of interaction and performative action within this socially engaged, situated and interactive media art, calls for an extension of current compositional strategies for performance, mediated and enhanced by computational technologies. The careful design and composition of performative media events in my work is aimed at providing meaningful experience situated within the particular space, time and context of the group it is presented to. Media images situated in this way present a form of social ritual that is intentionally 'scripted' to provide a process for reflection, and to locate a space for sharing

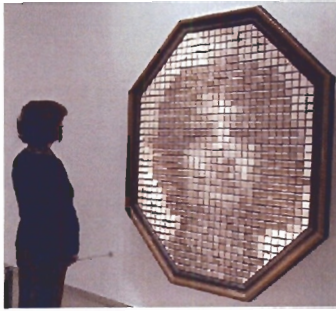


Figure 2 Wooden Mirror
Daniel Rozin, 1999, Israel
Museum, (Used by
Permission)



Figure 3 City Mirror,
Aleksandra Dulic and
Kenneth Newby, BELEF
2004



Figure 4 Jim Campbell,
Hallucination, 1998-1990

The mirror sets the viewer on fire, and puts a virtual woman in the reflection.

knowledge and wisdoms.

As an antecedent to interactive media art, this study explores the intersection of shadow play performance and cinema. I revisit concepts and philosophies of interaction embedded in contemporary tradition of Balinese shadow play that point to its transferable elements, investigate the genealogy of shadow theater in the context of the history of cinema and reinterpret the performative aspects of intercultural performances in the context of interactive media art and performance. Shadow play performances in the context of this work provide examples of media performance that offer a continuous historical perspective embedded in the living tradition of Balinese shadow play. Shadow play offers a case study in a traditional media form that is performative. It has a profound connection to ritual, and it presents an aesthetic social model of integrated space, time and context - the place of the community. Interactive media art and performance carry the potential to provide a place for social reflection, and in that way can contribute to creating coherent communities and culture in complex global societies.

Interaction, Media and Performance

Interactive media art has been characterized as an art of response (Newby 2001), as an art of interrelationships (Ylitalo 2000) or as a mirror through which we communicate with our selves (Rokeby 1996). Rokeby contextualizes interactivity through Marcel Duchamp's statement that "the spectator makes the picture." Interactive media art points to a form of computer art that focuses on the interaction between



Figure 5 Electronic Mirror, Christian Moeller, 1993

the environment and the computer system, and is characterized by flexible media elements expressed within the real time of the performative action. Interactive media art as the art of response has a potential to facilitate a multi-modal polyphonic media expression of sonic, visual, kinetic and kinesthetic media elements. These artistic systems allow the automation of the poetic interaction among humans, the environment and machines. Perceived and sensed information generated by a source in the environment is further analyzed to initiate and/or modify a media event, which can be modeled in various ways to produce the response and end-result. In the context of such interactive systems the participant or the environment becomes an active co-creator, and in this way these external elements become integral components of the work.

The computer system enables interaction among prepared multi-modal media materials, the actions of the performers and audiences. Jim Campbell suggests "if the new element to film was time then ...the new element to interactivity is the present. And it is the program that connects the present to the past" (Campbell 2000). This potential to express the present moment brings the creation of media out of the production studios and onto the performance stage. This can be achieved using a unique combination of embodied practice skills expressed with custom-designed performance software allowing artists to animate visual media with soundtrack and music in the real time of performance. The preproduction of work in this context includes software-based instrument design for the performance that allows access to various performing objects, methods and transformations through which content and meaning is

generated in an improvised manner within performance.

Once the instrument is designed the rehearsal process takes place where performance competence is developed. Instrument and performance skills form the structure of the work. Within this structure the artist can improvise and reflect the moment and context in which the work is presented. The multi-modal media instrument acts as an encoded content space composed of performing objects with which the performer interacts. The performing objects in this context can be digital characters, animations or various animation processes. These performing objects have a capacity to carry symbolic significance and transform those who play through them.

Whereas in cinema the long production process closes with the finished product that is distributed, in situated media performance the preproduction process culminates with a structure that allows the artist to modify the work to reflect the context in which each performance is experienced. The flexible and open-ended character of this structure, which integrates particularity of place, time, context and group, can enable immediate action and critical reflection on political and cultural events within the real time of performance. The production-heavy conventional cinema finds it difficult to provide the same level of contextualization, due to the fixed form of the final outcome and the disembodied presentation of the work, as well as to the significant time interval between initial conceptualization and presentation.

The outcome of a responsive interactive media art has the potential to be profoundly influenced by local events because

of its performative nature. This structure is not aimed at producing the finished products of long-running performances and touring exhibitions that contribute to the commodification of arts. Rather, each composition is directed towards providing a unique event for the group that it addresses. The situated interaction with media designed in this way acts as a socially active agent through the composition of the media events that are embedded in the particularity of place and group within which it exists. In these contexts, performance and media symbols become instruments for social action that contribute to the healing and strengthening of the quality of social interactions within the group and place. The aim is to create a particular, dedicated space for sharing wisdoms and knowledge through stories, images, music, and dances, where children can learn, and adults can be reminded of life cycles and its lessons. Those who attend can ask questions and seek meaning in their lives. This mystical space provides healing, not in a way that implies an illness of a group or individual within that group, but healing in a way that allows us to see ourselves as whole — it consolidates the balance among self-control, sacrifice, knowledge and wisdom, which are gifts that strengthen our spirit and thereby our mind/body.

According to Turner, industrialization conditioned a collapse of the former integrity of organized and all-encompassing religious forms that were the rituals of liminal societies. Modernization of societies made way for a number of performance arts such as theatre, carnivals, processions, sporting events, interactive media, state rituals and many others, that Turner named “liminoid” (Turner 1982). A collective and obligatory ritual that acted as a self-

representation and an enforcement of shared and common values in traditional societies transformed into the professional arts and performances that were an individual and optional activity. However, these liminoid events do contribute to cultural regeneration, critique and reflexivity.

A socially engaged and situated performance is comparable to that of a ritual in that it links the experience within the group to the socio-cultural, economic, and historical context the group emerges from, and also remains a valuable part of the social construction of the individual. The critical and reflective perspective within the particular group or community can emerge only through the process of building relationships and bridges among the individuals, empowering differences and creating solidarity, rather than purifying and normalizing value systems or social codes. Performance is a powerful tool and practice that can contribute to communication and relationship building, and involves augmenting the everyday interactions among individuals, groups, and communities through political, religious, traditional, and popular cultural considerations.

The examples that underline this transformation and point to the powerful potentials of the socially engaged ritualized performance art are to be found in a variety of contemporary traditions and intercultural performances. Following Artaud's curiosity in the Balinese dance theatre he was introduced to in the Paris exposition in the 1930s, and Bertolt Brecht's approach to art, not as "a mirror to reflect reality, but a hammer with which to shape it," the search for a "ritualization" of society began within the exploration of liminoid phenomena (Turner 1982) — a specially designed

“Performer, with a capital letter is a man of action. He is not somebody who plays another. He is a doer, a priest, a warrior: he is outside of aesthetic genres. Ritual is performance, an accomplished action, an act. Degenerated ritual is show. I do not want to discover something new but something forgotten. Something so old that all distinction between aesthetic genres are no longer of use.” Jerzy Grotowski (1997)

space, time and process that contributes to social transformation and a regenerative renewal of culture in modern societies. Anthropologists such as Erving Goffman and Victor Turner began to study the importance of representation, with its ritual and performative aspects, in everyday life. Modern society’s search for ritualization provides performance art with its elementary role of political intervention, a peaceful redefinition of the rules of society, cultural dialogue, communal bonding and social healing exemplified in the work of — to name just a few groups in the long list of socially engaged actors — Richard Schechner’s Performance Group; Peter Schumann’s Bread and Puppet Theatre in the USA; Augusto Boal and Vianna Filho in Brazil; and Jerzy Grotowski, Peter Brook, Eugenio Barba, Joseph Beuys and Marina Abramovic in Europe.

Jerzy Grotowski (1933-1999) in his work also reshapes ritual material into contemporary performance. He attempted to make connections across cultures and use different archetypal elements concurrently from both ancient and traditional rituals in order to discover what he believed were deep universal truths. Grotowski characterized the formal differences between theatre and ritual in relationship to “the place of montage.” In theatre, the place of montage is in the audience’s mind. In ritual montage happens in the minds of doers. There is no place for spectators in Grotowski’s work; the participants through their actions bring to life processes embedded in the event.

His search for universal elements of performance aimed at transcending the particular cultures in which they were embedded. The concept of “Art as a Vehicle” (1986-99)

presents a culminating phase in Grotowski's work, aimed to provide an intersection where the most personal meets the most objective "archetypal". This idea of universal performative action depends on the acceptance of transcultural methods and assumptions. Grotowski's utopian aim for universality uses strategies similar to those of global capital. It depends on advanced modes of communication as well as on unrestricted mobility through travel. His idea of universality leads to a standardization that results in an "archetypal" and ahistorical action. However, Grotowski's approach distinguishes itself from globalization in its attempt to reach back in time and history, rather than to assimilate different contemporary cultures and traditions.

The attempt for universality in the final phase of Grotowski's work "Art as a Vehicle" echoes Turner's late work, which sought the objective basis of ritual in the way our brain functions. Turner writes about "global population of brains inhabiting the entire world of inanimate and animate entities, a population whose members are increasingly communicating with one another through every physical and mental instrumentality" (Turner 1983). Both Turner and Grotowski believed that human endeavors are placed at the most ancient to the newest at the same time. This vertical search across ancient and contemporary, personal and objective is centered on understanding of human nature — not specific to particular time or tradition, but rather centered on the universal knowledge and meaning. This search is about a collective life of harmony based on the interplays across our natural environment and acts of human power, human voice and human movement, enacted through the spirits of playfulness and inclusiveness.

Agusto Boal's socially engaged theatre and performance also emerges in a historical moment when the locality and homogeneity of community in modern societies is eroding. The socially engaged performances facilitated by Boal aimed at allowing its participants to imagine themselves as members of a meaningful community. For Boal the performance is a rehearsal for revolution. His primary idea is to allow the audiences the power, authority and responsibility to rehearse active resistance to oppression through the relatively safe environment of performance. In Boal's (2000) *Theatre of the Oppressed*, spectators are transformed into "spect-actors"; they become active subjects rather than passive observers. The *Theatre of the Oppressed* offers the opportunity to reclaim self-reflexive critique using theatre as an act of political intervention and a tool for radical political practices.

Following the form of situated media performance this study finds a particularly strong echo in the socially expressive ritual of *wayang kulit* (shadow play) - in particular the Balinese form with its emphasis on place, time and context in performance, ritual and daily life.

Interactive media art, as a form enabled by the potentials afforded by computing technology, allows a database of prerecorded media elements to be represented as well as media to be constructed and generated in an improvised and flexible manner in the course of performance. Interactive media art is an automated art, and as such is an extension of the cinema and other recorded media. It inherits the capacity to automate the multimedia image in time in the same way

linear media do; but in addition computing technologies enable process, performance and body to be integrated in the artistic whole. Embodied performance, then, is an integral part of interactive media art and hence relates to other performance traditions.

The media in this context can be viewed as performing objects that manifest a symbolic significance. Interactive media can be positioned as a multimodal instrument able to express various polyphonic modes that address different senses: sonic, visual, kinetic, kinesthetic, etc. The characteristic of interactive media art sit at the intersection of the automated and disembodied art of cinema and linear media, and an embodied performance art.

There are many ways to understand performance. To perform can be understood in relationship to being, doing, showing, or succeeding. Richard Schechner (2002) proposes a theory that any behavior, event or action can be studied "as" performance. Using "as" performance as a tool one can study thing otherwise closed off for inquiry. In the context of this research there are several levels in which the study of performance is considered. Performance is considered in the way embodied action and the behavior of the performers and participants, in a physical location, affect and are affected by the interactive art system. On another level the interactive media system situated within public space, with is a braided form (further discussed in chapter six), is considered as an event that can be analyzed "as" performance. The main focus is on the intersection across the human performer and the interactive system.

The performative characteristics of computational media art are key artistic and theoretical concerns of this study, both in the way human action intersects with an interactive system as well as how the interactive system “performs” within the presentation context and production process. Since performance in the context of computational media art is positioned at the center, performance study and theory provide a framework for an analytical approach to theorizing about what interactive media art is and what it might become.

Performance Studies

The performance study field is a transdisciplinary project that makes a common cause with and contributes to the many fields from which it draws, placing artistic practice and performance as an integral part of the study. It makes new uses of the “participant observation” method drawn from anthropology, where the notion of the other is approached in a new way. While in traditional anthropology the home country is the Western and the culture studied is typically non-Western, within performance study the other can be Western, non-Western, a part of one’s own culture, or an aspect of one’s own behavior. This methodological positioning allows criticism, critical distance, personal commentary and participation. One actively performs the fieldwork keeping a critical distance that enables the understanding of social circumstances through testing, revising and rehearsal processes. This methodological approach can enrich the discussion, discourse,

representation, and understanding of place, space, time and the body within interactive media art.

"Once human behavior is seen as [...] symbolic action-action which, like phonation in speech, pigment in painting, line in writing, or sonance in music, signifies-the question whether the culture is patterned conduct or a frame of mind, or even the two somehow mixed together, loses sense. [...] Behavior must be attended to, and with some exactness, because it is through the flow of behavior-or more precisely, social action, that the cultural forms find articulation." (Geertz 1973: 10, 17)

Clifford Geertz (1973) suggests that cultural performance is a collectively performed "text" about a particular society. "We understand ourselves by telling ourselves to ourselves." (Geertz 1973). Geertz is interested in the ways in which human collectives tell themselves to themselves through surrogates in performance positions, and "text" as a performance, carried out in a collective of readers and provoking counterpoints. Geertz approaches performance as "text" - as readable action and as social negotiation. His notion of reading the world as text points to the idea of being through telling, the core idea embraced by many scholars devoted to performance studies.

Geertz's (1973) reflection on ethnographic method extends the idea of world as text through articulation of a continuation of fieldwork in the practice of inscription. The ongoing nature of fieldwork connects the ethnographer's personal experience with an area of existing knowledge with an emphasis on preservation of the voices of the subjects involved. The ethnographer's account is both descriptive, in that the detailed description is an important aspect of research articulation, and interpretive - the ethnographer filters and extracts meaning from personal experience to present his/her most significant observations. Geertz's (1973) concept of thick description locates the understanding of the social gesture by moving beyond action towards consideration of its social significance and meaning. Thick description represents the meaning behind a gesture - its symbolic significance in society and between communicators. Geertz's ethnographer... "inscribes social discourse. In so

Geertz's ethnographer... "inscribes social discourse. In so doing, he turns it from a passing event, which exist only in its own moment of occurrence, into an account, which exists in its inscriptions and can be reconsulted." (Geertz 1973)

"Performance studies struggles to open the space between analysis and action, and to pull the pin on the binary opposition between theory and practice. This embrace of different ways of knowing is radical because it cuts to the root of how knowledge is organized in the academy."
(Conquergood 2002)

Geertz's ethnographer is recording the world as a manuscript, without acknowledging his own absorbing, making and performing. Dwight Conquergood extends Geertz's interpretive model of the fieldwork-as-reading and the world-as-text. He points out that the written record only partially represents the enacted knowledge of a given practice and practitioner (Conquergood 2002). This positioning opens a way for the articulation of knowledge by means of performance. Conquergood's approach to performance study aims to link written scholarship and creative work based on equality and non-hierarchical positioning.

Performance study is concerned with performance as a continuum of human action: from ritual, ceremonies, play, entertainment, performing arts, and daily life, to professional roles, ethnicity, class roles, media and Internet interactions. All of these can be studied as performances and consist of ritualized actions and gestures. Richard Schechner positions performance as "ritualized behavior conditioned by play" and ritual as "memories in action." (Schechner 2002) Both rituals and plays bring people into a secondary reality through multivocal symbols where people can imagine, reinterpret, fantasize and construct a self that is different than the self in ordinary reality. Ritual and play both have the ability to transport and transform the people who engage in them. Ritualized performances and play allow people and

animals to deal with difficult transitions, hierarchies, crises and frustrations that violate norms of daily life. Interactive media art can be studied as a performance that embodies ritual and play. The concepts of ritual and play embedded in the work of interactive art are exemplified in the composition of various artistic projects that I engaged in during the course of my study. The works, such as *Leaves* and *One River* (running) are discussed in detail in chapter six and provide a synthesis of these concepts.

Much of the discourse on interactive media art has been focused on the corporal and technical aspects of the human-machine interface and interaction. However the first and the strongest association that comes to mind when one thinks about 'interaction' is what goes on between people. The interactions between people are invariably scripted, directed and constrained by an implicit 'codebook of culture' informing those acts, utterances, roles and performances sanctioned by a particular context or milieu. For example, the forms and social norms appropriate to attending a church service, a soccer match, a marriage, a peace rally, a university lecture, an art opening, a trip to the corner store or the doctor's office, etc. Each of these events is coded in such a way that everyone participating in the event understands these acts and roles.

The behavior of the members of a concert audience is no less 'scripted' than the behavior of those performing on stage, in the sense of the word 'performance' put forward in Erving Goffman's *The Presentation of The Self in Everyday Life.* (Goffman 1959) No interaction, no matter how casual it may seem, is entirely unscripted; there is always a culturally

instilled and culture-pervading script available. If only at the level of what zoologists call 'species recognition.' (Darwin 1873) Animal behavior is 'coded,' i.e. it is not random: similar patterns will be seen to recur again and again in similar circumstances. Victor Turner's research also stressed the biological identity of human beings and a rigid division of the functions that regulate the instincts, emotions, and rituals according to the different cerebral regions (Turner 1990). What seem uniquely human are the sheer varieties of behavior and its forms, to the extent to which behavior is biologically conditioned, culturally molded and socially malleable.

Performances can be generalized on a theoretical level as "restoration of behavior." (Schechner 2002) Restored behavior is symbolic and reflective. It can be identified in daily life, in ceremonial life, artistic performances, habits, rituals and routines. Those who participate or observe decode its meaning. But, as an embodied practice, each performance is different from another, unique and situated by particular cultural patterns, histories, presentation contexts and tradition of genre.

What are religions?
Religions are
psychotherapeutic
systems. What are we
doing, we
psychotherapists? We
are trying to heal the
suffering of the human
mind, of the human
psyche or the human
soul, and religions deal
with the same problem.
(C. G. Jung 1968)

Social Transformation and Ritual Performance

We can use the term ritual as a synonym for scripted collective performance events. These scripts are what Schechner calls memories in action (Schechner 1993) or what Catherine Bell characterizes as thought in action (Bell 1992).

It's worth looking at ritual to allow the extension of these concepts to the performance of interaction within computational media. The social script negotiated between one's self and others enables and encourages, or disables and inhibits, the possibilities for expressing our selves. The culture encoded in a performance and language mediates and channels the traffic between the inward looking soul, and outward-facing persona.

² In a number of cultures the division between sacred and secular is difficult to draw. For example a wedding ceremonies in Europe and Americas often includes secular and sacred rituals combined together. Secular wedding rituals include cutting the cake, throwing the bridal bouquet and the gathering of family and friends for celebrating through drinking, eating and dancing. A state ritual is also performed around signing the legal contract, while the sacred portion of the wedding ceremony is performed in church.

Ritual is a technology, a body of techniques, practices, acts - accessories that people employ to distinguish and set apart a space, special and magical, separate from ordinary and everyday life. There are religious rituals, rituals of life roles, rituals of various professions, rituals of politics and businesses, state rituals, and animal rituals. These rituals are explored from many different angles and perspectives, having been defined in various ways as structures, performances, practices, functions, processes, ideologies, and experiences. In common use ritual is associated with sacred ceremony. But the conception of ritual is not limited to religious ceremonies of traditional cultures. Scholars have discussed the ritual as either a sacred or secular mechanism for the enactment of social structure. However, the boundary between the sacred and secular is extremely diffused and culturally specific. Sacred rituals are associated with expression of religious belief and assume communication through prayer with, and an appeal to, divine and supernatural forces. Rituals associated with state ceremonies, sport events, and every-day life activities such as drinking, eating, dancing, sleeping and greeting take on a secular quality and are not specifically religious in character.²

The study of ritual as performance is complemented by the field of ethology in its studies of rituals from the perspective of the evolutionary development of animals within the continuum between the human and animal ritual. They are concerned with how rituals channel aggression, establish and sustain hierarchy, defend and mark the territory. With animals ritual behavior is usually fixed action patterns elicited automatically by some stimuli. From another complementary perspective anthropologists theorize that ritual practices in today's human societies are symbolic systems of meaning and structures that have formal characteristics. Performance study is concerned with rituals as processes or performative actions that underlie social dramas and theatre. Ritual constitutes one way people organize and communicate histories, wisdoms, processes and information that are a part of the cultural tradition of a group. Ritual is a process that embodies ideas through encoded or 'scripted' performance.

Components of human ritual are multivocal symbols that are constituted as a coherent system that can be manipulated differently in different contexts. Multivocal symbols incorporate forms that can be perceived with different sensory stimuli-images, paintings, dances, music, etc., which are receptive of many meanings. Through these multivocal symbols and in the context of ritual performance, the elements of culture may be recombined in numerous ways, and fantasized rather than experienced as a combination of fixed normalizing cultural structures (Turner 1964). This creative character of ritual performance allows ritual subjects to break away from the fixed structures of daily life, recontextualize their existence, and conceptualize and

imagine new modes of being. Turner (1982) regarded performance as a genre in which modern peoples reflexively symbolize the critique, norms and conventional roles that govern their ordinary lives, and provide contemporary surrogates for religious ritual in traditional societies, but with a greater potential for creativity and change.

Turner (1967) interprets symbols as initiators of social action with "determinable influences inclining persons and groups to action." He investigates how symbols operate and function. He points to operational, performative and functional characteristics of symbols. The question is how to develop symbolic language in the contemporary multicultural communities of Liminoid phenomena that lack commonly agreed-upon cultural characteristics and symbols based on shared-belief systems?

This is a complex and important question. When deep structures found in established belief systems lose relevance, the symbolic landscape becomes fragmented. This does not mean that the cultural symbols are completely erased; rather it means that they are detached from the belief system that gave them coherent significance. Cultures tend to produce new symbolic usage and recontextualize their traditional source.

This situation calls for new ritual processes and celebrations to be designed that have the capacity to bring together communities with diverse religions, ethnicities, and cultural histories. Situated interaction design, if focused on providing meaningful, secular events for diverse community celebration and bonding, has a potential to provide social

rituals and intentional 'scripted' processes for socio-political reflection.

The focus on symbols as initiators of social processes is an important element of performance study, and by extension of interactive media art. My concern with ritual, while it draws from performance study, is focused on situated interactive art and media performances mediated by computing technology. The ritual space and time within contemporary post-industrial and technologically saturated complex societies in this work provide the context for interaction within media art. Computational media art in its performative nature has a potential to reflect on the current state of the world and technology and in this way contribute to communal development and social well-being. To achieve this we need to analyze the ritual performance and its sociopolitical function and create a new framework and new contexts for situated and interactive media art.

" Life comes to be made up of a succession of stages with similar ends and beginnings: birth, social puberty, marriage, fatherhood, advancement to a higher class, occupational specialization and death. For every one of these events there are ceremonies whose essential purpose is to enable the individual to pass from one defined position to another which is equally well defined." (Van Gennep 1960: 3).

Ritual performance incorporates the technique of reversal of activities and behaviors (from what are considered to be ordinary social or biological states). Ritual separates a person or group from the state of normal condition and conventional daily life and places them into a place for free play, a place where normal convictions are suspended and converted, where they can transform, transit and be reincorporated into normal life. Ritual is a specially created situation where transition and transformation can occur. Van Gennep points out that life is characterized by a succession of passages from one phase to another and each step along the way is marked by ritual (Van Gennep 1960). Rituals that transform people permanently are called rites of passage and include rituals

such as weddings, funerals, birth, initiations - symbolic confirming of a new role in a social order-convocation ceremonies or sexual initiation.

Van Gennep proposes a three-phase structure of ritual action in the rites of passage: separation, transition and incorporation. Separation marks the clear boundary between sacred space and time and secular space and time, which include a rite, ceremonial act or procedure that changes the quality of time. It involves the symbolic behavior of reversal or inversion of things, which represents the detachment of the ritual subject from his /her previous social status.

Transition is a reversal or inverting phase, which Van Gennep calls margin or limin (threshold in Latin). This phase acts as the doorway, an interface in another world and another space where the ritual subject is betwixt and between social categories. Here the actual work of rite of passage happens. This liminal phase represents the creative aspect of ritual where new social realities are created, where one can suspend one's role in society into a new state and social condition. Persons are stripped of their former identities and enter a time/space between two realities, in the midst of inverted social and power structures. Liminal phenomena may involve a complex sequence of episodes in sacred space-time, and may include subversive and playful events with familiar elements to de-familiarize them. Ritual subjects enter the temporary autonomous zone (Bey 1991), where they are free to experiment with new ways of being. Here secular social structures may be discontinued, former rights and obligations are suspended, and the social order may seem to have been turned upside down. By the way of cosmological

systems the elders in rite confront the ritual subject through myth, song, and non-verbal symbolic genres such as dance, painting, clay modeling, and masking. These symbolic patterns amount to teaching through the rite about the cosmos, the world and the culture.

The final stage is Incorporation, which includes symbolic action that represents the return of the subject into a new well-defended position in the total society. The ritual subject in the rites of passage undergoes a leaving process in which signs of pre-liminal status are destroyed and signs of liminal non-status applied.

Van Gennep argues that the three phases in his schema are varied in length and the degree of elaboration in different kinds of passages, but that every ritual includes all three phases. The funeral rituals emphasize the separation phase, while the pregnancy rituals elaborate the transition phase, and weddings the incorporation phase. This division is further complicated by regional and ethnic diversity.

Turner extends the work of Van Gennep to focus on rituals of large-scale industrial societies, and complex civilizations that embody dynamic semantic systems where symbols gain and lose meaning (Turner 1969). Turner's interest in the liminal situation is inspired by his insight into ritual as a powerful life experience that provides the setting in which new models, symbols and paradigms arise. Turner characterizes liminality as anti-structure where dissolution of normative social structures, roles, statuses, rights and duties take place. In the liminal state people are freed from demands of daily life; personal and social differences within the community

are erased; these prove experiences of solidarity, companionship among the community. This liberation from the constraints of daily life is anti-structure.

Turner (1977) points to the similarities between the "leisure genres of art and entertainment in complex industrial societies and the rituals and myths of archaic, tribal and early agrarian cultures." The liminoid phenomena in the complex industrial societies belong to performative play, experimental theater and other forms of artistic expression, which are of crucial importance with regard to the process of regenerative renewal of culture and spirituality.

According to Turner (1969), liminal phenomena tend to dominate in traditional societies, and are collective rituals concerned with calendrical, biological and socio-structural rhythms integrated in social process. These are enforced with socio-cultural necessity, and contain the potentiality for formulation of new ideas, symbols, models, and beliefs. Liminoid phenomena emerged in 19-century European and American capitalist culture, with the development of industrialization and mechanization, a product of ideas set off by technical innovations. Liminoid phenomena are not cyclical but are continuously generated, apart from central economic development. They can be initiated by an individual product that produces "mass" effects, generated by a particular individual or social group (a school or a circle).

Liminoid phenomena formulate space/time in which the rules of daily life are temporarily suspended, to provide the opportunity for people to engage with new modes of being

and alternative identities (Turner 1969). Liminoid is a space/time where new values can emerge. Situated and interactive media art offers an opportunity to provide a script, through communal actions, and create a liminoid space/time where the cultural and spiritual values of complex post-traditional communities can be shared and the cultural articulation of the community can be achieved.

The aim of structuring the socially engaged situated and interactive media art in this way is not to achieve a mere aesthetic result, but rather to achieve the process of building relationships through creative communication. This process, which needs to be embedded in the ever-changing reality of the world we live in, has a potential to contribute to a wide variety of socio-economic and political issues we face as a society now, have faced in the past, and will face in the future. Here, the result is a means of communication; the aesthetic is not the primary goal. The well-sung song, danced dance, or performed performance, fills the heart and enables one to hear and see better, and to experience the culturally significant meaning embedded in the work of art. In this context, the main role of the artist is to facilitate the empowerment of differences rather than impose a collective experience or transpersonal/transcultural unity. The abilities that artists require in this context need to be holistic and to allow them to consider in depth all the social, psychological, and relational implications of their interactions with the group and the contexts in which the work is produced — along with the fluency of aesthetic presentation. The main objective is placed in the wellbeing of the people and groups involved, and special care needs to be taken not to exploit the groups and communities for personal artistic purposes. For

this reason the socially engaged situated media art is an activity that opens to and welcomes everyone within its scope.

To achieve these goals socially engaged situated media art departs from the mainstream socio-economic structure of commercial art. This structure is rejected in order to be able to work in a separate aesthetic and sociopolitical space. This independence enables freedom, research, and stronger involvement with space, time and contexts of the groups and communities. As a result much greater value is placed on experience than on professionalism, which through its commercial agendas entails the conquest of new physical, personal, and community spaces. Another important consideration is to keep close attention on where the money for projects comes from and what the ultimate goals of the donors are, and not to be taken in by the accomplishment of the short-term goals of individual productions.

The Contemporary Condition

Cultural interaction under the processes of globalization influences the local, while altering the very nature, heritage and values of the local. The contemporary global scene is problematic because it disrupts place-the particular space, time and context of communities and neighborhoods. For example, big news commonly features crisis happening in distant places, and significantly contributes to dislocating local realities. Anthony Giddens (1991) discusses modernity

as a post-traditional order where space and time become abstractions. The state of modernity, which is roughly equivalent to the industrialized world, characterized by globalization, carries a disruption of place and disjunction of space and time. The concept of place is changing its meaning. Place is a particular time and space with a context reflecting current conditions of the locality. The experience of place is acknowledged through a direct physical action in space. Subjective and objective relations in the environment intersect through experience, thought and sensation. Communication technologies disrupt place by changing the context of the local space and modifying one's experience of time. With communication technologies we are able to transfer our selves virtually anywhere, instantaneously, and time disappears because we have instant access to communication with distant places.

Another characteristic of the post-traditional order, argues Giddens, is the abstract system of disembedding mechanisms that consist of symbolic tokens and expert systems. Symbolic tokens are media with standard value that can be exchanged across multiple contexts. The most important example is money. Money brackets time because it is a means of credit and space since its standardized value allows the exchange of goods among individuals who never meet in person. Expert systems bracket time and space because the standardized professions have nothing to do with the particularity of place and people that use them. Doctors, therapists, scientists, engineers and technicians are essential to expert systems of modernity.

These transformations of space and time transform the

perceptions and practices of social life. This condition affects the third major influence on the dynamism of contemporary condition-reflexivity of modernity. Institutional reflexivity is "regularized use of knowledge about circumstances of social life as a constitutive element in its organization and transformation."

Giddens points out that the social sciences play a major role in the reflexivity of modernity. Turner's concept of liminoid phenomena found in industrial society extends the Giddens notion of reflexivity of modernity. Giddens positions the social sciences as a major actor in the reflexivity of modernity, while - as Turner points out - the contemporary work of art also provides space/time for reflexivity where new values can emerge through liminoid phenomena. By extension my interest in interactive media art, as a contemporary form of art, is based to a large extent on its ability to provide "reflexivity of modernity" where the cultural values of the post-traditional order can be articulated and shared.

Giddens's post-traditional order, as a globalization of social activities, provides a framework for the understanding of contemporary conditions. Performative action can provide one way to connect space, time and community and reconstitute the local. Performance is a powerful symbolic form of communication that has the ability to structure personal experience in relation to a particular situation in the world. Performance reinforces ontological realism. Being here and now. Globalization enacts imbalances of power, access to media and control over resources; and hence the issues of equity, inclusion and social justice are critical for

both artists and scholars. Performative action is grounded in the specifics of a locality and has the ability to fruitfully bring concerns with issues of place, personhood, cultural citizenship, and equity into the foreground.

With the global conditions of the contemporary world cultures are intersecting rapidly. The theories of embodiment, event, and agency in relation to live and mediated performance need to be inclusive and intercultural. Within the global movement of populations, in the complex modern societies of post-colonial order, one cannot position communities as belonging to any particular ethnicity, nation or religion. Communities and neighborhoods are made up of citizens of the world. Unlike traditional societies where cultures are more coherent and bound by collective performances that keep communities alive and well, in the complex multicultural societies communal cohesiveness and the collective articulation of the communal identity is a challenge. Here the purpose of ritual through art becomes significant. Ritual within art can be developed as meaningful action that offers space for transformation and the articulation of the image of the community.

Nicole Preston's discussion of the Public Dreams project provides an excellent example of a successful way to promote community articulation and participation through the arts in the multicultural environment of Vancouver. The Public Dreams Society, which was established by Dolly Hopkins, Paula Jardine, and Lesley Fiddler in 1985, enables participation by interactive and accessible public art programs aimed at creating participatory events and rituals that allowed Vancouver's multicultural neighborhoods to

Nicole Preston (2000) in discussing the Public Dream project, points: "in neighborhoods where everybody has their own religion, beliefs, and cultural history, creating an artistic event is a shared ritual that helps bond the community."

³ Quoted from Public Dream Society mission statement accessed at on April 2nd 2006 <http://www.publicdreams.org/about.htm>

construct symbolic and creative cultural experiences composed of diverse and personal creative expressions. It is through this multiplicity that neighborhoods of different cultural composition find their unique expressions. These experiences contribute to the construction of the ideal vision of the neighborhood as a whole. The Public Dreams Society facilitates community celebration events that provide mentorship and employment for people who want to engage with various multi-modal artistic expressions. The performances, events, and festivals created by the Public Dreams Society provide opportunities for the culturally rich and diverse population of Vancouver to come together. "At these events, the citizens could discover for themselves what it means to celebrate and be a part of a community."³

Symbolic action within the context of interactive media performance can provide this Liminoid space/time for the articulation of cultural identities. The orchestrated creative action and the ritual process can bring together disjointed communities and in that way allow a new vision of community to emerge. Interactive media art can provide meaningful, secular events for diverse community celebration and bonding. Through social rituals and intentional 'scripted' processes for socio-political reflection, interactive media art as a performance-based art has a potential to contribute to providing the space for sharing the wisdom accumulated within these diverse groups and communities. Socially engaged interactive and performative media art denies both the concept and the practice of repetition and finished media products and performances; the work maintains an "open for critical review" stance (Schechner 1985). Interactive media art is no longer a fixed

something that has to be reproduced, but is instead a single experience of growth within the contexts and group in which the work is presented, enabling it to communicate with other groups and the reality outside the group. Community-based performance activity in which everyone can participate is a key element to socially engaged interactive and performative media art. The achievements are in its ability to facilitate communication, relationships, true exchange, democracy, critique and development; to create a community, celebrate diversity, spot problems, and raise public awareness; to create circles of exchanges and encounters.

In this way, interactive media performance has a potential to reach deep into the community well, honoring the interrelatedness of every aspect of our lives, which is exemplified within the communal and cultural milieu we live in. In this way it provides liminoid space that contributes to cultural articulation. Through the creation of events that are inclusive, reflective and relevant we can embrace new hybrids of social thought that develop within nonhierarchical heterogeneous cultural composition.

New social mythology and symbols emerge from the interweaving of the diverse cultures in contemporary post-traditional societies; in return cultures are encouraged to transform, diversify and in the process create and articulate their own distinct realities.

The emphasis on embodied performance within interactive media art can afford a space for building a common ground and enforcing spiritual wealth within the local. Symbols and symbolic actions are powerful activators of collective

memory and provide liminoid space/time comparative to that of ritual, where ordinary reality is transformed and inverted, to produce the new 'idealized and imagined' reality. This special space/time allows us to reflect on the state of our world, on the uniqueness of our being, and to reconstitute new meanings and future paths into the regenerated communal culture. The regeneration of culture within community is forged through the enabling of the place where neighbors meet within a creative and cooperative environment. Interactive media performance has a potential to provide a space for the articulation of shared contemporary realities.

One of the key elements of healthy life and healthy community is a vision of future well being for the total community. This needs to be cultivated through a collaborative process that helps the community articulate a vision of wellbeing and turn this vision into reality. A healthy community is not simply an outcome, but a process and action that together accommodate changing conditions and actively engage in improvement in the quality of life of its citizens. Situated interactive media art calls for the development of formal compositional strategies in order to allow this process of continuous revision and rehearsal of culturally meaningful and contextualized action. These compositional strategies are drawn from a cross-cultural study of shadow performance. As a result the concept of a cinema of braided processes (Dulic & Newby 2003) is developed through the course of the study and is further discussed in chapter six.

Shadow Play

One of the ways in which interactive media art can be contextualized is by examining forms of contemporary performance that emerge from the traditions across different cultures. This study explores the intersections among shadow play performance, interactive media art and cinema. Shadow play performance and interactive media art share many characteristics. The histories of shadow play and cinema intertwine: they share the magic and mystery of stories animated by moving shadows. The one significant difference is that shadow play is performative in a way automatic cinema is not. Cinema mechanized the art of shadows and took the process out of the image in time. Interactive media invites us to look at shadow play and reinterpret it with performative action and the locality of the community in mind.

Shadow play is considered an art of mediated performance that does not necessarily employ computing technologies. The technologies that the shadow play employs are also very complex and share many parallels to interactive media art. The audiences of shadow theatre, cinema and interactive media art alike are engaged in the emotional space of image: they watch projections on a screen; the narrative unfolds through the action of figures formed in light and shadow on the two-dimensional plane of the screen. There are three key characteristics that shadow play and media performance share. First, the narrative unfolds in time through the

interplay of shadow and light amplified by integrated aural elements. Secondly, visual elements are articulated by the basic principle of projection. While the first two characteristics are also shared by cinema, the third characteristic is unique to shadow play and interactive media performance. This is the use of a 'database' of performing objects and media elements that can be called and recalled in an improvised manner during the performance to articulate and visualize the content of the work.

The numerous examples of shadow play performance across many diverse cultures are, for the purpose of this study, limited to the intercultural exchange between Bali and North America. Two major concerns provide a bridge between shadow play performance and interactive media art. The first concern drives the analysis of how the formal and social context of Balinese wayang kulit informs performance practices in North America and how these could be extended towards interactive computer-based media forms. The second concern drives the analysis of how computational and media technologies integrate with shadow play performances in Bali.

Balinese shadow play in the context of interactive media art can be studied through the analysis of how its social context shapes form and structure. Every performance of Balinese shadow play is a part of the ritual that keeps the culture alive. The shadow play is aimed at the particular place, time and context of activities of the community in which the performance is represented. Balinese shadow play performances draw storylines from a wealth of traditional narratives. For each performance a passage of the story is

chosen that best reflects the ceremonial context of the play in consideration of current issues that emerge from the community. These well-known stories are retold and reinterpreted each time to reflect the state of the community and the purpose of the ceremony. An innovation reflects the tradition and spiritual philosophy. The structure of shadow play evolved to support innovation and improvisation. Traditional Balinese shadow play does not require a rehearsal process; the well-defined structure and the language the puppet master shares with the musicians allow the narrative to be changed and modified from performance to performance without rehearsal. The complex communication between the musicians and the puppeteer allow improvisation to take place. This improvisational form emerged to serve social purpose-the efficacy embedded in shadow play is part of the ritual process. Balinese shadow play offers a case study in a traditional media form that is performative; it has a profound connection to the ritual, and it presents an aesthetic social model of integrated space-time and context - the place of the community. This concept of space-time-context *desa kala patra* is important to Balinese artists and it is discussed in both a philosophical and practical manner in the context of performance. It provides a way of putting human activity into the context of the world and nature and is a way of intersecting with forces greater than those of human design. *Desa kala patra* gives a sense of place on both social and metaphysical levels. Interactive media art and performance carry the potential to provide a place for social reflection, and can contribute to creating coherent communities and culture in complex global societies. It has the potential to act as a mechanism for reincorporation of the local.

Ritual Interface

(Harold Innis) changed his procedure from working with a "point of view" to that of the generating of insights by the method of "interface," as it is named in chemistry.

"Interface" refers to the interaction of substances in a kind of mutual irritation. In art and poetry this is precisely the technique of "symbolism" (Greek "symballein" – to throw together) with its paratactic procedure of juxtaposing without connectives. It is the natural form of conversation or dialogue rather than of written discourse. In writing, the tendency is to isolate an aspect of some matter and to direct steady attention upon that aspect. In dialogue there is an equally natural interplay of multiple aspects of any matter. This interplay of aspects can generate insights or discovery. By contrast, a point of view is merely a way of *looking at* something. But an insight is the sudden awareness of a complex process of interaction. An insight is a contact with the life of forms.

Marshall McLuhan⁴

⁴ From *Media and Cultural Change*, Marshall McLuhan's introduction to the 1964 edition of *The Bias of Communication* by Harold Innis.

The case can be made that the spread of computer-mediated interactivity in the realm of every day life changes our relationship to media by accustoming us to a new subjective position. It can be said that interactive systems position us in a conversational situation (Newby 2001, Morse 1999, Hutamo 1995). Interactivity promises a two-way relationship characteristic of conversation rather than the one-way communication of broadcast technologies. Electronic and broadcast media such as radio, television and cinema provide one-way communication; for this reason these media have been used as effective tools of dominance. The poverty of the 'global cultural defaults' - mass media culture - supplants local cultural forms wherever and whenever

introduced.

From the standpoint of media theory a public media space can be theorized only when it is already an occupied territory. By the time Bertolt Brecht tuned in, the radio broadcast already demonstrated its crisis. Brecht (1932) calls for radio to be no longer "a mere sharing out," but rather "to let the listener speak as well as hear." For Brecht, sound needs to become the meeting space of a continuity that escapes the systems of power. Interactive media has been popularly presented as a form that offers this bi-directional communication, and as a consequence has been referred to as media that can provide the democratization of communication technologies and therefore of society as a whole. Interaction through the world of technology depends on the power relations through which it is carried out, and therefore the vague idealist promises attributed to interactive media suggest a dangerous techno-idealism that projects a technological determinism on the quality of life.

Interactivity within interactive art provides a taste of improvisational freedom and at the same time imposes a structure. The metaphor of conversation points to a form of scripted interaction. In the most general terms conversation channels and reinforces human values. This notion that conversation is always in some way constraining comes out of soundscape studies (Truax 1985, Shafer 1977). The traditional model for conversation is in taking turns (Sacks 1974). Here the metaphor is a polyphonic organization of musical voices, where each musical voice is given its space-its turn. The model of conversation works particularly well in interactive media. It is the reciprocal relationships among

impression, insight and irritation, as McLuhan refers to it, as well as sensation and complementary expression, action, and reaction.

The concept of braided processes (for detailed discussion of this concept please refer to chapter six) provides a model for braided conversations and is relevant in this context in that it provides an open framework for describing an integrated relationship among various independent elements that comprise the complex media braid. The associative narrative braid is taken up as the central compositional strategy—weaving and intertwining a variety of threads at several levels of the work. On the compositional level this complex braid of narrative elements allows different streams of the narrative to be available for mixing in different ways and to be montaged in time and accented with responsive processes.

The braid is articulated through the participant's engagement. This form of interaction with the work is based on a particular participant's engagement. Different participants can engage with different independent elements of the braid and their actions influence the overall symbolic juxtaposition and interplay of multiple insight-generating aspects of the performance. The cinema of braided processes acts as an improvisational system responsible for organizing a multiplicity of multimodal voices, negotiated order, distributed participation and direct dialogue with oneself and others through the materials of the work. It is a form of open work (Eco 1962) that allows braided conversations to emerge through improvisatory co-creation.

The model of conversation impelled by developments of interactive technology provides an intrinsic promise that interaction through technology guarantees a 'democratization' of society, through the emphasis on the democratic potential of technology. It is naive to assume that massive exposure to the interaction with the world of technology and the gradual integration of society with interactive devices would lead us to a utopian democratic society. The discourse on interactive art dramatically lags behind social or cultural considerations. While interactive art and new developments of technology carry a great promise and generate much excitement among contemporary artists, addressing only hardware development, interface designs and marketing agendas is not sufficient to achieve the goals of interactive art as a democratic form. This new technology needs to be placed in a larger context, which embraces not only the social and cultural framework, but also a continuous relationship with tradition, history, education, and spirituality [ethical/social values]. The idea of braided processes on a conceptual level provides a model for situating the work of art within the particular social, historical, ethical and spiritual contexts within which the work functions. The conscious braiding of these elements provides a work of art that is grounded and situated in the particular space, time and context. In this way the concept of braided processes contributes to strengthening and diversifying the place and locality. The braided processes as a model enables interactive art to have a critical role, by providing a space for conversations and continuous community-based reflection on contemporary life and technologies that shape the way we live.

Interaction facilitated by socially engaged and situated media art has a potential to provide a ritual interface — an instrument of social action — that acts as the magical space for the sharing of cultural wisdom that links the experience within a community or a group to the socio-cultural, economic, and historical context from which it emerges. The role of artist then, the way I see it, is to facilitate the space that allows communal conversations to emerge; to provide a meaningful and reflective space where diversity and equality within post-traditional technologically saturated complex societies are enabled and celebrated. The ritualization of interactive media art provides engagement in a socially significant action and reflection on the current state of our realities. The mode of interaction that facilitates healthy living and healthy communities in complex societies belongs to art and performance. Interaction in the context of socially significant action and healthy community is the most significant concept I learned while studying Balinese shadow play.

My objective is to theorize how effectively to make interactive media art meaningful to people here and now, relevant to its community, to the place. The emphasis on social interaction facilitated by computing technology provides a 'ritual interface' for structuring aesthetic experience according to a process inspired by the Balinese philosophy of *desa, kala, patra* - intersecting space, time and contexts for significant spiritual, environmental and communal purpose.

Chapter 2: Interactive Media Art

This section presents definitions of concepts that contribute to the articulation of interactive media art, as it is understood in the context of this research. The study of the theory and practice of interactive media art in this research is focused specifically on the kind of work that integrates a real-time exchange among the participants and the materials of the work within a given physical location. Interactive media art, on the most general level, refers to the form of media art in which computing technologies enable interaction—a real time exchange among the participants and the materials and processes of the work. A broader concept of interactive media art also includes CD ROM, web based and virtual environment art that does not take place in a particular physical location in space, but these kinds of works sit outside of the scope of this research and are not discussed here.

Since computing technology enables interactive media art this technology becomes a place where artistic ideas are articulated and produced. In the context of this research I refer to interactive media art as a kind of art that is only made possible by means of computing technology. In order to be able to deal with the particular technical requirements necessary for the development of interactive media art two concepts are developed: the concept of the computer as an

artistic medium—a medium that acts as a carrier of artistic concepts; and the concept of code as artistic material—an elementary material that enables the artistic virtuosity to be expressed.

Using computing technology as carrier of artistic concepts, which can be only expressed by means of this technology, allows for the positioning of computers as artistic medium. This implies that this technology is integrated with the work of art from the production to the presentation stage and also that this kind of work can only exist if mediated by this technology. That artists working with this medium commonly exhibit, explore and extend the potentials that are inherent in this technology. The distinguishing features of the art forms afforded by computational medium constitute a distinct form of aesthetic that opens new paths for artistic expression. Since the discussion here is focused on a form of media art that is only possible by means of computing technology it is important to address the techniques in which this kind of art is created.

The analysis of technical aspects of interactive media art centers on the use of the computer as a medium for artistic expression, where artists working with this technology use code as an artistic material to articulate culture, and in that way contribute to the development of the computational medium itself, its expressive significance, and its tools. These ideas are not discussed here with an aim to replace the creative skill that an artist brings to the work of art, rather the aim is to demystify the complex technical characteristics of computational technologies and empower artists to move beyond the sole use of commercial software applications,

which by necessity impose a particular artistic methodology.

The key characteristics of the computing technology are that it affords interaction, participation, performativity, dynamics and customization. Because of its ability to mediate a variety of different modalities, art made using the computer has a multiple manifestation in many different disciplinary forms of art and design.

The purpose of the study of interactive media art is to deepen understanding in the very specific area of computer art that is focused on the intersection across media, computation, performance and physical location. In this dissertation I develop artistic practice and analyze two particular contexts of interactive media art: (1) interactive audiovisual installations and (2) media performances. The ability of computational media to enable interaction, improvisation and performance is explored here in several different ways.

Interaction

Today the meaning of the term interactivity in the context of art has been confused because it has been used to refer to numerous levels of exchange that imply our engagement with the world of technology. Ultimately, every work of art is interactive on the level of how the interplay between the content and the context of the work influences the recipient's production of meaning. Computer-based artwork is characterized by its dual bases in information and process

which enable variability of electronic media as well as the programmability of the mechanical systems that allows for new forms of navigation, analysis-resynthesis, montage, iterated mappings, feedback, temporal dynamics and for new physical engagements between augmented objects and spaces, performers and audiences.

This interest in the participant's involvement can be traced from Dadaism and Constructivism of the early twentieth century to the participatory and responsive arts of mid-century Fluxus and Situationism, where the space between performer and public disappears. The images moved outside of the frame and the boundaries between art and life were blurred. Artists explored the shifting experience of here and now in attempts to subvert the privileged relationship of authors as solitary creators, and re-introduce participants as co-creators of the event, in that way emphasizing the collective and social significance of art.

Despite the rapid developments and shifts in technology in the twentieth century, the themes established in early century participatory art are still relevant to the avant-garde of today. With contemporary interactive media there is a potential to extend this avant-garde approach and employ interactivity that goes beyond interactivity by means of the triggering of media events. My intention for studying interaction in the context of computational media is in exploring its ability to intersect a performative action with electronic media.

Media

We can consider media, on the most general level, as a vehicle for communication - a concept much broader than electronic media, which includes the book or any other artistic or non-artistic object that is a form that communicates.

McLuhan positions electronic media as "technological simulation of consciousness" and as an extension of "our nervous system into global embrace, abolishing both space and time" (McLuhan 1964). This separation of space, time and local context is even more dominant today. The differences between live events and electronic media, the digital and the original, physical and simulated are collapsing. In this research the intersection of electronic media with the performative act aims to provide a vehicle to reconnect space, time, and place. Embodied performance with electronic media has a potential to change our relationship to automated electronic media, and bring the action and the body back to the disembodied media machine.

The inquiry of performative and interactive media suggests affinities with performance traditions that use performing objects as media, such as mask dance, marionette and shadow puppet performance. For the purposes of this study, my concern for media interaction has inspired me to revisit concepts employed by the traditional shadow play. While cinema captures projected shadows in a media machine,

interactive media invites us to look back into this traditional form and learn what we missed. What we missed is the role media performance can play when it makes use of the action and embodied interaction within realities of the particular group or locality that it addresses. In this study a special attention is paid to the improvised media performance that resembles cinematic composition, but has the ability to be modified and adjusted in response to the contexts in which the work is experienced, each time in a new way.

¹From interview with Wayan Wija 2003/2005

The dalang (puppet master) Wayan Wija¹ makes the important point that digitalization of shadow play performance by means of recording and television broadcast is taking away the essence of what the art of shadow play actually means and represents within the community. The example of Balinese Shadow Play, which is performed as part of a temple ritual, implies a spiritual connotation and teaches wisdom within the context of the ceremony. Viewers who watch the shadow play alone in their homes on their televisions are displaced from the space and time of the community ritual and the wisdoms contextualized within the local place, which are disseminated through shadow play performance. The sense of displacement does not happen only geographically but also occurs within the spiritual context of the community.

Art

The definition of art for the purpose of an inquiry in cultural crossings in media performances needs to support the attempt to create intercultural bridges among different forms and traditions of shadow play. In order to find some elementary ideas with which to provide a framework for an understanding of the notion of art in the context of this research it is worthwhile to turn to anthropology for definitions. Richard Anderson's idea of art as a culturally significant meaning provides a definition of art that has potential to offer a necessary intercultural bridge. In 'Calliope's Sisters: A Comparative Study of Philosophies of Art', Anderson studies art across eleven world cultures. He draws his definition of art through a search for something akin to art in all cultures and histories. Anderson puts forward that "Art is culturally significant meaning, skillfully encoded in affecting sensuous medium." (Anderson 2004)

² Drawing on the idea of Moris Weitz who suggests that art can have only what Wittgenstein calls "open definition".

Richard Anderson proposes an "open definition" (Weitz 1979 Anderson 2004) ² of art form from the cross-cultural perspective, as a series of qualities: "a culturally significant meaning", "skill", "code" and "affecting sensuous medium." Individual arts and artifacts vary in the emphasis placed on each of these qualities, argues Anderson, and these variations are permitted by open definitions. People understand, communicate and create meanings. The common values of meaning in art can be found in the relationship of art to human health, communal goodness and as a manifestation of

truth. The contributions that art makes to spiritual, philosophical or ethical areas of life point to culturally significant meaning—a meaning skillfully encoded to affect our senses. Anderson's definition of art reflects John Dewey's idea of art as a "universal language" that "expresses the life of the community" (Dewey 1980).

"If there is a commonality in art, it lies in the fact that certain activities everywhere seem specially designed that ideas are visible, audible, and—one needs to make up a word here—tactile, where they can be cast in form where the senses, and through the senses the emotions, can reflectively address them." (Geertz 1983)

Art reaches the highest purpose when it conveys and expresses meaning of significance for a culture's spiritual, philosophical, political and ethical tradition. The work of art is significant if it supports, transmits or transforms cultural values, if it teaches or if it provides ethical training and administers justice. Art conveys meanings of extensive cultural importance by embodying social, and political principles.

An important means of deepening understanding in any endeavor is to study cross-cultural approaches and perspectives on art, in order to find forms and values that can be shared. Another reason to look across different cultures and histories for the framework in which we can understand a philosophy and meaning of art is the fact that advanced industrial post-traditional societies are increasingly characterized by alienation from the worlds of art. Anderson points to a contemporary problematic wherein scholars conduct numerous scientific studies to examine wide varieties of subjects in minute detail, while art is often ignored. Even when art is a subject of study, the study is focused only on stylistic and technical characteristics, or examines art in relation to more concrete activities such as art education or its economic function. Throughout the twentieth century contemporary art has already revealed to us its

potential as a powerful multimodal form of communication, which in vital and critical times goes beyond its borders and takes on the role of critically engaged social agent, or in Brechtian terms acts as the hammer that shapes reality. My concern focuses on this transformative power of art and its potential to play a powerful socio-political role.

As discussed in chapter II, contemporary multicultural communities of the new world are internally diverse and continuously evolving. Large movements and displacements of populations around the globe, conditioned by colonial rule, evoke this situation. As people move, both by choice and by force, their identities and the identities of their descendants transform into a newly hybridized situation. The coherent cultural frameworks of traditional societies have a role to hold communities together in periods of crisis, loss and distress, through religion, rituals, dances, storytelling, singing and painting. Within the cultural mosaics of multicultural nations, art can provide a critical framework for exploring the communal identity that is inclusive and supportive of these cultural diversities. Consequently it can provide a space for the exploration of issues like racism and cultural assimilation that emerge within these newly hybridized identities. Dewey's idea that art "expresses the life of the community," and his proposition that we must learn a language of art to enter into the spirit of relevant community (Dewey 1980), then, supports this concept that art provides a reflective space and time for addressing the basic questions we face as citizens and as communities within our ever-changing world.

Interactive as Technical

The word interactivity is increasingly associated with our engagement with machines in every sphere of contemporary life: interaction with automated bankers, remote controlled televisions, cd-roms and DVDs, internet, art installations—even traditional artifacts in museum exhibitions are displayed and enhanced by interactive augmented reality systems. Some of these examples do not point to interactivity but to a form of social control. The application of the expression interactivity as it is used to indicate a mode of engagement with the world of technology obscures rather than clarifies the range of meanings assigned to this concept. The issue is that interactive becomes a synonym for technical. This understanding of interactivity influences the way the term is used when applied to interactive media art. Various kinds of art works are referred to as interactive if they are technological.

The references to interactive media art encompass everything from net art and interactive installations, to robotic and automated sculptures, and from immersive virtual environments where the user navigates a 3-dimensional space, to various kinds of virtual reality games, to smart fabric fashion design. Computing technology is the only thing that connects all these different forms. Therefore critical discourse on interactive media art may be characterized as dependent on technological developments.

This profoundly technological art form is positioned among different development contexts: academic research, corporate applications for consumer markets, the military industrial complex, and independent art production. These worlds impose their own, often differing, definitions and agendas with regards to what constitutes the notion of interactive media art. This situation forms tensions among the utilitarian military technological development that made a way for this technological form, the critical implications and the cultural reflections that belong to art, the utopian values promoted by industrial growth, and economic interests promoted by the entertainment industry. Interactive media art is splintered among the contexts of fine arts, entertainment industries, military developments and engineering.

The issues outlined above profoundly influenced the direction and approach I chose for this research. I came to this work with an established artistic practice in experimental film and animation, wanting to understand the different ways in which computational technologies might extend these practices. My approach to working with this evolving practice was positioned at the intersection of academic research and independent art production. Since I was extending my artistic practice towards computing technology, the learning process involved immersion in the world of this technology. The acquisition of technical fluency and literacy with computational technology, as well as the process of shifting my practice and developing new theoretical frameworks, form integral parts of my research. The process of learning was initially based on the purely formal and theoretical considerations that computer as art

medium imposes. I discuss the artistic outcomes that exemplify these technical innovations in chapter four. The issues that arose from the first steps I took in acquiring fluency with computing technology mirrored the issues that arose around the early computer art of the 1960s.

“While engineers strive to maintain the illusion of transparency in the design and refinement of media technologies, artists explore the meaning of the interface itself, using the various transformations of the media as their palette.” (Rokeby 1998)

³ A good overview of early computer art is provided by Digital Art Museum accessed at <http://www.dam.org/artists/index.htm>

Computer scientists, who incidentally had appreciation for the arts, dominated the early computer art of the 1960s. Examples of this early computer art can be found in the work of Herbert Franke, Ben Laposky, Yoshiyuki Abe, Roman Verostko and others.³ This technological art is often characterized as 'old school computer art,' (Graham 1999) and has been referred to as 'art made by scientists'. These works can be perceived from an artistic perspective as technologically superior and advanced but artistically naive. Artwork with a scientific and formalistic orientation pays minimal attention to content. The approach to art making that comes from engineering and scientific grounding places its primary significance on technical innovations and development, while artistic issues and innovations are placed on a secondary level.

To provide an example of this issue I can refer to my own research. My early computer work focused mainly on formal issues that arise from researching the basic elements of form that can facilitate performance and interaction. The innovations developed in this work are formal in nature. The criticism of the formalist approach is that the work seems to be grounded in the building and developing of new technologies, and articulating forms as new code and algorithms.

Technical innovation gains meaning if it is positioned in a social context. The study of shadow play in Bali defined my interest in situated media performance, and my focus on technical innovation shifted to researching artistic issues that have as their focus the means for spiritual and social wealth. Further discussion of the collaborative artistic outcomes that exemplify artistic innovations is provided in chapters six and seven.

New technical facilities are constantly being developed for scientific and corporate research. It may be that new technology, new materials and new mediums are enabling new artistic abilities, but technical ability for an artist is not the means to an end. In that sense, technology itself is immaterial. For the artist, new technical abilities and scientific discoveries are important only insofar as they are integrated in a work of art that reflects the contemporary world and life.

The potential to reflect critically on the contemporary condition, and to stimulate and reinforce communal bonding through the expression of cultural wisdoms and values, in the context of the contemporary post-traditional world, belongs to secular rituals embodied in art. For contemporary multicultural communities that do not have a common religious and cultural ground, there is a corresponding responsibility for artistic expression to provide space where the common ground and communal vision may emerge.

Errki Huhtamo, in 'Seeking Deeper Contact Interactive Art as Metacommentary,' (Huhtamo 1995) articulates the role of interactive art as a vehicle to create a metacommentary about

the nature of interaction that employs technology. Only through a reflection on the current state of society, technology and its effects on the community, can we understand what interactivity means and who can benefit by it. He proposes that interactive art has a potential to become a catalyst for social change, socio-political critique, and to contribute to a true democratic society, only by providing a critical and reflective perspective on its own technological properties, influences and contexts.

This positioning of interactive art as instrumental to socio-political reflection on the world of technology, and by extension to the society as a whole, strongly echoes my search for the compositional system that best serves this new form and its place in reflexive socio-political systems. To fulfill this goal my research goes beyond the study of how this phenomenon occurs today among the interactive art practitioners; rather it looks at the philosophies of interaction and compositional systems that embody these philosophies. The search for understanding interaction outside of purely technological art aims to connect this new artistic practice to traditions that have continuously maintained this socially aware approach, expressed through various screen-based media. The key concepts for the compositional system that enables interaction in this work are explored through the study of the contemporary tradition of Balinese shadow play, which is further analyzed through the genealogy of shadow play in the context of cinema. Cinema presents a major point in the development of technology for screen-based media art and hence provides a direct precursor to interactive art. The improvisational character of the shadow-play system, which presents a form of interaction through screen-based media, is

explored here as one of the key qualities for enabling structured interaction. This structure encompasses spatial, temporal and contextual elements, which directly address the immediate environment in which this work co-exists. It is this dedication to addressing the particularity of the locality within which the work is presented that situates interactive media art and enables the reflexive and ever-changing improvisatory system, which has a capacity to continually reexamine itself and the structures of which it is a part.

Immersion



Figure 6 The Man Who Flew into Space from His Apartment, Installation Kabakov Ilya. 1981, Centre De Pompidou, Photo Aleksandra Dulic

The seductive idea of the participant entering and moving through the immersive world inspires much of the research into virtual reality systems and user interface. Interaction by definition requires decision-making and deliberate action, and consequently contradicts the daydream-state of immersion. Removal of the psychological obstacles to immersion represents a common goal for research directed towards industrial and entertainment products. The development of industrial technologies aims at providing a way for interaction to enter an intuitive mode, so one doesn't need to think about which button to press, but can move through the virtual world spontaneously. The transparent interface anticipates the creation of virtual reality systems where the user can immerse in the computer simulated virtual reality in an unrestricted way. There is a search for a middle realm - between the capacity to be immersed in a world of imagination, and the waking state of considered

for critical reception that can be extended to immersive media. His anti-Aristotelian 'dramaturgy of estrangement' supplements realism in order to stimulate a critical view of the play and prevent viewers from emotionally identifying with the action on the stage. Verfremdungseffekt, which roughly translates from German as a distancing, estrangement, or alienation effect, is a means of detachment and reorientation by which Brecht reminds audiences that this representation of reality is not reality itself. He did not want the actors to disappear into their roles, but rather to establish dialectical relationships with their roles. Theatricality is turned into its own topic, into a conceptual approach that functions as the strategy of distancing the familiar, and calls attention to the fictionality and incompleteness of representations.

In the "total installation," Kabakov entirely reworks the existing space into an immersive environment. Floor, walls, and ceiling-the whole interior is reworked. Kabakov argues that the falsity and artificiality of the installation must prevail. The viewer needs to be aware that the artist has intentionally constructed every aspect of the work in order to create an image. In this sense, total installation is a constructed place where action has taken place, will take place, or may yet take place.

Virtual reality works are an extension of the total installation into the digital realm. In Char Davies' immersive virtual environment, *Osmose*, interactivity is placed at the center: an active participant wears a head-mounted visual display and a vest filled with sensors to navigate through the virtual world. The vest monitors each breath and movement of the torso,



Figure 9 Forest and Grid, Osmose, Char Davis 1995, (Used by Permission)

providing information used for navigation. At the same time, the participant's experience of the world of Osmose is exposed outside through a large-scale projection screen, so that other visiting observers can follow the individual interactor's journey through this simulated natural world. The isolated interactor generates the experience, and the images are displayed on the screen. The relationship between the individual actor and the audience in a darkened space suggests a new blend of shadow play and cinema.



Figure 10 Tree, Osmose, Char Davis, 1995 (Used by Permission)

In Osmose, the interface molds perception, reception and the dimensions of interaction with the work. Char Davies' natural interface is a point of contact where machine and the active body meet in order for exchange to take place. The breath as an interface technique provides an intimate synthesis of the organic and the technical. The control interface of Osmose is much more physically and emotionally intense than using a joystick or a mouse, in that Davies uses breathing, normally an unconsciousness aspect of the autonomic system normally requiring no decision-making, even in the case of trained breathing. In the virtual reality of Osmose, where physical laws are extended, boundaries between physical and data space disappear. A head-mounted display envelops the visual field and provides the interactor with a sense of full-body immersion. The effect of embodied presence and immersion is further emphasized by sound. Each zone in the world of Osmose has its localized sound.



Figure 11 Rocks and Roots, Osmose, Char Davis, 1995, (Used by Permission)

Oliver Grau points to the problem of a person achieving aesthetic distance while inside the omnipresence of virtuality (Grau 2003). When immersed in a 360-degree audio-visual illusion, the participant cannot maintain distance from the

work or create space to objectify it. Without that space, a virtual-reality artwork cannot be perceived as an autonomous art object. Aesthetic distance is vital to the participant's critical reflection on the work, and this critical reflection provides a space for understanding the meaning and structure of the work.

Char Davies examines "[...] immersive virtual space as a spatio-temporal arena, where in mental models or abstract constructs of the world can be given virtual embodiment in three dimensions and then kinesthetically, synaesthetically explored through full body immersion and interaction." (Davies 1998)

The complete immersion of *Osmose* recalls the question posed by Kabakov of how to accommodate the space necessary for the participant's reflection. In *Osmose* the participant's own breath, enveloped by technology, becomes an interface that enables one to move through the virtual space. The movement through this virtual space is conditioned by the interactor's own breath, which intensifies the sense of immersion. In the virtual world, active and responsive interfaces merge the content and provide an experience of becoming, transforming and revealing. The artistic challenge within this highly immersive environment is to create space that empowers critical reflection, social transformation, and participation, where participants and events can shape each other.

Emergent Practice and Collaborative Research and Development

The computing technology enables a non-linear media structure and it has the potential to integrate different fields of art—visual, auditory, spatial and temporal compositions—into a multi-sensory expression. It affords the intersection of many different artistic domains, which suggests that the

artist needs to be knowledgeable in diverse areas of specialization: from literature, narrative and dramatization, to engineering, architectural, hardware and software design; from cinematic, video and audio production, to theatre, dance, performance and improvisation. While this practice emerges from diverse disciplines, it is at the same time separate from them. Interactive media art is distinct from the specialized areas of industrial design, computer science, and architecture. It differs from film, photography, and graphic arts, and it differs from literature, theater, and choreography, in that it is an area that integrates all of these knowledge bases and experiences into an artistic whole appropriate to the potentials offered by computational media.

Custom design of software applications and programs that integrate these multi-modal expressions form an integral part of the artwork and artistic practice, and this closely relates to aspects of computing science, engineering and human computer interface-design research. While the protean nature of the computing technology provides a rich site for artistic creation and exploration of the potentials of this medium for multi-modal media expression, the language and architecture of computer systems are so technically complex that it often takes a computer scientist or engineer to design an artistic expression.

The integration of all these domains, merging within interactive media art, provides new possibilities, while at the same time posing challenges for a new kind of literacy. This new literacy includes understanding the system as a whole so that work can be developed collaboratively among different experts, or it requires different kind of artistic education that

is focused on developing skill across these different domains.

This challenge of literacy refers not only to approaches needed from the fields of art and applied sciences, but also to an integration of necessary skills from the diverse fine-arts field. Artists working with the computing technology need a command of the language of two-dimensional visual elements, such as painting and photography, which provide literacy in frame composition; they need a grounding in illustrative arts and typography to support the ability to communicate visually. In addition, visual artists need the skills to work in three-dimensional spatial design, sculpting, and installation. These understandings are essential both for expressing images in the imaginary virtual world and for constructing a work of art spatially and architecturally in a physical location. In addition, sound design and music composition are integral and inseparable parts of the media image as a whole.

Myth and literature, as well as narrative and dramatization techniques, are essential components that provide meaning and depth. And if the content is physically expressed in the context of performance, then the work will include elements of movement and choreography.

Finally, custom engineering is often required when new technical boundaries are being pushed in order to create a particular artistic image. An understanding of computer software and hardware systems that goes beyond the use of authoring tools, helps artists to address their needs for custom-designed hardware and software applications, which more often than not arise within advanced interactive media

art productions. As essential as it is for the painter to understand the physical properties of the paint, so the artist dealing with the computing technology must understand the basics of computational systems and the methodologies for composition within that system. In this context the computing technology is a carrier of artistic expression and therefore it can be positioned as a medium that holds artistic ideas. But this medium is technologically complex and requires appropriate educational structures that equally emphasize artistic knowledge in various artistic domains as well as technical fluency.

The challenge for institutions teaching computational art, as well as artists working with computational media, is in achieving a balance among these diverse specializations. Perhaps an appropriate metaphor here might be the Renaissance person, not highly specialized in one small knowledge domain, but rather, as Indonesians call it "all 'round" that is, knowledgeable in the many different domains necessary to achieve a complex, multifaceted and nuanced artistic virtuosity.

Skills need to be acquired to the level that both serves artistic expression and facilitates communication with a production team. The complexity of interactive media-art projects resembles that of cinema and various theatrical productions, which require a great number of specialists to complete the work.

Contemporary computational techniques enable creative and performing artists to enter into new collaborative relationships with encoded systems that carry compositional

and performative knowledge of artistic practices. When applied to performance-based art, computational techniques provoke queries into the philosophical influences, formal characteristics and aesthetic qualities of this art. Process-oriented, interactive and computer-assisted approaches to the control and generation of audio and visual performances in this work are discussed in the context of a variety of culturally encoded and multiply mediated performance techniques. In this thesis, much of my reflection is based upon the collaborative research carried out by the Computational Poetics Research group, aimed at constructing complex multimedia performances and installations.

Conclusion

The research into interactive media art is placed at the intersection of artistic and technical innovations. One of the main challenges in working within this form is its profoundly technological nature. While the distinguishing features of computational technology enable new forms of artistic expression, its technological nature has a tendency to define the outcome in terms of technological developments. The tension between artistic expression of cultural meaning and technological progression characterize this form. I position my approach to art as "culturally significant meaning" (Anderson 2004), which enables me to contrive a study of media performance across Balinese and North American cultures. My intention for studying interaction within media performance across culture is to articulate a working model that can be applied to computational media.

This chapter aims to define key characteristics of interactive media art and provides the necessary context for understanding the aims and outcomes that are specific to my research. Notions of interaction, art, media, critical reflection and collaboration are concepts integral to my research. In this chapter these concepts are articulated in the contexts of interactive media art.

Chapter 3: Computational Processes for Media Performance

I present here three related studies aimed at exploration and understanding of the possibilities of the computer as an art medium using code as material, with encoding of practice as a basic methodology. *Electronic Drawings* investigates composition using multiple correlated voices. *Videojoiners* explores animation and transformation of image using camera feed. The third experiment, *Metro*, is a study of the techniques of random access to a database of video and audio clips, which enables a new kind of documentary format. These experiments provided me with a grounding in computer composition and introduced me to the language of computable form. The outcome of these studies is a collection of techniques that are further developed in later work with an emphasis on culturally significant meaning. I view these studies in computer form as abstract explorations aimed at extending my understanding of the potentials of computational technologies as applied to artistic practice that is focused on performance with media.

This study of computer art rests on two pillars: the first is that the practice extended by encoded processes, and the second is the focus on the performative potential of the computing technology. The process of encoding practice provides an artistic methodology for composition using computing technology, while the performative potentials of computer-based multi-media forms are a major consideration in the development of the artistic whole. Since practices are encoded

through time, history and language artists shape codes that emerge from the culture they are apart of. To shape the cultural codes, as well as tools and instruments used to create the work of art extends to shaping the creative process and culture itself. Tools and instruments reflect culture and are culturally specific, and it is therefore important that the artist be involved in the very design of the systems and their associated creative processes. The considered design of a tool for realizing a work of art extends to the design of the creative process and methodology applied through this tool.

The performance mediated by computing technology can model a variety of creative and performative situations ranging from the use of the computer as co-creator with an embedded creative agenda of its own, to the development of a responsive environment that enables audience participation. By treating the computer as a medium for artistic expression, it is thus possible for artists to take advantage of a wide range of possibilities. Here we have a new creative model for composition in which encoding practice becomes the essential methodology of an art research engaged with interactive media art composition (Newby and Dulic 2002).

Encoding Practice

Contemporary artists use the computer as an instrument for expression and a medium for cultural representation. It is therefore important to understand the artistic and social practices that emerge from computer-mediated interactions. As the elements of the practice are encoded in the machine, we

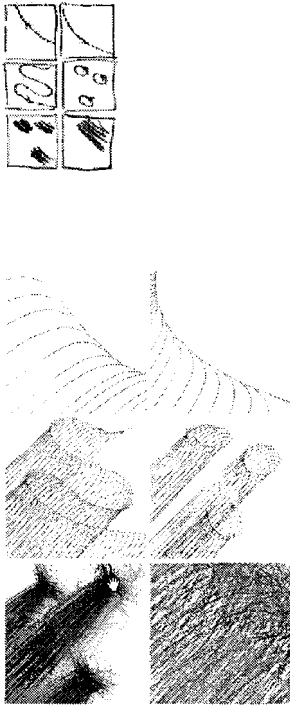


Figure 12
*Computational
 Expressionism* by
 Joanna Maria
 Berzowska, 1998,
 (Used by Permission)

need to understand the principles and potentials underlying this new form of expression. The challenge that computational media faces is in how to accommodate the means and range of expression within its limitations as well as how to encode and integrate compositional processes that are both appropriate to a particular domain as well as complementary across the variety of fields that constitute emerging media. Computational media crosses disciplines and hence expands the arenas of visual arts, theatre, music and cinema—moving toward an interdisciplinary discourse, across boundaries of fine arts and artificial sciences.

In *Computational Expressionism*, or how the role of random is changing in computer art, Berzowska and Bender (Berzowska and Bender 1999) point to the fact that contemporary artists, while using commercial software, are not developing their technical skills. They suggest that they are presenting a new creative model for visual composition in a computational medium, one that is more iterative and transformable than the duplicating methods of commercial tools, hoping to develop a different perspective on visual thinking. Commercial software is designed as an artistic 'tool' that frames and also limits the creative and technical art-making skill, mediating the artist's competence and craftsmanship. Artists using computers as a tool through common commercial software packages work within a creative design methodology that is already defined by the designers of these tools. The encoding of compositional knowledge and practice can take advantage of the emerging potentials of a computational environment.¹ The pixel architecture of the computer display, and its extensions into points, lines, plains, solids, etc., as the basic element of computer-mediated graphics, can generate complex compositions animated by algorithm. Berzowska's

¹ In using the computer as a medium artists often cross knowledge boundaries encoded in software "tools".

² *Computational Expressionism* (figure 22) presents a two-fold process for drawing mediated by computer. The first level is the artist's composition of the high-level conceptual and algorithmic behavior of the drawing tool. The second level is a real-time gesture drawing process. Gesture input transformed into a deep structure that generates a computational line, which she defines as a sophisticated digital brush. The brush responds to various parameters of a gesture. This approach to composition in an explicitly procedural way suggests the analysis of the very nature of drawing process, decomposing a practice to its basic elements.

Computational Expressionism provides an example of an algorithmic compositional approach through encoding the practice of drawing.²

Computer software designed to resemble tools imposes a particular creative method. Lev Manovich (1999) proposes the idea of software as avant-garde when many of the media professional software tools recapitulate modernist concepts; for example, techniques developed in the fields of photography, cinema and printing are the bases for digital software tools such as Photoshop, Illustrator and Premiere editing. The initial approach to creating, when confronted with computer technology, is to assume that the computer is a tool. Yet the artistic process has a potential to expand across limitations set by the software packages designed to simulate tools. Therefore media artists have an opportunity and artistic responsibility to design their own methods for articulation of the media image.

When working with a printing press, for example, the artist develops methodologies that are appropriate for the technology of the printing press. It is necessary to experiment with and learn the properties of paper, paint and printing techniques. Here artists deal with physical materials that have their own laws. Computer technology has its own laws and logic. These laws and their logic become an important technical consideration for artists wanting to create work that extends beyond available commercial applications. The treatment of computing technology as an artistic medium involves adopting the encoding of artistic practice as an artistic methodology, where the code is treated as artistic material. The encoding of practice is a process involving a certain level of abstraction and modeling of the creative process, embodied knowledge and skill

into a formal model that can be achieved by code. In this context the code becomes integral to artistic practice and it is for this reason positioned here as artistic material. It is integral to the act of composition within a computational environment. Since code can be interpreted as a “material” that expresses an artistic concept, computational technology in this context becomes the carrier of the artistic image by means of that code, and in this way it acts as a “medium” that enables the work of art to be experienced. The challenge with this approach is to extend poetic and artistic ideas into logical information processes.

The aim of this positioning is not to replace artistic skill and virtuosity with a formal coded model, nor it is aimed at creating art machines that erase human creativity and intelligence, but rather the aim is to allow more suitable uses of computational technology appropriate for the particularity and diversity found across various artistic practices as well as the development of artistic methodologies, instruments and tools that best serve a particular practice. Commercial software applications are typically standardized in order to serve certain industries and a general audience of practitioners particular to the place where these technologies are developed. However artistic practices are much more complex and it is impossible for the software industry to serve equally various artistic practices especially once we move across cultures and the demands of culturally-specific encodings.

To illustrate the necessity for the artist to be in charge of the tools and technologies they use, or better yet design, I can bring an example of this problematic I encountered in Bali. The contemporary shadow play, entitled *Dasanama Kerta*, 2003, by I Made Sidia, which is discussed further in chapter Cultural

Crossings, was in many ways a successful attempt to extend the traditional shadow play with computational media. However one problem that arose was a result of combining traditional Balinese musical instruments coded in a non-equal tempered pentatonic scale with an electronic keyboard coded in 12-tone equal temperament. When all of these instruments sounded together the tuning differences were obvious. This example is just one of many problems of cultural exports and a globalized imposition of the dominant technological culture onto a tradition that has very different ways of coding their expressions. Providing the ability to arbitrarily tune the keyboard—with 12-tone equal temperament being one of a number of tuning presets—is a step toward providing an expanded instrument can reflect the culture particularity of its player.

Encoding practice as a methodology affords an alternative way of working with technology that is appropriate to artistic process. This way of working acknowledges the evolution of the idea into code, and allows for improvisation and active response within the process of creation. Encoding practice is the essential methodology that forms the foundation for composing with computers (Newby & Dulic 2002). Within the context of encoding practice (artistic methodology for using the computer as a medium), practice is defined as procedural knowledge—algorithmic, experimental, and improvisational. Practice deals with embodied knowledge that is manifested through skill, as well as incorporated knowledge, based on the mutually agreed-upon problems recognized within a community of practitioners. Artistic skill depends on a knowledge that incorporates body memory and coordination in a significant way, such as playing a musical instrument, dancing, drawing or painterly fluency,

virtuosity and technique. Writing, or writing code, may also embody artistic skill. Practice informs innovation in that it deals directly with outcomes demanded by an engagement with creative process.

³ Software facilitates the exploration of processes and causes - of the "how" of practice rather than the "what" of analysis. When we compose a piece of software to model a performative practice we are building a model of a theory to explicitly and empirically test our knowledge of this practice. The success of the outcome is immediate in that it reveals the quality of our model.

⁴ Heidegger (Heidegger 1977) refers to the roots of the word *techne*—used by the ancient Greeks—as simultaneously the activities and skills of the craftsperson as well as arts of the mind and the fine arts.

Encoding practice as a methodology points to the basic questions concerning the very nature of artistic practice. The act of encoding artistic process forces us to make explicit that which is merely implicit-aspects of ourselves that remain largely invisible to ourselves as long as they remain "inner" and operate at the level of intuition. The artist's own creative methodology needs to be treated as a model that can be achieved in code. The implication of art-software and code as research practice is an insight: formal procedures and the compositional intelligence of the artist/programmer can be encoded in the computer system.³

The computer is designed to manipulate symbols in a logical fashion with the software patterns representing ideas that facilitate the variable potentials of the computer. Heidegger's suggestion that idea is the essence of technology⁴ finds an echo here. Technology as idea is made explicit in his characterization of the essence of technology as a mode of revealing. For Heidegger (1977) technology "comes to presence in the realm where revealing and unconcealment take place, where *aletheia*, truth, happens." The physical computer itself is unavoidably passive without the insertion of symbolic patterns of code-ideas—that allow the hardware to reveal the inner logic of the algorithm. Technology reveals its potential only when an idea is inserted into it as coded procedure (a set of instructions) that the hardware will perform in the execution of these procedures. Encoded procedures guide the particular unfolding or unconcealment of the truth through a hermeneutic process open

for interpretation.

Harold Cohen's AARON (1994) painter is an example of encoding painting practice into a software program that draws autonomously, relying on its own knowledge, on a rule-based structure that determines how the character of the image unfolds. Cohen formalized his own stylistic and artistic intelligence and encoded his compositional knowledge and aesthetic judgment into the computer software.⁵ Yet Cohen's code still requires a human intelligence to select the successful compositions from the ones that are not successful. So even in this radical attempt to create an art machine the artist retains the ultimate creative and critical function.

⁵Cohen formalized his aesthetical approach into code by reducing his own creative process to a logical sequence that can be taught to a machine. His software has autonomy to create an image that carries his aesthetics intelligence and artistic approach.

A wide variety of compositional procedures emerge in the practice of coded process-some familiar from previous compositional practices, and some providing novel approaches to the compositional problem.

Performance Systems

Robert Rowe (1993) in his book, *Interactive Music Systems*, provides a two-level classification of interactive systems that characterizes the formal properties of a system in terms of how information is handled. Rowe classification comes from the perspective of the music world, and as such provides special focus on computer systems as performance systems. For the purpose of my study, Rowe classification provides a basic ground that is extended here to include the perspective of multi-

media expression.

The first level of classification is directed toward the way the machine generates material, structure and form. Rowe proposes three categories: transformative, generative and sequenced. In the transformative method algorithms modulate and manipulate variations on already existing source material. Transformative techniques allow real-time source materials to be stored or captured and transformed (processed, stretched out, layered with other materials) live. The generative method treats the source material as elementary, minimal, fragmentary or abstract. Here, common procedures utilize randomness or rule-based ordering principles to create complex outputs composed of these fragments or basic source material. The sequenced method makes use of the database of prerecorded source materials triggered by some sort of input, on the level of manipulation of information within the computer where variations such as reordering, reediting, and random access may occur.

The second level of classification focuses on how the performer interacts with the computer system, using metaphors from music. Rowe identifies two models of interaction between human performer and computer: the instrument paradigm and the player paradigm. In the instrument paradigm the computer amplifies the performance or extends human gesture. The performer can play the system like a musical instrument, controlling it to execute some kind of performance. This approach allows creation of hyper instruments aimed at performance amplification, and has a potential to extend the existing instrumental model, the human gesture, and normal instrumental response. The output of the interaction between

the human performer and the system resembles solo performance. In the player paradigm the computer is treated as an artificial performer, and it provides a creative presence with its own distinct personality and behavior. The computer system has an autonomous creative presence. The output in this case resembles the duet-the performer in partnership with the system. The first approach extends and amplifies the human gesture; the second allows the machine to embody its own creative character.

Rowe proposed these classifications from the perspective of a music composer, but they are extendable to multimodal interactive experiences because they articulate the internal structure of the computer system and the code, while having performance as a focal point.

Each formal experiment presented here explores some aspect of Rowe's classification extended to include visual expression correlated with audio.

Electronic Drawings

The experimentation in Electronic Drawings includes explorations of deep structure that act as an underlying mechanism for the visualization, animation and sonification of the computable image. For the artist the computer has great potential as a medium for creative expression, but in order to be able to use all the potentials of the computer as medium the artist needs to learn how to articulate the image within its language and structure.

The Bauhaus studies of elements that underlie pictorial form, particularly those of Paul Klee, inspired the graphical compositions explored here. In his quest to visualize temporal rhythmical elements, Klee (1961) abstracted two bars taken from a section of J. S. Bach's sonata no. VI in G major for violin and piano, scored for three parts. He used this rhythmic abstraction as an underlying form or 'inner melody' to create a number of drawing and paintings. Paul Klee's methodology of abstracting the rhythm of musical time into a graphical space is achieved by mapping melodic form to 2D space. From this rhythmical character Klee created a series of drawings and paintings.

Figure 13 Paul Klee's study J. S. Bach's sonata no. VI in G major for violin and piano, © Estate of Paul Klee / SODRAC (2005)

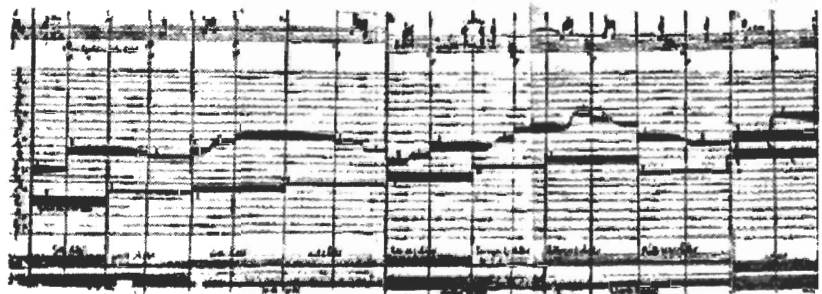
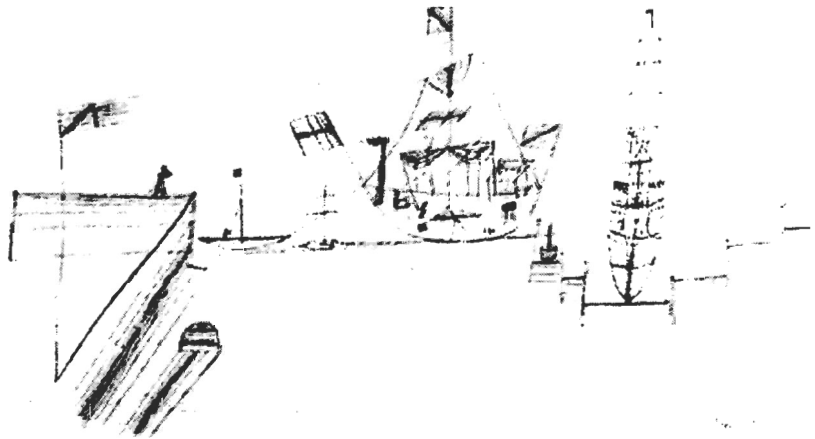


Figure 14 Departure of Ships, 1927
Oil and pen and ink
on canvas with
original frame, 50 X 60
cm. © Estate of Paul
Klee / SODRAC
(2005)



This points to another link to Klee's work. There is a great variety of graphical forms that can be generated within the same the formal structure. Klee's exploration of rhythmic synergy across musical and graphical composition is an approach that can be fruitfully explored within the computational medium.

Klee abstracted two bars taken from a section of composition by J. S. Bach's sonata no. VI in G major for violin and piano, scored for three-parts. Below the musical notes, of Klee's abstraction from Bach, he created a graphical system for registering the pitch of the notes over three octaves. Underneath this system he mapped the qualitative and quantitative measurable structure of the bar.

Paul Klee's contributions to the theory of pictorial form (Klee 1961) begin with the analysis of line, which derives from the movement of a point in space. A free play of intertwining lines is able to produce the most varied forms of expression ranging from stillness to turbulence. Through the analysis of rhythm, Klee demonstrated how several lines combine to create a simple pattern that can be defined in mathematical terms. Variations of these basic forms construct elaborations and ornamentations of that form. In the conceptual domain, Klee's (Klee 1961) contributions to a theory of pictorial form find an echo in the contemporary organization of form in digital art such as John Maeda's (Maeda 1999) with its formulation of the pixel and line as basic elements of computer mediated graphics.

“After application of the pencil or any pointed tool, a (linear-active) line comes into being. The more freely it develops the, the clearer will be its mobility. But if I apply line, e.g. the edge of a block or colored crayon, the plane is produced.

If we had a medium that made it possible to move planes in a similar way, we should be able to inscribe an ideal three-dimensional piece of sculpture in space.

But I am afraid that it is utopian.”

Paul Klee

The Illumination machine makes this possible.

Illumination Machine

Paul Klee’s explorations of deep structure can be shared across aural and visual media. Illumination Machine employs the same generative techniques together with the synchronization of audio and video streams in a performance context. Illumination Machine also functions as an audio/visual instrument.

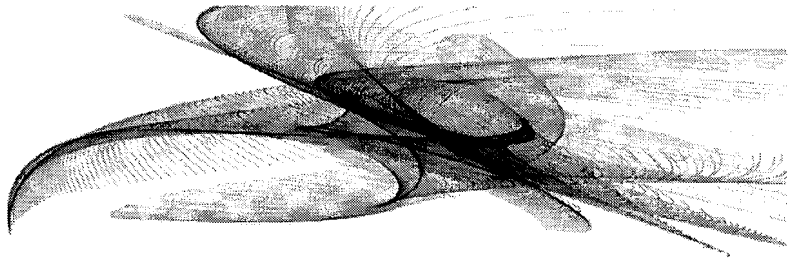


Figure 15 Illumination Machine, Aleksandra Dulic and Kenneth Newby, Space carved from the history of the Bezier line movement, screen-capture.

I created and produced the work in collaboration with Kenneth Newby as an initial experiment in deep structure and multiple articulation of form across and among media elements, and it was presented at New Forms Festival scratch video night at Sonar 2002. We designed a simple generative art machine - The Illumination Machine - that combined real-time animation of basic visual and audible forms. The visual composition is comprised of spatial relationships among basic graphic elements and the variations on those forms. Two or more simultaneous renderings of surface elaborations and ornamentations based on a common synchronized deep structure provide the basis for the composition of the visual

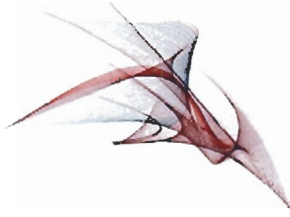
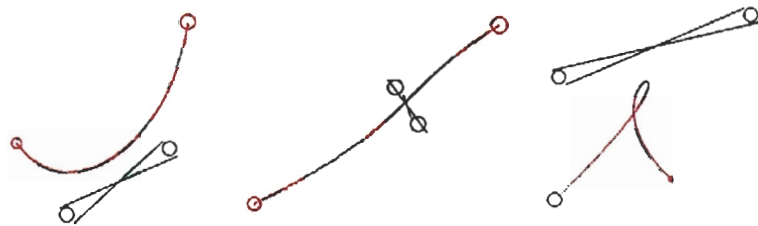


Figure 16 Illumination Machine, Aleksandra Dulic and Kenneth Newby, Space carved from the history of the Bezier line movement, screen capture.

portion of the illumination performance machine.

The core idea for the design of the Illumination Machine is the use of Bezier's mathematical curve⁶ — a deep structure on which to articulate both aural and visual composition. We chose the mathematics of the Bezier curve out of the desire to generate composition using curved lines and surfaces, which are more complex than rectangular forms and curves derived from arcs and circles.

Figure 17 Illumination Machine, Aleksandra Dulic and Kenneth Newby, four control points and a Bezier curve.



⁶ Pierre Bézier in the 1970s developed a Bezier curve to design the body of the Renault car. In its most common form, the Bezier curve is a simple cubic equation that eventually formed the underpinnings of the entire Adobe PostScript drawing model (i.e spline-based 3D programs Adobe Illustrator or Macromedia Freehand)

The movement choreography of the illumination-machine is achieved through the underlying animation of control points defining a Bezier curve. Four control points are set in a three-dimensional space and are animated along Bezier curve paths, which are generated by a random walk between target points in the virtual space. The result is a dynamically evolving curve with a deep structure on which can be erected any number of visualizations and sonifications.

Given the five components of the deep structure--four control points and the curve itself--different ways of mapping visual representation were developed. For our initial experiments we attached basic shapes, such as circle, rectangle, line and points, to the control points and to points along the curve. Two

approaches to rendering were found to be useful and resulted in quite different outcomes.

The first was to clear the screen between renderings of updated control-point geometry along its Bezier or linear paths. This resulted in a familiar animation of the basic forms moving in space as independent objects. The other approach was to let the drawing accumulate over time--not clear the screen between updates--retaining a history of the movement of the control points and curve in the virtual space and creating impossible curvature planes through a history of the Bezier path. This mode is especially interesting because it draws a three-dimensional curved space.

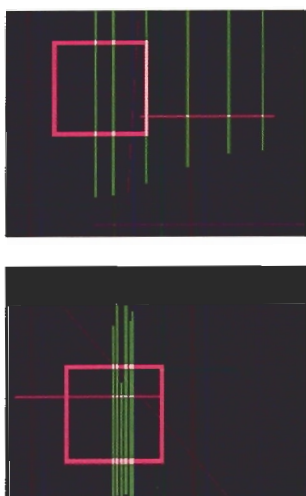


Figure 18 Illumination Machine, Aleksandra Dulic and Kenneth Newby, screen capture, still from animation of basic forms animated by the Bezier curve path in 3D space.

The sonification of the Bezier curve is achieved by use of the implementation of a justly-intoned pitch-space based on a two-dimensional array in the form of a Table of Pythagoras that creates one-to-one mapping of the integers 1-20.

This provides a rational ordering of musical intervals based on a harmonic and sub-harmonic series and its harmonic transpositions. The end-points of the Bezier curve are tied to the end-points of the diagonal elements of the array. The curve is used to define a path through the pitch-space. The number of points used to define the curved line defines the number of pitches being selected from the table. If the line is straight the selected pitches will all be the same, i.e. 1:1, 2:2, 3:3, etc., which corresponds to the fundamental of the parent harmonic series. The farther from the diagonal path the curve traverses the table, the farther from this 1:1 fundamental the selected pitches will be. The resulting pitch sequences are mapped in time using a generative grammar to recursively divide up a temporal period

corresponding to a musical bar.

Figure 19 Three Bezier paths through the pitch-space with interval ratios notated.



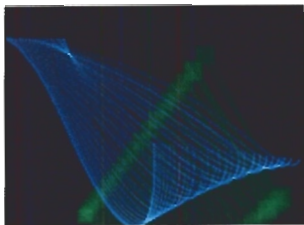
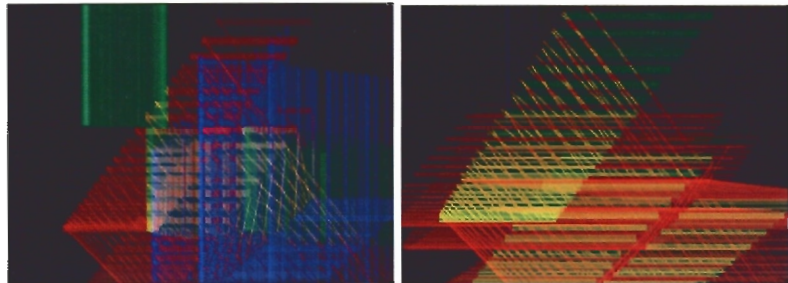
For the presentation at New Forms festival 02 we used two computers with two-screen display of the Bezier composition. The screens were synchronized, by sharing a common geometry. Each Bezier space was identical and symmetrical at any given moment but had a different surface representation—Bezier points had varied shapes and colors that depicted the graphical outcome on each screen.

For the presentation at New Forms festival 02 we used two computers with two-screen display of the Bezier composition. The screens were synchronized, by sharing a common geometry. Each Bezier space was identical and symmetrical at any given moment but had a different surface representation—Bezier points had varied shapes and colors that depicted the graphical outcome on each screen.

This animation of space provided a kind of movement choreography for geometrical forms. The underlying animation algorithm was shared across these two systems and the screens in space, but the pictorial character within the displays was varying. These variations become a new kind of compositional or chorographical component. Two screens can share a time-based rhythmic structure but have a contrast in pictorial

rhythm. Different forms or constructions of complementary colors across the screens can be interactively modulated as a performative element of the screen space. As a result, forms in light and color dynamically transform the whole visual space. One of the most exciting outcomes here is the ability to perform visual space with a balanced relationship of automatic and performative elements.

Figure 20 Illumination Machine, Aleksandra Dulic and Kenneth Newby history of the movement of 2d forms attached to the control points showing Isomorphic symmetry of across the two screens.



Isomorphic multiplicity is explored by synchronizing the underlying spatial geometry of the Bezier space. This is achieved by networking two computers that share the same Bezier geometry but vary the surface visualizations. The result is a generative and strongly correlated choreography of visual elements.



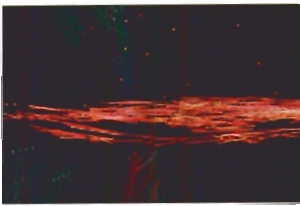
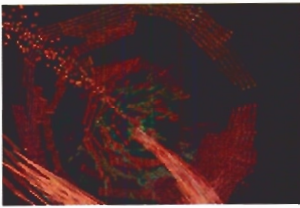
Figure 21 Illumination Machine, Aleksandra Dulic and Kenneth Newby history of the movement of 2d forms attached to the control points showing isomorphic symmetry of across the two screens

Audio-synthesis techniques based on non-linear distortion (such as wave-shaping and frequency modulation) can be obtained by controlling just a few parameters, and these will generate a great variety of sounds. The multiple screen's systems are synchronized with the same instantaneous geometry that is animated in the three-dimensional space. They all share the same structure underneath the depicted surface, and what we see is the variable yet deeply correlated surface. In mathematical terms, the two displays are isomorphic with each other through the sharing of an equivalent underlying structure.



Electronic Sphere

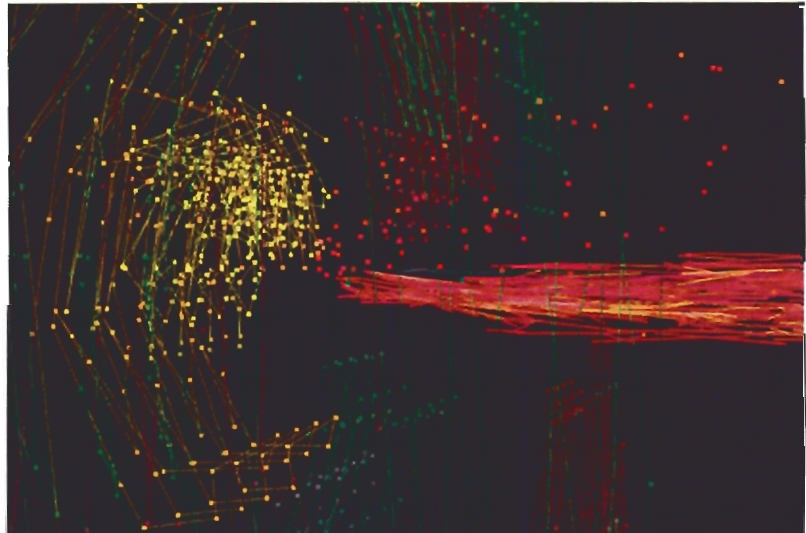
Electronic Sphere was developed as part of a directed study in the mathematics of space and time with Julie Tolmie. Electronic Sphere presents an articulation of three-dimensional form composed of independent voices constrained by the geometry of the sphere. In terms of the first level of Rowe's classification, this object uses the generative method.



The inner melody of the Electronic Sphere is the mathematics of the sphere, along which the diverse voices, the elementary points, are singing the spatial melody. The random walk of each voice can traverse the sphere, as well as deviate from the surface by moving inwards and outwards of the geometry of the sphere.

Figure 22 Electronic Sphere, screen capture, Aleksandra Dulic

Figure 23 Electronic Sphere, screen capture, Aleksandra Dulic



The three-dimensional Electronic Sphere is articulated through time by multiple elementary fragments that are constituted by a

point in space. The points in space live a trace of their random walk along the invisible surface of the sphere.

Figure 24 Electronic Sphere with drawings by the audiences, screen capture from the presentation at the Western Front, 2003, Aleksandra Dulic,

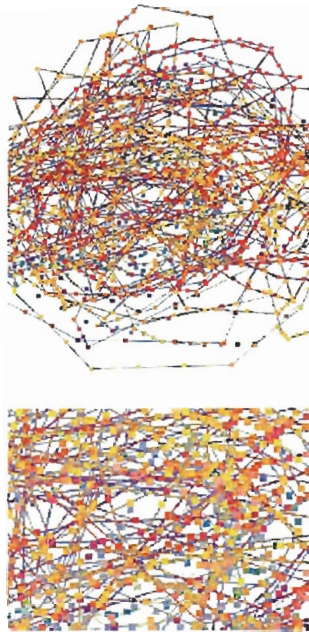
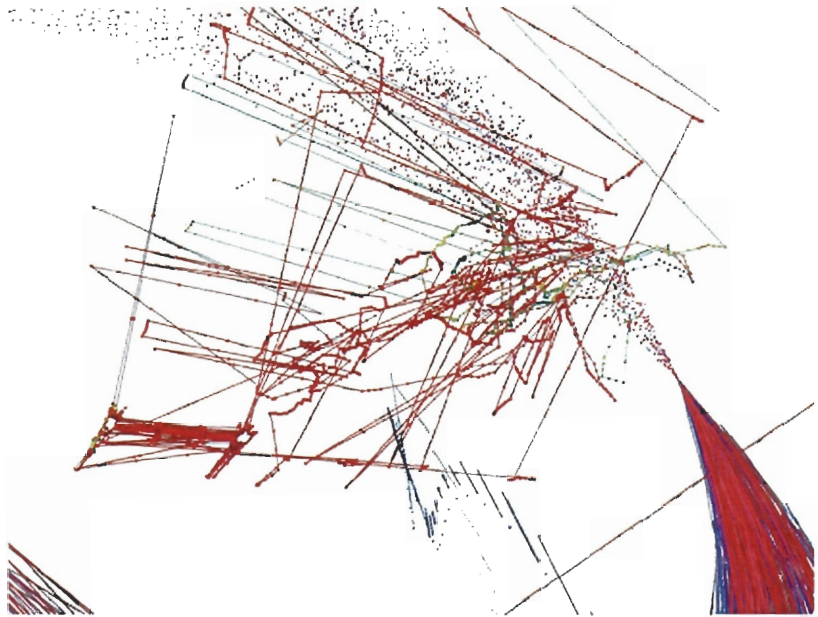


Figure 25 The image generated by the audiences, screen capture, Western Front, 2003.

Electronic Sphere is the exploration of the articulation of form using multiple sources that are correlated by the geometry of the sphere. Every voice is a drawing process that has some parameters that can be manipulated. In that sense this object, according to Rowe's second classification, is an instrument paradigm. The player can specify the quality of line (straight or curved), the color range, the individual voice, and the deviation from surface of sphere. Every parameter for voice can be independently manipulated, so that each voice is a unique variation of the drawing process. The unifying element is that all the voices are constrained in some relationship to the surface of the sphere. The mathematics of the sphere is the 'inner melody' of the work.

For the presentation of Electronic Sphere in the Western Front, the drawing process based on the geometry of the sphere was

extended to include the inner space of the sphere composed by participants drawing in the real space, and an audio component composed by Mark Brady.

The audiences at the Western Front were able to generate the sound and image by drawing in the three-dimensional virtual space of Electronic sphere. Robb Lovell's machine vision system Eyes was set to track movements in the physical space of the gallery. Two cameras were positioned, one top view and one side view, in order to track participants' gestures. Gestures were isolated by a light source, the movement of which was tracked by the system, and the traces of gestures were made visible in the virtual space by the electronic-sphere drawing process, and amplified by sound generated in response to the gesture. The Electronic Sphere acts as an audio/visual instrument played by the audience in the space.

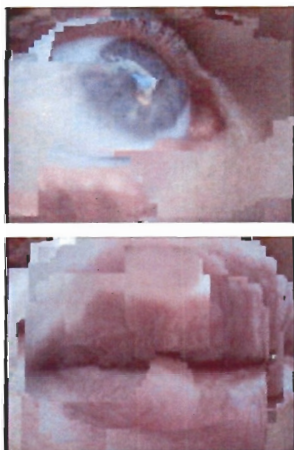


Figure 26 *Videojoiners*
Aleksandra Dulic and
Kenneth Newby, 2001

Videojoiners

Videojoiners is an exploration of camera techniques using Rowe's transformative method. This work was created and performed in collaboration with Kenneth Newby.

The cubist concept of space and time, extended by David Hockney's (1999) *Joiners*, is encoded in the Videojoiners software. Initial experiments in Videojoiners involved a windowing technique, where a window reveals a small portion of live-video input as it moves across the screen. This represents the present-time state of the image segment. Meanwhile the

vestiges of past images are still visible in the rest of the screen. The window is drawing the history of the video image through the movement across the screen. The image rendered as a consequence of this process becomes a collage: a history of the present state with multiple perspectives of the past.

In the Videojoiners installation, two live video inputs are processed and projected onto two projection screens. These function as a mirror metaphor. Live video involves a motion-detection system, which triggers the mode of the work. There are two modes in this process.

The first is the collage process using windowing technique. Three windows reveal three different segments of the live video input moving across the screen. This represents the present-time state of the image segment. At the same time the vestiges of past images are still visible in the rest of the screen.

The second mode also presents three different segments of live video input moving across the screen, but without any vestiges of the past.

The audio is also constructed around the metaphor of mirror. Six buffers of sound are captured over three minutes. Each buffer is played back continuously at variable rates and with different resonance filters tuned to different pitches of the harmonic series. The outcome of this process is that the ambient sound in the environment forms the basis of composition.

Videojoiners conforms to Rowe's player paradigm. The audiovisual system has its own embedded intelligence, where the outside world influences the work only by providing source

material and does not influence the algorithmic process.

The result bears relationship to the process explored by cubists in their formalizations of the image of time. The cubist image is one of multiple times, perspectives and spaces — a superimposition of layers of time-giving a temporal collage that creates image depth. The cubists painted the object seen from different angles - a process implying a sequence of time in that it maps an attentive eye in motion and its accumulation of perception. Braque's woman and guitar, for example, is represented from different angles implying a sequence of time embedded in a still image.

David Hockney (1999) in his *Joiners* applies a similar process by combining the media of photography and collage. His methodology involves taking multiple photographs of a scene and creating a collaged composition from these multiple perspectives and times. His process breaks the perspective of the photographic image, resulting in a new photographic image space. His treatment of architectural spaces alters the perspective of the Quattrocento, as seen by the photo camera, into an inverse perspective. The inverted representation of space was explored by Van Gogh in his painting *Chair* (1988), as well as in Byzantine fresco paintings, where architectural space is similarly represented. Hockney refers to this distortion of space as an attempt to approach infinity. The point of reverse perspective is movement - an altered perspective that embeds time.

The historical progression here is interesting: Byzantine frescos represented inverse perspective, cubists painted the representation of time, Hockney photographed multiple takes of

a scene to construct a cubist-like collage with inverted perspective to reintroduce the element of time into the still photographic image, while our technique treats the collage time image as a time-based process.

David Rokeby's *Sorting Daemon* inspired the next iteration of *Videojoiners* software. *Sorting Demon* is a site-specific installation designed as a processed-based algorithmic composition that paints with the images of people extracted from the environment. The *Sorting Daemon* system surveys its environment with a motorized camera that can pan, tilt and zoom, and looks out onto the street in search of people in motion. Once the system recognizes a person, it separates the person's image from the background. The image/body is then divided according to areas of similar colour.



Figure 27 *Sorting Daemon* David Rokeby 2003

The next iteration of *Videojoiners* similarly separates people from the background and treats the time-based image of a



Figure 28 Videojoiners Animation Aleksandra Dulic and Kenneth Newby, Dance: Henry Daniel and Courtney Bannon, SFU, 2004

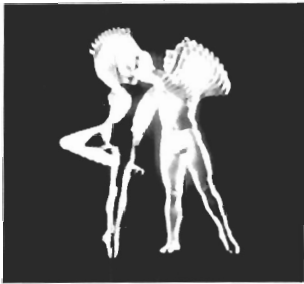


Figure 30 Pas de Deux, Norman McLaren, National Film Board of Canada, 1967

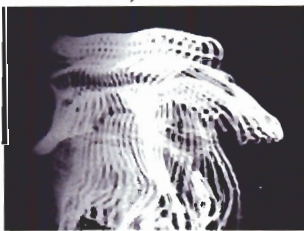


Figure 31 Reverse Patterns, Animation and Interaction design: John Crawford, Choreography: Lisa Naugle, 2002.

moving body as a paint-brush which constructs the image. These various explorations of collaging time superimpose two layers: the time of the moving image and the time of the present collage process.



Figure 29 Screenshot of the next iteration of Videojoiners, Visual performance and software Aleksandra Dulic and Kenneth Newby, dance performance by Henry Daniel and Courtney Bannon, SFU, 2004

This exploration of the movement as a compositional process is also explored in the interactive telemetric performance, Reverse Patterns by John Crawford and Lisa Naugle. Crawford's Active Space system at the Bing Theatre in Los Angeles generated video imagery in response to the movements of dancers located at University of California, Irvine. A high-bandwidth research network connected the two locations, which are 40 miles apart. In reverse Patterns gesture and movement reach into new expression - body movement expands beyond the physical into a virtual.



Norman McLaren in his film *Pas de deux* does extend choreography into a movement painting. He exposes the same frames as many as ten times, to create a multiple image of a dancing couple. Dancers create trails of movement that act as brush strokes, which resemble an artist painting on a canvas.



Reverse Patterns and *Pas de deux* relate to new version of *Videojoiners* in the exploration of movement as a compositional and painterly gesture - articulated by dancing bodies. This treatment of painterly visualization of movement intersects the choreography of the body in the space with choreography derived from camera movement. This three-fold choreography, which forms the basic structure of the final iteration of *Videojoiners*, creates a meeting space of the algorithmic treatment of the source image derived from camera, the choreography of the body movement in the space and the choreography of the camera movement, image frame and in-camera montage that is an analogue to the painterly gesture of drawing lines, planes and colored surfaces.



Figure 32 The next iteration of *Videojoiners* software, Aleksandra Dulic and Kenneth Newby, Public art presentation at the BELEF international festival in Belgrade, 2004

The constructed image becomes a meeting space for parallel and multiple creative gestures among all the participants. In terms of Row's classification this system provides both an instrument paradigm and player paradigm. As an instrument, camera operator, movers and dancers on the stage become players, while the code that treats the image analyzed from the camera input provides an internal intelligent structure that has its own creative logic. The constructed image through the choreography of the body, the camera and the code, together form a collaborative meeting place that is afforded by this complex and collaborative digital paintbrush.



Figure 33 Metro,
Aleksandra Dulic and
Kenneth Newby

Metro

Metro combines methods of sequencing and transforming to explore the potentials of performing with prerecorded media elements. This work is presented via a performance-based editing system, which allows on-the-fly inputs and interfaces to animate the source material and the image-processing applications. Each process is independent, allowing one to work with multiple processes simultaneously.



Figure 34 Metro
Aleksandra Dulic and
Kenneth Newby

Metro was created and performed in collaboration with Kenneth Newby as a single-channel video installation with an immersive 5.1 channel audio system. For the Interactive Futures event in Victoria we incorporated a machine-vision system as input, to which we added our own performance. The work that resulted was a 30 - 40 minute performance.

The basis for the video content is documentary footage shot in the Paris Metro. The visual material includes portraits of riders captured as reflections in the windows of the trains, riders waiting at the station platforms, and trains traveling. The open-ended nature of the metro footage made it easy to create a complex braid of movement, without beginning or end, through underground space and traffic. The overall composition moves from highly abstracted imagery-treated metro documentation footage--to pure documentary material not treated in any way. Animating geometric forms such as points, lines and planes

composes abstracted imagery. The process allowed us to move back and forth between heavily affected, animated images and the documentary images.

Metro is about the gaze; people filmed in Paris metro stations eventually become aware of the camera and look at the camera. This makes the viewer aware of being caught gazing at the people through the camera lens.

Figure 35 Metro
Aleksandra Dulic and
Kenneth Newby



The sound is made up of the Metro soundscape (trains recorded from inside and out, footsteps, talking etc), an original musical score, and a speech component that implies layers of "inner dialogue." These inner voices recite poetic and philosophic ideas on the subject of the gaze, voyeurism, watching and being watched. The music is scored for string ensemble and percussion, and consists of a blend of high clustered glissandi harmonics and percussive patterns that complement the movement of the trains and passengers. The soundtrack is

layered: multiple tracks of musical material are mixed with processed Metro soundscapes and the inner speech of the characters.

Two streams of video drawn from the database of Metro material are blended, montaged, and processed. The visual language spans a spectrum from pure realism, with the original documentary material montaged and mixed, to a play of pure visual formalism. The large screen space can be broken up in a variety of ways by the masking and layout of the two video sources.

A computer system running our own interactive cinema software co-edits, with a performer, the presentation of aural and video components of the film. The interactive cinema software embodies a film editor's compositional knowledge.

One component of the interactive cinema-editing engine is a machine-vision system based on video-camera input. The camera provides information from the environment, such as direction of movement, relationship between foreground and background, etc, and our program analyses the data and looks for the action and motion vectors across the frame. This information is used to select and manipulate aural and visual components of the work.

All of these elements are mixed and composed in real time by a performer using a computer system with our interactive cinema software.

Conclusion

These experiments provide grounding in computer-based compositions focused on performative potentials of composing with computational technologies. The outcomes of these studies are a collection of techniques that can be applied to different performative contexts in which artwork is presented. Studies presented in this chapter are focused on formal and technical characteristics of computer-based artwork. These abstract explorations are aimed at extending my practice, focused on performance with media, and developing a better understanding of computing technology as a medium of artistic composition. In Chapter six and seven I extend these techniques to employ philosophies of interaction and the dramatic structure, which derived from my studies of shadow play theatre. Chapters four and five present my research in shadow play theatre.

Chapter 4: Cultural Crossings

The discussion in this chapter is focused on wayang kulit (shadow play) of Bali, as it is practiced traditionally and as it has been re-invented interculturally. The extension of wayang kulit to experimental and cross-cultural shadow play performances are discussed in this section through connections across Bali and North America. The contemporary tradition of wayang kulit performance and its intercultural extension, point to philosophical aspects of the traditional Balinese shadow play that are transferable to the context of intercultural media performance. Basic contextual performance structure and the philosophical approach to interaction and improvisation are two significant elements shared among traditional shadow play and new creations in Bali and North America, which indicates how this form can be further extended to situated and interactive media performance.

Wayang Kulit of Bali

I made brief studies of Balinese wayang kulit music, performance and puppet carving in 2003 and again in 2005. My objective was not to master wayang kulit performance and become a dalang, but to engage with this performance

tradition in order to become a better observer. My teacher, I Wayan Mardika, is a popular young dalang (puppet master) in Bali. To be a good dalang one needs to be able to use effectively any means of artistic expression available to express narrative. Mardika is a puppet maker, musician, and dancer. In Bali he is highly regarded, as a hero and as a priest, able to sustain all-night performances, which involves teaching, healing, inspiring and entertaining the audience.

This learning process enabled me to build a complex of relationships with wayang: as a performance art, as visual art, as music art and as multi-lingual literary art. I was able to grasp the many-faceted nature of Balinese wayang kulit. The approach to learning that I engaged with on my two visits revealed much of the Balinese philosophical approach to artistic expression and its significance in that society. My understanding of the contemporary tradition of Balinese shadow play was drawn from interviews I conducted with I Wajan Wija and I Wajan Mardika during my visits in 2003 and 2005.

Introduction

Wayang kulit performance is a multi-layered expression of various dramatic stimuli in shadow, light, movement, voice, speech and music, woven together by the dalang, usually accompanied by a quartet of bronze keyed percussive instruments (gender wayang). One puppet master manipulates all the puppets, delivers dialogues and

¹From the interview with Wayan Wija, 2003/2005

narrations, sings songs, and creates percussive sound effects. There are two different types of wayang kulit performance: one performed at night, wayang wengi, and the other performed during the day, wayang lemah.¹

It is only in the night performance that puppets are given life through shadows cast by the flickering light of a coconut lamp (blencong) (Sedana 2005). The image literally vibrates on the cloth screen. The puppeteer sits half a meter behind the screen with the lamp placed just above his forehead.



The daytime performance is done without a lamp. The puppets lean on a cotton string, which symbolizes the screen. Wayang lemah is a ritual form of puppetry that is performed simultaneously with the ceremony being conducted. The principle audience of wayang lemah is of a divine nature; the performance is meant for gods and ancestors, not for people. Very few adults actually attend the performance. Balinese people feel that such performances are important, not just for religious ceremonies, but because they are at the heart of Balinese arts. These sacred performance practices keep the overall artistic tradition focused and insightful. Art and performance are essentially spiritual and a social necessity; they provide food for the soul (Herbst 1997). The collective view holds that art is as essential to life as food. In this way an aesthetic energy and sensibility are maintained and sustained.



Figure 36 Dalang Wayan Wija performing with Kayon puppet, South Bali

Wayang kulit performances function as a means to maintain and reinforce wisdom and the value system of the society, and to preserve the narrative tradition of Balinese folk heritage. Every performance takes place in a ritual setting

and is embedded in social and religious life, with the exception of performances staged for tourists, which commonly keep traditional performance techniques, but are much shorter, and are presented outside the temple context. The contemporary work that comes from the STSI, National Performing Arts Academy, can be encountered at international arts festivals and other public events; it also functions outside of sacred setting, but unlike shows staged primarily for tourists, these works actively expand the traditional form itself and the philosophical questions embedded in the tradition. These contemporary experimental shadow plays are a form of post-traditional performances, focused on examining the integration of Balinese tradition with external influences of globalization. I further discuss these post-traditional performances later in the section entitled Wayang Listrik.

The traditional performances are not judged and critiqued by common artistic standards but are appreciated and valued because they fulfill an aspect of ritual ceremony. Through wayang kulit performances, which are enjoyed by the Balinese from early childhood, people become familiar with their classic philosophy, literature, and with the unseen world where gods, daemons and heroes dwell.

The screen acts as a doorway through which gods communicate with people (Hobart 1987) and symbolizes an interface between the world of everyday life among Balinese people and the world of gods and heroes, who play out their eternal, universal battles of good and evil. The dalang bridges these two worlds. He channels a story told by the ancestors, allowing insight into the realm of the gods. The banana

trunk in which the dalang keeps the puppets symbolizes earth. It is significant that Bali spectators sit on both sides of the screen. It is common for spectators to watch the puppeteer, the painted puppets and the music performance directly. They directly experience the dalang at his bridgework.²

²From the interview with Wayan Wija, 2003/2005

Wayan Wija describes the wayang purwa ensemble, which includes seven members in a performance depicting scenes from the Mahabharata, as a small but perfect group. The number seven symbolizes the directions East, West, North, South, Up, Down and Center, like a sphere viewed from any side that remains the same. Wayan Wija refers to the four gender-wayang musicians as representative of the four brothers that are with us from birth: water, earth, air and fire. They also symbolize the gods of four directions: Indra, god of rain and north; Kuwera, god of wealth and east; Yama, god of death and south; and Baruna, god of sea and west (Sedana 2005). And the two dalang's assistants represent mother and father who are always there to help during the performance. The dalang symbolizes the human being; he is a priest and his duty is to share knowledge, give advice, make holy water and bless the people.³

³From the interview with Wayan Wija, 2003/2005

Each performance is an offering to the Gods, spirits and ancestors, and marks the completion of a ceremony. Temple anniversaries, celebrated in one of the three village temples, are essential to the religious life of every village. Rite of passage rituals, such as weddings, tooth filings, childbirth, cremation or purification ceremonies,⁴ are celebrated in the family compound temples, attended by extended family, neighbors and friends (Fisher & Cooper 1998). For any

⁴Ceremony dedicated to prevent or stop illness or damage to crops.

⁵ For the ceremonies celebrated in the family compound temples dalang commonly develops story in conjunction with sponsor, while in the village temples dalang usually selects the story to suit the occasion.

performance of wayang kulit, the dalang develops the story to reflect the occasion, place, time and activity of that community.⁵ The dalang will choose a passage from the Mahabharata, or from another appropriate narrative, that responds to the given event, and will provide to the community a reflection on their experience from a wider perspective. In this sense the narrative is instructive and contains a political message and moral wisdom.

Wayang kulit performances are the most prominent of all the various art forms found in Bali, and the dalang is one of the most highly respected artists. The dalang is a performer who excels in many things, and the complex nature of wayang kulit performance requires that the dalang be what Indonesians call 'all-round.' The dalang has under his command singing, music, percussion instruments, puppet movement, dance choreography, improvisation, knowledge of ritual and comic relief. His role in Balinese society is part priest, teacher and performer. He is the embodiment of sacred knowledge. In addition, he has a grasp of Old Javanese, Kawi, the language of classical literature derived from Sanskrit, from which he composes dialogues and songs spoken by Gods and refined characters. He has command of all levels of Balinese language necessary for the dialogues among clowns that provide translations of conversations spoken in Kawi to the Balinese audience.⁶

⁶For discussions about the complexity of language systems in Balinese shadow play see Zurbuchen 1987

The stories

The narrative aspect of the performance is derived from ancient Balinese mythology recorded on palm-leaf manuscript, lontar, in the archaic Javanese language, Kawi. The oldest wayang kulit performances involve episodes from the Indian epics, Mahabharata (wayang parwa), and Ramayana (wayang Ramayana), as well as stories of the East Javanese prince Panji (wayang gambuh). Classical literature is highly respected as it preserves the sacred language of the Gods and eternally valid truths about the world. Narratives derived from the lontar manuscripts circulate freely within oral, performance and graphic arts traditions of Bali.⁷

⁷From the interview with, Wayan Wija 2003/2005

An innovative dalang occasionally invents a whole new cast of characters, creating new puppets based on classical Balinese mythology not previously part of wayang kulit performance. Some innovations live briefly and fade away from the repertoire. Very few of these innovations become a part of standard performances. Recent innovations in narrative were initiated by I Wayan Wija, one of the most highly regarded Dalangs in Bali, and wayang kulit embodying these continue to be performed throughout Bali. They include Tantri episodes derived from ancient Indian Panchatantra stories (wayang tantri), Shadows of Light and Illusion (wayang sinar maya) and stories following the literature of Balinese history (wayang bebad).⁸

⁸From the interview with Wayan Wija, 2003/2005

Wayang tantri episodes are a variant of the "Thousand and One Nights" theme. Dalang Wayan Wija was the first to use these stories, and remains its main innovator. Tantri stories



Figure 37 Wayang Tantri performance with two dogs, I Wayan Mardika, South Bali, 2003

include many animal characters. He has devised an entirely original set of puppets. Every new form of wayang requires a whole puppet set, which involves creating as many as 150 new puppet characters per story (Fisher & Cooper 1998).

Wija's intention was to use animal characters to inspire the interest of young people in wayang, expand its moral lessons and spread an environmental consciousness in Bali. Wija's wayang tantri represents a breakthrough in the kind of stories commonly depicted in wayang kulit performances. Traditional wayang is fundamentally about human beings and eternal struggles over land, love, and disagreements between good and evil, but wayang tantri is about animals. These stories explore ecological issues and people's relationship to animals. This world is not created only for human beings, points out Wija, in Hindu religion the respect for god is enacted by the respect for what God has created, and God created animals, humans, all living and natural beings. Wija has also extended the traditional sets of Ramayana characters by designing more articulated joints and very flexible movement.⁹

⁹ From the interview with Wayan Wija 2003/2005

Wija created and experimented with sets of dinosaur puppets to depict the scientific findings in paleontology. He mixes these characters with traditional stories. At the time I did my research in 2003, Wija performed with dinosaur puppets only outside of Bali, using his traveling performances as the opportunity to rehearse these and other innovations. By 2005 he already began to introduce these characters into the local setting. This example points to the flexibility of this tradition and religion to reflect the contemporary understanding of the world we live in. In this way the religion maintains a close relationship to peoples consciousness. Although he produces

different work for foreign audiences, which allows him to test new ideas, these experiments further influence his local performances, since the local audience, as Wija points out, is much more critically literate. Wija has made a number of International collaborations, with Lee Breuer on MahabarAnta, Larry Reed's Wayang Listrik ShadowLight Production and with the Mabou Mines Theater Company.

Figure 38 Crocodile, Wayan Wija, South Bali, Wayang Tantri Puppet.



Figure 39 Turtle, I Wayan Wija, South Bali, Wayang Tantri Puppet.

The performances, conceived and presented outside of Bali, allow Wija to experiment with radically different approaches, techniques and materials, which would be otherwise difficult to discover in the context of sacred temple ceremonies.

His current creative project is the development of the Wayang Sinar Maya, or Shadows of Light and Illusion, which makes innovative use of reflective materials and intense light sources. His mirror puppets make shadows out of light. They are dancing mirrors, made of reflective flexible plastic, on which Wija has made complex character drawings. A small

¹⁰From the interview
with Wayan Wija
2003/2005

bright halogen lamp points away from the screen towards the dalang, and the puppet reflects the light onto the screen. The puppet is manipulated by bending the flexible plastic material. They have very tiny moving parts, since the smallest bend is amplified drastically on the screen. "The only reason my ancestors did not make mirror puppets is because they could not get a hold of these new materials," says Wija.¹⁰

These mirror materials are widely used in contemporary European and American shadow theatre. Polish director Tadeusz Wierzbicki, for example, in "the Laboratory of Appearances" creates an entire play with puppets and stages constructed from different reflective materials. American director Larry Reed, who collaborated with Wija on a number of occasions, combines puppets constructed out of the same kind of flexible mirror-like material with other kinds of puppet and scenic designs.

Wija experimented with mirror characters for many years before he decided to introduce them in the context of the temple ceremony. In 2005 I encountered Wija's wayang Tantri performance where he combined these mirror puppets and halogen electric light with otherwise very traditional and sacred temple settings.

It took Wija many years to develop the characters made of flexible mirror materials. The flexibility makes them sensitive to the smallest movements. Wija developed a whole new performance technique for these characters. The puppets integrate effortlessly with the flickering light of the coconut lamp that adds so much to the animation of characters. They share the common flickering quality achieved by the coconut

lamplight. Also the consistency of halogen electric light is broken by the shimmering effects produced by this reflective and flexible material when projected onto the surface of the screen.

Wija's innovations point to the flexibility of this tradition and its ability to adapt to contemporary problems. Wija's ritual performances explore contemporary ecological problems, realities brought to us by scientific studies, and new materials brought to us by industrialization.

"Today people think that truth is in the reality and they forget to look inside, within themselves, for truth," points out Wija. He characterizes the outside world as seductive and continuously growing, developing and changing, which contributes to people overlooking the truth that is placed within them. With electronic media people become addicted to the good feeling one gets from the entertainment, and philosophical questions are overlooked in this desire. Wija finds the new speed of life, brought by post-traditional order, a great challenge to his own performance. This challenge is not only facing shadow plays but also all other forms of art. The speed of contemporary life also has its influence on traditional wayang kulit performances, which are continuously getting shorter. People do not have time to stay up all night because they have to accommodate the eight-hour working day required by jobs in the office. ¹¹ This way of structuring time is in direct opposition to the traditional life that integrates religious ceremony throughout the day. Wija's innovations point to a conscious attempt to reflect on the contemporary problematic and to respond to the new expectations of his audience, which is influenced by

¹¹ From the interview with Wayan Mardika 2003/2005

electronic media and new lifestyles.

Music

Wayang kulit music is closely integrated with the performance and provides an essential element in dramatization. The make-up of the musical ensemble lets the audience know which story is going to be performed that evening. Certain pieces and sudden shifts in rhythm, melody and tempo indicate dramatic mood, emotion and movement. Music announces entrances, supports the dialogue, and creates the atmosphere for romantic and conflict-driven scenes.

Balinese wayang kulit is accompanied by rhythmic music played on a quartet, or in some cases a pair, of metallophones called gender wayang. The paired instruments—the basic male (pangisep) and slightly higher-pitched female (pangumang)—produce the characteristic interlocking shimmering sound. The core gender wayang ensemble accompanies wayang parwa performances that depict episodes from the Mahabharata. In wayang Ramayana the basic gender wayang ensemble is expanded to include two pairs of drums (kendang), a set of cymbals (cengceng), and small gong chimes (klenang, kajar and kempur), which forms the batel ensemble. The ensemble accompanying wayang gambuh, called pagambuhan, includes several long bamboo flutes (suling) that replace the four gender instruments of batel Ramayana, metal percussive instruments (gumanak) and bell clusters (gentorang) (Sedana 2005). The repertory and sound of these instruments are borrowed from gambuh dance

¹² There are many innovations in new forms of wayang and their musical accompaniment, such as Wayan Mardika's wayang listrik that included Slondeng, old Balinese orchestra, using contemporary composition, which will be discussed later in this chapter.

¹³ I Nyoman Sedana provide detailed analysis of the relationship between the musicians and dalang in his essay Collaborative Music in the Performance of Balinese Shadow Theatre.



Figure 40 Shadow puppet of Saraswati, Goddess of literature and learning, new puppet, South Bali

drama, one of the oldest theatrical genres. Wayan Wija has devised an entirely original instrumental ensemble for wayang Tantri, which uses pelog tuned genders playing in gender wayang style, drums and gongs.¹²

A successful collaboration between dalang and musicians is very important to the overall success of the performance.¹³ The dalang produces a percussive sound by hitting the right side of the wooden puppet trunk (kropak) with his cone-shaped wooden hammer (cepala), held between the toes of his right foot (Sedana 2005). This punctuates dialogue, movement and animation in general, and provides the musicians with cues to start, stop, speed up or slow down the performance. The dalang also uses this sound to articulate the body movement of the puppet and to add to the overall percussive ornamentation of the performance. The dalang is conductor and musician, leading the other musicians with the sound of his cepala, his vocal expressions, his singing, as well as with the way he manipulates the puppets. Musicians respond to the visual and aural cues by musically reinforcing the dramatic moments, moods and movement of the characters on the screen.

Dalang

Although the dalang draws characters and events from well-known classical literature to form the basis of the plot, only the bare skeleton of the tale forms the complete narrative structure. The narration and dramatization of events is conducted in an improvised manner, without a fixed script. Every performance is an innovation, and within every



Figure 41 Shadow puppet of Ganesha, new puppet, South Bali



Figure 42 Shadow puppet of Karna, a hero of the Mahabharata, half-brother of the Pandavas, new puppet, South Bali

performance the dalang invents new dialogues and makes new jokes that reflect on the details of the ceremony at hand. The dalang rarely performs the same episode twice, at least not twice in the same community, thus he needs to learn and develop new stories as long as he lives. The elements that allow this improvisatory approach are the precisely defined contextual details that deliver much liberty to the scheme because the parts are variable. Performances are created in relation to a well-defined family or community religious event, and while these contextual details are defined, each performance is unique to the occasion. Because the religious texts are interpreted to respond to the context of the events, they are never performed in the same way. Improvisational elements abound: in the way the performers interact with one another, in the presentational context, the story, the audience, and in the accompaniment. This performance form has a number of fixed contextual elements designed to enable reflexive improvisation. During the performance the dalang weaves topical dramatic elements into a new arrangement, incorporating both mythical kingdoms from traditional narratives and contemporary issues into a single performance. This principle, where every performance reflects the particular context and community, maintains wayang kulit as an ever-changing living form.

The dalang may invent the variation on the classical narrative and sometimes even new episodes, but each time the characters are placed in a new context their action is kept consistent with the individual qualities of each character - the character's temperament, personality, speech, voice, style, movement and appearance stays the same. When the dalang brings the puppet to life, the hands and arms serve as a



Figure 43 Shadow puppet of Krishna, Avatar of Lord Vishnu, new puppet, South Bali

connector, through which the puppet's character, voice and spiritual life force, *taksu*, enters the *dalang*. The key to characterization in Balinese wayang is that the *dalang*'s voice and puppet movement come from each character (Herbst 1997). *Dalang* and the puppet are one body while the character is speaking and moving. When each character speaks, there must be no distance between *dalang* and puppet. For this reason, the challenge for the *dalang* in telling stories is dialogue: how to speak consistently in each character's true voice? The *dalang*'s own voice is used only for narration. The *dalang*'s narration, in *Kawi*, invokes the mystical world of wayang and sets a scene for action to follow.

The complexity of wayang kulit is exemplified in the sustained multi-layering of language and character. The characters in wayang are categorized into different types: divine, royal, courtly, profane; each has its own language and focused relationship to the narrative whole, as well as its own spatial and temporal quality. Each character type speaks in a unique linguistic form. Divine, royal and courtly characters of classical literature speak, sing and chant in the archaic language *Kawi*, which the audience cannot understand, but which provides a powerful symbolic content, while their wise Balinese servants advise their principals, and provide translation and interpretation in the common language of the audience (Zurbuchen 1987).

The God *Iswara* is the lord of sound and protects the *dalang*. Sound comes from emptiness. *Dalang* is *talang* (empty) and he needs to empty himself in order for the spirit of the character to enter his body and speak. To give the puppet life,

voice, action and internal power, the dalang needs to invite the spirit, the god, and the god plays the character, makes the decisions, controls the puppet master and all the puppet characters. If the dalang does not empty himself he can not allow the character to enter the puppet.

¹⁴From the interview with Wayan Wija, 2003/2005

The dalang pays attention to what is going on in the community where he performs, and he works those things into the story. "I hear from the people, I give to the people," says Wayan Wija.¹⁴ Sometimes the sponsor asks the dalang to make specific comments about people or events.

¹⁵From the interview with Wayan Mardika 2003/2005

The dalang works with the abstract quality of the character. This is what allows him the flexibility to improvise with the character, to add events, dialogues and comments appropriate for that character. The duty of the dalang is to interpret the meaning of the texts and to make the drama exciting for the people. He works with the materials of the plot to reveal what is beneath its skin, to reveal its essence, the seed.¹⁵

The dalang learns at a young age that he/she must continue to develop, grow and take in new experience as long as he/she lives. This continuous development is to be shared for the spiritual and social well being of the community. The new developments are always rooted in tradition. Tradition always provides the basis for innovation. This continuous development makes the cultures of Bali diverse, vibrant and alive. The reason to make something new is to offer people a reflection of contemporary issues within a framework they can understand. If the performances are not performed well, or are not engaging and reflective of people's lives, people

¹⁶ From the interview
with Wayan Wija
2003/2005

will not pay attention to the philosophy. As Wija points out, the duty of the dalang is to lead the audience articulate movement that feeds our eyes, expressive song that feeds our ears and meaningful philosophy that fills our hearts.¹⁶

The puppet master must continuously learn, make progress and expand the tradition to incorporate elements of the contemporary way of living. "We learn from tradition," points out Wija, which evolved, over the centuries, into a very refined form using particular materials available at hand. Now the new ways of contemporary life, industrialization and globalization, supply the contemporary dalangs with new approaches, materials, and technologies that at the same time present new challenges. Wija points out that if the dalang integrates these new ways with the traditional ways, the tradition is expanded and made relevant, richer and reflexive of this present way of living. But each innovation calls for recontextualization of the tradition. Wija observes that the traditional puppets do not best serve contemporary performances, which radically change the stage, screen size and layout, the traditional puppets do not best serve. The traditional puppets are designed to be shorter, and correspond to the architecture of traditional shadow-play settings, and the puppet is angled in relation to light projected by a flickering coconut lamp. While the traditional puppets do not appear very realistic when viewed directly, when viewed as a shadow projection the characters stretch out, become longer, and are more realistic. The puppet design is conditioned by the particular setting of the shadow-play stage. Wija points out that if the screen is expanded to a cinematic scale one needs to redesign the puppet's anatomy to accommodate this change; the puppet's

¹⁷ From the interview
with Wayan Wija
2003/2005

puppet's anatomy to accommodate this change; the puppet's design must also reflect the difference in the quality and positioning of the light source and/or various computer-based multimedia projections.¹⁷

The quality of the puppet character provides the basic condition for a good performance. Every puppet has its own distinct character. That is why the dalang needs to take special care when designing a new or original puppet. When Wija creates drawings for a new character, he spends a long time observing his designs very carefully, and evaluates them critically at each stage of development, so that he can design what he calls a perfect puppet, and have it perform true to its character. This search for the perfect puppets motivates Wija to cut and carve the puppet several times until he reaches the character's quality necessary for a good performance. It is through the physical qualities of the puppet that the dalang invites the spirit of the character. Not every dalang is a puppet maker and creator. Commonly, the puppet making is considered craft, rather than art, because traditionally the puppets are made as direct copies of characters that circulate in the narrative tradition of Balinese shadow play. Maybe it is this virtuosic puppet-making skill that allows Wija to create his groundbreaking innovations. For Wija the characterization begins with the puppet. He applies the same care in puppet design to both the traditional and new creations.¹⁸ In this context the puppet can be characterized as a hybrid across an instrument and a player. It is an instrument for channeling the voices of Gods and ancestors while at the same time it can be seen as player, since it embodies the characteristics of the characters it represents.

¹⁸ From the interview
with Wayan Wija
2003/2005



Figure 44 Merdah and Twalen [top] Sangut and Delem [below]

¹⁹ From the interview with Wayan Mardika 2003/2005

Characterization

Four clowns (panakawan), comic servants to the classical characters - Twalen and Merdah on the side of protagonist, and Dalem and Sangut on the side of antagonist - are at the core of characterization in wayang kulit performances. The comic servants paraphrase, comment on, and discuss the dialogues, philosophical discussions, charged arguments, and love scenes that take place among royal characters. The clowns provide a connection between the classical Kawi literature and present-day audiences by combining the spiritual and philosophical themes developed in drama with local rumor, scandal and current social concerns. As a consequence they can be seen to be braiding the narrative along the boundary between holy and mundane time. The clown characters are related to the Balinese ancestors and are considered to be spiritually charged. It is uncertain how or when these characters developed. They are distinctly different from other characters in wayang and do not belong to the distant world of India's classical literature. ¹⁹

The role of the clowns is to teach people about culture, religion and current social issues, while keeping the discussion engaging and accessible by providing jokes and comic relief. The dalang Wayan Mardika points out that the panakawan characters create space for the dalang to play and improvise. These characters can comment on the ceremony (upacara), if the performance happens in a temple, or respond directly to the comments, laughs and cheers that come from the audience. The story, event and supportive

come from the audience. The story, event and supportive audience provide opportunities for the dalang to improvise and create comic moments. If the story is about a marriage that's going to take place, there is an opportunity to make jokes about Merdah, Twalen's son who has not been married yet: "Hey, you should get married, why can't you get married, hey there's a beautiful woman over there, how about her?"²⁰

²⁰ From the interview with Wayan Mardika 2003/2005

In wayang kulit performance, characterization is based on the visual appearance of the puppet, its psychological condition as expressed through the voice, gestures and movement of the dalang, as well as the character's spatial placement on the screen and its sense of inner force.



Figure 45 Shadow Puppet, Rangda (widow) the witch, South Bali

The carving of the puppet is the first level of each character's embodiment. Wayan Wija explains that when he made clown characters for Wayang Tantri he carved and painted many puppets of the same character until he made the puppet he could connect with. If the connection is good the character and the voice emerge from the puppet.

Joseph Fisher and Thomas Cooper (1998), in *The Folk Art of Bali*, point to two continuous scales in the symbolic representation of visual elements that define the appearance of the puppet: one of rank and one of refinement. Facial features, color, postures, clothing and ornamentation within gods, humans, demons and ogres reflect spiritual and physical refinement of the character on one hand, and on the other the character's rank and status. These scales do not necessarily coincide: there are unrefined characters among royalty and there are refined demon characters. The refined

characters are thin, small, with straight noses, narrow eyes, no facial or body hair, and have subtle stylized smiles. They speak in high, soft and musical voices. Less refined characters are bigger and stronger, have large round eyes, some facial and body hair, and they speak with louder and deeper voices. At the end of the refinement scale are ogres with bulky, hairy, muscular bodies, inflated eyes, thick hands, sharp long fingernails and fangs. The clothing, ornaments and hairstyle of the puppet carry a symbolic meaning that denotes the social position and dramatic role of the character. Gods and kings usually wear some sort of crown; higher officials wear slightly less imposing ornaments, while common people and servants wear modest clothes. Holy men wear various kinds of turbans and a long coat open at the front, decorated with flowers. (Fisher and Cooper 1998)

Figure 46 Shadow puppet of Shiva [left], the destroyer, new puppet, South Bali

Figure 47 Shadow puppet of Brahma [middle], the creator, new puppet, South Bali

Figure 48 Shadow puppet of Vishnu [right], the preserver, new puppet, South Bali



Most of the Balinese puppets of gods, daemons and humans are constructed with heads, legs, feet and arms represented in profile, with the torso viewed from the front, but as if slightly turning in the same direction as head and legs. The legs, head and feet are connected to the body and are not independently movable. These puppets have movable arms, with joints at shoulders and elbows. ²¹ Thin wooden rods that allow

²¹ There are exceptions to this general form, such as God Shiva, Pamurtian (representation of angry gods), some representation of Saraswati (goddess of art and learning) from south Bali and more humble humans do not have movable arms. In the representations of Shiva and Pamurtian the legs are oriented frontally and feet turned outward.

shoulders and elbows. ²¹ Thin wooden rods that allow manipulation of the arms are attached to the puppet's hands. The same general form is applied to ogres, demons and animals that have partly human form, except that their faces are represented differently. Their forehead, eyes and eyebrows are shown in three-quarter profile, while the nose and mouth are shown in profile. Many demons have only one movable arm, and some minor characters have no articulation. The comic servants, some ogres, and more recently some animal puppets are distinguished by their movable jaws. The upper body of the servant puppet is shown in profile and both arms are attached at the same point. In the case of the servants their movable jaws relate to their roles as the main spokespeople and interpreters in the play. Body volume is achieved by the sophisticated diversity of ornamental elements carved in the leather that articulates the body parts. The puppets, once projected as a shadow on the screen, show a full grayscale spectrum.

Each character is oriented spatially to the left or right of the screen. The division between right and left separates protagonist from antagonist, morally superior from inferior. In episodes from the Mahabharata, the puppets representing the Pandawa clan are placed on the right side along with the servants of the good side, Twalen and Merda. The Korawa clan puppets are placed on the left, along with the two servants representing the bad side, Delem and Sangut. In Ramayana performances, Rama, Sita and the monkey army are placed on the right along with Twalen and Merdah, and the demonic king Rawana with his son, brothers, and servants Delem and Sangut, are on the left side.



Figure 49 Kayon, new puppet by Wayan Wija, South Bali, Wija places the temple and the religion at the spine of his Kayon puppet.



Figure 50 Kayon, new puppet by I Wayan Mardika, South Bali.

²² From the interview with Wayan Wija, 2003/2005

Spatial symbolism within the screen space reflects the philosophy, *rwa bineda* that recognizes the polarities. In the West, people are accustomed to a philosophy of two opposing forces that represents a clash of extremes: good-evil, heaven-hell, sacred-profane, constructive-destructive. Balinese people also recognize this polarity, but in Balinese-Hindu philosophy these forces are not exclusive and the oppositions are seen as mutually dependent complementary ideas. People live in a world where good and evil coexist. Good and evil are parts of a whole and each cannot exist without the other. Wrong is the shadow of right. Without this shadow, one does not understand good. In addition, Balinese-Hindu philosophy includes a third position - the center, which balances the other two (Eiseman & Eiseman 1990). The notion of three overlapping and interdependent forces that constitute the whole is at the centre of Hindu religion. The groupings of three - *tri hita krana* - governs Hindu ideology and is represented in the trinity, Brahma the creator, Vishnu the preserver and Siwa the destroyer. In Hindu philosophy, the *tri guna* [three form] stands for the good, the middle, the bad. Everything is under the three of *tri guna*; *tri guna* makes the world go round.²²

In a performance, the *kayon* or *kayonan*-a tree-shaped puppet that symbolizes the tree of life - or a mountain is always in the middle of the screen. The *kayonan*, like the *dalang*, is in the centre and does not favor the left or right side. The *kayonan* puppet is the symbol of the heart, of the god, and the *dalang*. In Bali, *Kayu* means tree and *kayun* means feeling. The *dalang* waves the *kayonan* to indicate the start of the story and bring the universe and the puppet characters to life. Tree links the underworld, earth and

²³ From the interview
with Wayan Wija,
2003/2005

heaven. Tree has roots in the underworld and branches in the sky and represents transience. The kayonan also represents the mountain or Mahameru, the Mountain of the Gods, the sacred centre of the universe. Mountains rise out of the depths into the sky and represent stability.²³

With respect to temporality, divine characters move in a universal time-scale of cosmic proportions, the royals in terms of epochs, those of the court in terms of shorter political agendas, while the lowest social figures, the clowns, act out their desires and reactions to unfolding events purely in the moment. This complex layering of time-scales relates to the equally complex Balinese notion of calendrical time in which cycles of differing time-length run simultaneously. Each day has a unique significance in the temporal scheme as it represents the coincidence of different starting points in the various cycles of time.

Other forms of Shadow Play in Bali

As we have seen, shadow play performances are not merely a spectacle to be watched but a ritual to be enacted. Beyond providing entertainment for Balinese and tourists alike, the shadow play performances function above all as a stage where Balinese society is revealed, where its members simultaneously enact and observe their own history and their own values.

Over the centuries, the Balinese have shown their ability to borrow whatever foreign influence suits them, while maintaining their identity. Today, the Balinese have adjusted

maintaining their identity. Today, the Balinese have adjusted to the tourist invasion of their island, taking advantage of the application of their cultural traditions to foreign visitors and exploring their own spiritual values in relation to the post-traditional condition. The influence of globalization on Balinese shadow play can be traced both through the influence of tourism and through that of electronic media, various forms of technological invasions and the industrial work ethic. The result is exemplified here through two parallel but very different contemporary forms of shadow play, namely performances staged for tourists and experimental work, popularly referred to as *wayang listrik* (electronic shadow play).

The market economy around performances staged for tourists also influences the kinds of shadow play performances one can experience in Bali. These performances are miniature versions of traditional shadow play and are presented as a commodified entertainment theatre. The performances staged for tourists require the visitors to purchase a ticket and usually last between an hour and an hour and a half, to accommodate the common form and attention-tolerance commonly defined by western theatre, which is short in comparison to performances held for the Balinese that can go on for four hours or more. Performances staged for tourists have purely commercial purposes, but are nevertheless carefully designed to avoid sacrificing their own sacred and spiritual values in the name of monetary profit. The American anthropologist Philip McKean (1973) points out that the coming of tourists to their island provides the Balinese with an opportunity to preserve their social fabric while revitalizing their cultural traditions. He sees the various manifestations of Balinese culture as "cultural

various manifestations of Balinese culture as "cultural performances," which distinguish among various audiences — the Gods, the Balinese, and the tourists. The belief that a divine audience is present at performances, for the Balinese, presents an assurance that traditional values are preserved. As I discussed earlier in this chapter, such performances, mainly staged for religious ceremonies, are at the heart of Balinese arts. These purely sacred performance practices that address the divine audience keep the overall artistic tradition focused and insightful, and position the art of performance as essentially spiritual and a social necessity. In contrast, performances designed for visitors have a purely commercial purpose and thus lack the meaning that religious performances are based on. Nevertheless, the presence of tourists stimulates Balinese performance art in general through the monetary rewards of commercial shows, which can be characterized as positive influence, since the monetary rewards allow more extensive practice of performances that are apart of the temple ceremonies. Traditional performances intended for divine and Balinese audiences provide a sense of authenticity to the tourist shows, and tourist performances contribute toward the traditional ones at least through monetary stimulation, and perhaps also through the additional reflexivity these performances require of the artists.

These cultural performances staged for tourists provide a form of ongoing dialogue between tourists and locals, between the universalistic requirements of globalized international tourism and the particularities of a given tourist destination. International tourism generates a demand for cultural performances by prompting whole societies to stage their culture for foreign audiences. In reply to this demand,

their culture for foreign audiences. In reply to this demand, the local populations construct a representation of their culture, simultaneously based upon their own indigenous system of references and their understanding of the tourists' expectations (Picard 1990).

The arrival of tourists in Bali has provided a new audience for Balinese cultural performances—whether they are ceremonies, which the visitors happen to attend, or attractions intended specifically for tourist entertainment, typically staged in hotels or major tourist centers. The extent of this influence has placed the Balinese in the novel situation of having to interpret their culture for a foreign audience (Picard 1990). Today, even within the traditional ceremonial context of shadow-play performance, one might hear the clown characters addressing the audience in English or other foreign language if their presence is known to the dalang.

Cultural performances staged for tourists are in some ways intercultural experiments. However, my interest in the contemporary forms of shadow play in Bali is focused on the experimental forms influenced by the post-traditional condition, that, unlike tourist performances, continuously maintain their philosophical and spiritual quest. This category of contemporary Balinese shadow play is promoted through academic institutions, international festivals, other kinds of public events that function outside of temple settings and through various international co-productions. Unlike shows staged for tourists these works actively expand the traditional form itself and the philosophical questions embedded in the tradition. They provide an example of post-traditional and cross-cultural performances, and focus on examining the integration of Balinese tradition with external

examining the integration of Balinese tradition with external influences of globalization. In the next section I discuss this form of shadow play, which is popularly referred to as wayang listric, through cross-cultural influences among the contemporary shadow plays of North America and Bali.

²⁴ The Indonesian word Wayang means shadow or ghost, and it is used to refer to the performances in general and in specific it refers to all kinds of sub-genres of shadow play performances. The word Listrik stands for electricity.

Wayang Listrik ²⁴

The contemporary influences and the cross-cultural exchange between Bali and North America are discussed here through Larry Reid's, I Nyoman Catraand's, Ron Jenkins' and Maria Bodmann's experiments and innovations in the United States of America, and I Made Sidia's and I Wyan Mardica's experiments and innovations in Bali.

Larry Reed extends the philosophy, technologies and materials of traditional Balinese shadow play. He combines shadow puppets with performing bodies to create a new kind of improvisational, reflective and immediate cinematic experience.

²⁵ The Bauhaus artist Laszlo Moholy-Nagy, in the 1920s, incorporated light and shadow abstractions in his experimental Theatre of Totality. Avant-garde theatre and experimental cinema throughout the 20th century repeatedly rediscovered the dramatic potentials of shadow play.

Shadow plays directed by Californian Larry Reed present bi-cultural and bi-lingual productions that build on European animated-shadow theatre,²⁵ extend traditional Balinese shadow play toward cinematic experience, and integrate shadow figures and human actors within a single theatrical performance. Larry Reed studied the traditional shadow play form with Balinese masters, performed it for several years, then adapted what he learned to the North-American context and finally created his own innovative hybrid

products. Reed uses the term wayang listrik, coined by his Balinese colleagues, to distinguish his productions from traditional Balinese wayang kulit.²⁶

²⁶ From the interview with Larry Reed, 2004

Reed first visited Bali in the early 1970s as a film student in order to make a film, but ended up studying wayang kulit, and returned to Bali several times during the seventies and eighties. He learned the Balinese language and Kawi, the ancient Javanese language. His traditional performances, Wayang Bali, follow the Mahabharata epic, using the Balinese performance technique of improvising from a basic text to reflect the contemporary context and bring the performances closer to his.²⁷ This form juxtaposes ancient wisdom and established teaching with immediate local matters. The dramatic plot alternates between the refined characters that belong to the Mahabharata and speak in Kawi, and the crude characters, the clowns, who reflect local concerns and interpret the story to the audience in their own language. Reed chooses to retain this structure of relationships, then mixes American and Balinese humor and mythology in such a way that his work is engaging and accessible in both locations. In wayang Bali, Reed maintains the traditional stage and screen arrangement, and uses the single coconut oil lamp, accompanied usually by two gender wayang musicians.²⁸

²⁷ To make an analogy Reed refers to the western theatrical tradition where Shakespeare's words present one of the essential narratives, but no one knows what his performances were like. In Bali the performance style is intact, but the words are improvised and changed within every performance. From interview with Larry Reed.

²⁸ From the interview with Larry Reed, 2004

He performed traditional wayang parwa for over twenty years before he realized that he needed to develop a new approach. He developed the new hybrid form of projected shadows, what he calls wayang listrik, out of a need to teach people in North America about shadow theatre. He felt that he could not teach the traditional Balinese form of shadow

play, because this form is best understood in the Balinese context, through the teachings of Balinese shadow masters. Reed felt completely free to use his new form as a way of teaching.

"I am trying to use shadow play as a bridge between cultures and also between states of mind putting people in a situation that feels foreign, and then making it feel familiar through the humor." Larry Reid ²⁹

²⁹ From the interview with Larry Reed, 2004



Figure 51 Larry Reed, In Xanadu 1993-1994, Kubilai Khan and Chabui.

Wayang listrik style employs cinematic ideas and utilizes spatial and temporal montage that allows the blending of bodies with shadows. Roles shift between human actors and shadow puppets, blurring the boundary between illusion and reality. In wayang listrik, Reed uses multiple high-intensity halogen and other forms of lighting that allow him to extend the small scale of traditional shadow play (lit by oil lamp) to large-scale cinematic events. In wayang listrik, there's less improvisation than in traditional Balinese wayang. There is usually a large group of performers and elaborate technology that need to be coordinated during the performance. To allow for some improvisational freedom among the performers, Reed developed a technique where the beginning and end is defined and the middle can be improvised.



Figure 52 Larry Reed, In Xanadu 1993-1994, Kubilai Khan sends a messenger across China to Chabui.

In Xanadu (1993, 1994, 1997), depicts Mongolian ruler Kubilai Khan and his Buddhist wife Chabui, who was a guiding spirit behind her husband's success as a good ruler.

In this work, which is an example of an early hybrid shadow play, Reed extended his production to encompass a wealth of new ideas and techniques. He combined shadow puppets,



Figure 53 Larry Reed, In Xanadu 1993-1994,



Figure 54 Larry Reed, In Xanadu 1993-1994, behind the screen.

masks, live actors/dancers, a large-scale screen and powerful lamps to enhance the sense of illusion that the puppets and the people inhabit the same two-dimensional world. Four xenon arcs and two halogen lamps were used to produce a clear image from a distance and allow play with perspective and scale. For this production Reed developed an elaborate spatial montage technique, using different sized puppets to achieve an even greater range of scale manipulation, and a split-screen technique to allow two separate areas of activity within the screen space at the same time. The screen could be split both horizontally and vertically. To allow actors to see their action on the screen, Reed developed a two-faced mask: the actor can face the screen and at the same time show his/her profile.

The In Xanadu production was a big collaborative effort, requiring the handling of a hundred shadow puppets, fifteen masks and thirty backgrounds. The visual design was inspired by Chinese shadow puppet theatre. One major challenge the production faced was the coordination of actors, dancers, puppets and scenery within the unfolding of narrative. Another was the integration of new elements and techniques with the new narrative approaches.

With the trilogy *Sidha Karya* (1995), *Mayadanava* (1996), *Electric Shadows of Bali* (1998), Reed further developed the wayang listrik style, refining the new techniques he introduced in In Xanadu and strengthening the integration of narrative and presentation techniques, while at the same time extending the traditional form of Balinese wayang kulit. The struggle with narrative fragmentation and coordination among actors and puppets that caused problems in In



Figure 55 Larry Reed, In Xanadu 1993-1994, behind the screen.

Xanadu was solved within this trilogy. Reed used an all-Balinese cast and a traditional Balinese narrative. Integration of acting and speech, stylized Balinese dancing and the movement of puppets, all reflected Balinese energy and intensity, and was underlined by the vocal characterization of a Balinese dalang. These different Balinese voices created a unified cultural framework of Balinese life, preserving the spiritual significance of wayang kulit. The consistency and harmony of movement and vocalization among the actors, dancers and puppets emerged naturally from their grounding in the same tradition. Aural and visual elements in the play reinforced one another to create a magical and mythic environment where comic and serious, quiet and anxious, were set off against each other.



Figure 56 Larry Reed, Mayadanawa 1996;

Mayadanawa was created in Bali for the Walter Spies biennale festival in 1996, which that year focused on wayang kulit. Spies was a German artist and writer who lived in Bali through the 30s and influenced Balinese contemporary painting style. Mayadanawa is a well-known character among Balinese people. The story depicts the rise and fall of a despot kingdom, Bata Anyar. In this production, Reed brought together numerous Balinese actors, and used music composed by Dewa Berta and performed by the Pengosekan gamelan orchestra, Sekeha Gong Tunas Mekar. He collaborated with the village artist to create scenographic slides based on Walter Spies paintings. The slides were painted cut-out scenes of typical Balinese scenery, depicting thatched temples and terraced rice fields in which the farm puppets were working. Reed used multiple halogen lights placed in coconut shell housings with dimmers, to allow a kind of filmic cut and montage among scenes.

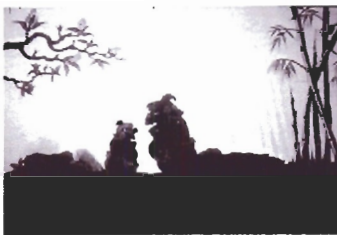


Figure 57 Twalen and Merdah in Electric shadows of Bali; Photo Luis Degado



Figure 58 Demon puppets in the underworld in Electric shadows of Bali; Photo Luis Degado



Figure 59 Basuki, King of the Snakes in Electric shadows of Bali; Photo Jane Levy Reed



Figure 60 Twalen accompanying Indra in Electric shadows of Bali; Photo Jane Levy Reed

In Electric Shadows of Bali, narrative is based on the Balinese creation myth, The Elixir of Immortality (Trita Amerta) that is rooted in the Mahabharata epic. Reed worked in collaboration with I Nyoman Catra and I Wayan Wija, who created numerous puppet figures of animals and demons.

Wija's animal puppets move with realistic flexibility, while the demon puppets provide comic relief with their power to transform, stretching their necks or turning themselves inside out. This production incorporated forty elaborate sets and fifty puppets. The shifts between sets once again resembled cinematic transitions, where scenes appeared to melt into and grow out of one another. This was achieved by complex interaction across screens split either horizontally or vertically. Two sets of images would act at first independently, then slowly merge and overlap with each other. I Dewa Putu Berata in collaboration with Miguel Frasoni composed music. I Dewa Putu Berata and I Made Subandi played a special kind of gender wayang limolas-a 15 key metallophone (which is favored by Wayan Wija for wayang tantri performance). The electronic keyboard fulfilled a function of recreating the sound of a large gamelan.

Larry Reed performed the usual comic interpreters of the creation myth: Twalen and Merdah (father and son) on the side of the protagonist, and Dalem and Sangut on the side of the antagonist. The two pairs of clowns joke, while at the same time providing an English translation of the refined characters' Balinese speech. In this production Balinese dominates while English is used for translation.



Figure 61 Charlie Thom, Red Hawk, Coyote's Journey, 2001

For non-Balinese audiences understanding the spiritual and religious significance of traditional wayang kulit and its interconnectedness with the cultural tradition of Bali can never reach the same depth as for Balinese villagers. The non-Balinese audience might enjoy the performance, follow the narrative, and perceive a kind of spiritual state that the dalang brings to the performance, but the performance would not be experienced in terms of its religious significance. While Reed's work cannot recreate a particular religious context from traditional shadow play, it can certainly provide a spiritual and sacred experience. He extends the notion of shadow puppets as mediators between the visible and invisible world by extending the Balinese spiritual philosophy to the North American context, making the invisible visible. (Klee 1961)



Figure 62 Coyote's Journey, 2001

Reed's work exceeds a simple transference of shadow-play techniques by bringing new technology into a ritual context. His hybrid productions reflect the space, time and context of the contemporary world of California. His experimental shadow play works, on the technical level, to extend the tradition of Balinese wayang, but in a larger sense, he has also imbued his new creations with the holistic Balinese philosophy of integrating art with history, mythology, ancient wisdom and contemporary reflection. The production, *Coyote's Journey* (2001), and the staging of Shakespeare's *Tempest* (Fall 2005), are good examples of the re-contextualization of Balinese philosophy into local histories and mythologies.

Coyote's Journey is the traditional Northern California's High Dance People's story of the adventures of Coyote, the

trickster. In this production, Reed combined storytelling, singing, and drumming with large projected shadows and live actors. Charlie Thom (Red Hawk), the Karuk Elder, singer and storyteller, recites his stories of Coyote's Journey in the Karuk language. This project brings forward an effort by many Native performers, artists and designers, unified by the voice of Charlie Thom, a hereditary ceremonial leader. Charlie Thom is a spiritual teacher, an outstanding storyteller, and one of the few people able to bring knowledge of Karuk to an English-speaking audience. Coyote's Journey shadow play performance does not employ any written script. The story is told, danced, and sung in an improvised manner using the magic of shadows to enhance the visual impact.



Figure 63 Coyote creating the world, Coyote's Journey, 2001

Reed retained from Balinese wayang a rich relationship with language as a way of preserving the spiritual, mythological and educational aspects of shadow play while reinterpreting it in the context of North America narrative tradition. This production is bilingual, spoken in Karuk and English. The narrative reflects the ancient history and spiritual philosophy of the Native Californian land, while exposing the stories to the native community in present relationship with that land.

"Stories and myth are the connective tissue between culture and nature, between self and other, between life and death that sew the worlds together in their telling."
Joan Halifax (Halifax 1993)

According to tradition Native Americans honor the sacredness of the stories told around fires, danced in dances, and represented in carving or painting. Their stories, like everything in their traditional universe, are living entities with a power of their own. The Coyote tales, through

laughter and entertainment, teach people how to be in the world. These stories are used in healing rituals to help children forget the pain of injury, or to help people get over the grief of loss and death. Here a parallel can be drawn between the Native-American storytelling tradition and that of Indonesian culture. There too stories, dances, songs and rhythms are used repeatedly in ritual: they create a special time, a dedicated space through which mysteries of life can be thought. All over the world strands of the "old world" offer examples of the power in stories. "Old world" societies have a storytelling tradition and a shared cultural context, while deracinated global subjects in multicultural communities do not. The purpose of the story, according to Clifford Geertz, is to "draw pictures of inner thought and feeling to give an external form to the internal feeling. More specifically, it pictures conflict in the individual between what he wants to do and what he feels he ought to do.... All such wishes and tendencies threaten every day to ruin the individual, to destroy his thought and to upset his behavior." (Geertz 1960)

Stories represented in these shadow-play performances teach us the balance of self-power, sacrifice and wisdom that strengthen our spirits and therefore our bodies and minds and provide healing space so we can see ourselves as wholes. For Indonesian people the events in stories are seen as part of life, and characters represent a part of a whole person, and these characters are dramatized through shadow-play performances. Transformation and the celebration of change are the essential elements in ritual performance that allow for the awareness of a fundamental and sacred process that links past, present, and future. The spiritual value of the Coyote's Journey production is in the way that it connects the

Journey production is in the way that it connects the traditional wisdom of Native-American storytelling with the contextual means of shadow play drawn, through Reed's approach, from Bali. This intercultural performance also benefits the multicultural and post-traditional audience of North America. Coyote's Journey connects the wisdom of traditional Native American storytelling, to general North American audiences through contemporary production, which resembles cinematic spectacle, but preserves an oral and improvisational character.

Shadows can be considered intermediaries between an everyday state and a spirit state. In Reed's productions, audiences participate in the formation, transformation and disappearance of the performed image. Everyone's attention is fixed on the screen. Actors and shadow-casters cause the action on the screen; though working together they look at the screen, not at each other. Reed's productions displace the notion of cinema and filmmaking (recorded media, a kind of projected, but temporally fixed shadow play) to the performance space, a kind of cinematic zone where shadows are allowed to bloom in an improvised context.

The narrative form of shadow play has an effect that's different from the effect of a radio play, a cartoon or an animation, and different from the effect of a live stage performance or a movie. The shadow-play performance engages the viewer in such a way that it provides a situated space and time for the audience to construct, complete and find a closure for an image. There is a highly creative relationship between performance and audience-the performance engages the viewer's imagination at a more

unconscious, dreamlike level. Reed refers to the shadow play as a performance created in that space in between, where everyone's attention and focus is converging, and such performance becomes a kind of a sacred act in itself.

Reed's production *Mayadanava* was created in collaboration with local Balinese artists and presented to Balinese audiences. *Electric Shadows* was restaged by Berta and toured Bali as well. Reed took his innovative hybrid bi-cultural plays back to Bali to be appreciated, judged and further extended by the Balinese people. In this way he offers something precious to Bali; he offers a gift similar to the one he was given by Balinese shadow masters at the beginning of his path as *dalang*. His work offers reflection on the post-traditional contemporary world - a meaningful version of tradition extended by our contemporary way of living. Bringing his experimentations with the new forms of *wayang kulit* back to the Balinese community, he made an impact on contemporary Balinese *dalangs* interested in innovation and experimentation with new technologies that are increasingly present in many aspects of life.

Another California-based shadow artist, Maria Bodmann, studied shadow play in the village of Sukawati in Bali. Bodman performs traditional Balinese *wayang purwa* in English and Kawi, accompanied by *gender wayang* music. She is a co-founder of the performing arts company, *Bali & Beyond*, with Cliff DeArment, which stages music, shadow play and dance performances inspired by the Balinese culture in Los Angeles.

Bodmann makes an attempt to merge the performance



Figure 64 Maria Bodmann, Alice in Shadows



Figure 65 Maria Bodmann, Alice in Shadows

knowledge and experience she gained in Bali with the traditions and living contexts of North America. Alice in the Shadows is Bodmann's first contemporary shadow play, and it represents a fusion of Bali-inspired performance with English narrative, in this case Lewis Carroll's Alice in Wonderland. To the Balinese approach she adds ritualistic elements such as flower decoration, food and insects, and a colorful puppetry from the Chinese shadow-theatre tradition. Her out-door 'camp fire' performance combines elaborate theatrical lighting with a contemporary rock concert, where tunes by John Lennon, Jefferson Airplane, The Doors, and Tom Petty are weaved into the dramatic structure of the play. Alice in the Shadows follows traditional Balinese shadow theater in a number of ways. The audience can sit on either side of the screen. In her use of stage elements such as the flickering light of the oil lamp, traditional Bali screen and puppet size, and all is overseen by one shadow master.

Larry Reed and Maria Bodmann have made important contributions to the development of an American shadow-puppet scene as well as expanding the possibilities for a contemporary expression of Balinese wayang. Their work in traditional wayang kulit contributes to the dissemination of Balinese culture, philosophy and myth to American audiences.

Larry Reed's passion for the traditional Balinese wayang kulit and his hybrid intercultural shadow-play productions have influenced contemporary forms of wayang in Indonesia. Reed's collaborators Wija, Sidija and Berta brought powerful lights back to Bali to explore their possibilities locally. These collaborations planted a seed for several streams of kerasu

baru (new creations) of wayang kulit. Even the term wayang listrik, originally coined to refer to Larry Reed's Shadow Lights productions, is now popularly used to refer to any new creation in wayang kulit that employs new technologies.

The STSI [National Performing Arts Academy] in Bali encourages young dalangs to experiment with and explore new approaches to wayang kulit in a way that reflects and critiques a contemporary world immersed in ever-growing powerful technologies and issues of global development.

I Wayan Mardika's STSI graduating project is a Wayang Tantri produced in 1998, entitled Kamandaka, which literally means taking pleasure in stories. For this project, Wayan Mardika mixed ten live actors, dancers, and singers, with wayang kulit puppet characters. The main character, Dyah Tantri, is the daughter of the minister whose job it is to find wives for the king. She has such a lot of good stories about animals that the king is enchanted night after night and forgets to seek new girls for marriage.

Dancers/actors play the real characters in the story-Dyah Tantri, her minister father, Raja the king, and several soldiers--while the action and animation of the characters in Tantri's stories appear on the wayang kulit screen. Dalang Wayan Mardika narrates and performs with puppets the actions that take place on the screen. On the screen is realized the story within the story. A kind of magic happens here, and the world of wayang blends with the world of people. Like Larry Reed, Mardika combines cinematic projection, the performing bodies of dancers and the world of shadow puppets. Rear projection was used for the big screen, with

dancers performing both in front of and behind the screen.

When the dancers are performing in the front of the screen, the screen becomes a scenography depicting, for example, the interior of the palace. In this context, the screen functions as a background for the humans/dancers and, depending on the action, the dancers/actors appear in the front or behind the screen. When Dyah Tantri is telling her stories the screen depicts the virtual world of the story. The inspiration for this arrangement comes from the source: the Tantri story.

Wayan Mardika employed three bright halogen lamps, which allowed him to use a large cinematic screen and to experiment with the scale of characters and projected images. He used a colored spot lamp to light the dancers who appeared in front of the screen. Sometimes lights positioned in front of the screen were focused onto the dancers in such a way that they were visible and the screen was in the shade.

These dancers were juniors of the academy. STSI junior dancers will help with a project, but the musicians are from Sukawati-a complete traditional Semar Pegulingan ensemble.

"The Balinese see this new form as an adjunct and expansion of their ancient tradition into modern times, accepting it as one more contribution to the genre of kreasi baru, new creations. They found that traditional and new puppets and techniques can be seamlessly combined."

Larry Reed, 1998 (Diamond 2001)

Dasanama Kerta, (ten elements that cause harmonious prosperity), (Sedana 2005) directed by dalang I Made Sidia of Bona village, was a shadow play aimed at resolving sufferings that came from the bomb that exploded in the Sari

Club on Legian Street on 12 October 2002. But how can theatre help resolve suffering caused by terrorism?

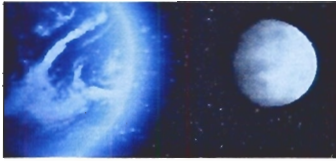


Figure 66 Dasanama Kerta, 2003, I Made Sidia

The most disturbing aspect of the terrorist attack in Kuta has been its psychological influence. The Balinese, who are reluctant to discuss their problems openly, turn to the performing arts for support and instruction. Many performances of wayang kulit have been staged across the island to help young people understand a world turned upside down. Sidia's work was of particular interest because he extended traditional performance style to include contemporary technology as a response to a contemporary problematic. Yayasan Kemanusiaan Ibu Pertiwi, an organization established to assist those dealing with stress resulting from the bomb blast in Kuta, sponsored this performance (Ballinger).



Figure 67 Dasanama Kerta, 2003, I Made Sidia

The performance was first presented in Kuta in an area where the bomb killed hundreds of people. Following this performance the shadow play was broadcast on Balinese television, extending its reach to the entire island. During 2003, the work toured several cities in Bali: Ubud, Bona and Denpasar, as well as in Java: Surabaya and Jakarta.

In Balinese tradition, the performance functions as a tool for maintaining and restoring balance and for sharing the wisdom of ancestors. Wayang Dasanama Kerta aimed at restoring harmony and balance following this terrorist act. The production utilized many technical and dramatic innovations. Innovations are inherent in the tradition of Balinese wayang kulit, since the tradition embodies the philosophy of continuous reflection on the current social and

spiritual state of the community. Technical innovations in this work can be interpreted as reflections on the complex powers of contemporary technologies, which represent globalization and modernization initiated by economic and political interests. Dramatic innovation reflects the new life imposed by these technologies; therefore the innovation underlines the philosophy of the tradition.

³⁰ Contemporary shadow play

Even in the newest permutation-wayang kontemporer³⁰ we see one of the old impulses of Balinese puppet performance: art actively reorders the universe, and humans become like gods when they enter the realm of art.

I Nyoman Sedana (2005)

³¹ Reed (California), Kent Deveraux (United States), Nigel Jamieson (England), and composers Paul Garbowsky and Peter Wilson (Australia)

In *Desanama Kerta*, many of the technical aspects of traditional wayang kulit were altered. While Sidia has a solid grounding in traditional performance, he has participated in numerous collaborations with international artists,³¹ working on hybrid productions of innovative shadow-play performances. The work reflects contemporary tendencies to employ new theatrical technologies, and presents a significant intercultural fusion. The screen was expanded to cinema scale, and the productions involved many performers. Five dalangs animated the puppet characters, though only Sidia narrated the whole performance. The large-scale screen was made possible by using the bright light of computer-based projection. The projector was placed several meters away from the screen to allow for a broad back-stage performance space. Smooth and coordinated movement of puppets across the screen was supported by dalangs sitting on wheeled platforms, which allowed them to move unrestrictedly across the large stage. Because these platforms resembled skateboards, the work was popularly labeled *Wayang Skateboard*.



Figure 68 *Dasanama Kerta*, 2003, *I Made Sidia*

The digital stills, moving images and 3D animations made extensive use of color, easily afforded by the multimedia potential of the computer. This is unusual since traditional wayang is strict in its use of opaque puppets that cast black shadows on a white screen.



Figure 69 Dasanama Kerta, 2003, behind the screen;

The bright colors of blood and fire were used to intensify representations of the attacks of demonic forces terrorizing Earth. An elaborately drawn scenography that resembled cut-out shadows was integrated with animated elements using power point multimedia slides designed by Dewa Made Darmawan. This scenery depicted classic Balinese landscape, forests, mountains, temples and temple gates. Larry Reed introduced to Balinese artists the idea of using slides to portray the classic Balinese environment, and the technique of cinematic montage of scenographic elements. While Reed used multiple light sources combined with cutout and painted slides in order to create the sophisticated cinematic montage necessary to integrate live actors and dancers with the two-dimensional world of puppets, Sidia used computer-based multimedia slide projections to create a similar editing effect.



Figure 70 Dasanama Kerta, 2003,



Figure 71 Dasanama Kerta, 2003, I Made Sidia.

For Sidia's work the computer is more suitable, since he does not utilize live performers. In this production, an expanded sense of space comes from the integration of moving image, three-dimensional computer animation, and the two-dimensional world of shadow puppets. Time-lapse animation and video images of Balinese landscape, such as clouds, running water, ocean and fire, were integrated into the silhouette landscape background, which enabled integration of colorful moving images with shadows cast by puppets. The pre-recorded and edited sequence of video images of the traditional topeng - male dance - and telek - female dance - were used to represent gods coming to earth as performers.



Figure 72 Dasanama Kerta, 2003, I Made Sidia.

Nyoman Sira, Sidia's brother, made many new multi-jointed and flexible puppets for this show. These reflected the contemporary themes and reality of Kuta, such as villagers suffering from the effects of the bomb, girls wearing fashionable clothes, a man riding a bicycle, wheels turning. Traditional puppets were used to represent gods and daemons. Some puppets transformed from one being into another during the performance. Animal puppets with articulated movement were used (an innovation introduced by dalang I Wayan Wijaya).

A group of musicians playing flutes, percussive instruments and two genders was supplemented with an electronic keyboard.

This work incorporates many innovations, but the story Dasanama Kerta, also known as Siwa Tattwa, and the philosophy behind its performance, both embrace tradition.

³² For the analysis of the story and its relevance in Balinese philosophy and tradition refer to I Nyoman Sedana Theatre in a Time of Terrorism: Renewing Natural Harmony after the Bali Bombing via Wayang Kontemporer.



Figure 73 Dasanama Kerta, 2003, I Made Sidia.



Figure 74 Dasanama Kerta, 2003, I Made Sidia.

Dasanama Kerta (Ten Elements That Cause Harmonious Prosperity) is derived from Balinese mythology recorded on a palm leaf manuscript, Lontar Cudamani (meaning pure diamond and referring to the third eye) (Sedana 2005). The ten elements are earth, water, fire, wind, plants, animals, fish, birds, humans and God. Lontar Cudamani carries a message that each of these forces needs to be cherished, nurtured and controlled as a whole, to maintain the balance and harmony that is the essence of Balinese religion.³²

The God Siwa has banished his wife, the goddess Parwati, to live on earth in a graveyard, as a daemon Durga. But sexual hunger for Parwati and the feeling of loneliness overwhelm Siwa and he leaves heaven for earth in order to find her. But he cannot appear in his divine form, so transforms into the terrible daemon Kala Rudra. On earth they join together and in their thrill gather all daemons that carry the plague throughout the world. Demonic forces enter animals and humans not protected from the six internal enemies: lust, greed, anger, confusion, drunkenness and jealousy. The entire world is unbalanced and at the edge of destruction.

The Hindu trinity of Brahma (the creator), Vishnu (the preserver) and Iswara (a form of Siwa the destroyer) transforms into priests who descend to earth to restore security to the world. The priests perform wayang puppet theatre. Brahma turns into a priest named Tapowangkeng and serves as the dalang's right-hand assistant, Vishnu becomes the priest Salukat who serves as the dalang's left-hand assistant and Iswara, as the priest Lotatia, is the dalang who presents the first wayang kulit performance. The guardian gods of the four directions play the four gender



Figure 75 Dasanama
Kerta, 2003

wayang instruments that accompany wayang kulit performance. Sidia, as narrator represents the priest Lotatia who carries out the first wayang performance.

In addition God Brahma transforms into a coarse red mask dancer, *topeng bang*; God Vishnu into a refined white mask dancer, *telek*; Iswara appears as a lion-like mythological creature, *Barong*; and Bayu becomes the puppeteer *Dalang Samirana*. For this section, Sidia prerecorded and montaged the dances and represented them as video projections of the gods descending to perform.

As the gods perform, the demons *Kala Rudra* and *Durga*, affected by the beauty of art, are reminded of their divine origin and return to their god forms *Siwa* and *Parwati*. Through this story, Sidia's depiction of chaos on earth provides guidance, and answers terror with art, beauty and love. Before his departure to heaven, *Siwa* reminds humans that every ritual has to have an element of art, and offerings need to be given to the *bhuta kala*, the spirits of chaos. This story and reminder address the question: why do these various artistic genres continue to be presented in temple ceremonies?

In this work, we can see how Balinese arts combine improvisation, reflection on contemporary needs and the store of knowledge of tradition to create something alive, relevant and deep. In the context of Balinese arts, the artist carries a social responsibility to provide healing through performance. He/she does this by taking the place of power in order to reconcile chaos and pain by the active power of performance.

³³ I Nyoman Catra, made his New York first appearance performing with Julie Taymor and Bill Irwin at La Mama in the early 1980's.

"To some outsiders, responding to terrorism with sacred art and ritual might seem naive, but the Balinese are proud to report that the perpetrators of the Balinese bombings have been captured, tried, and imprisoned, and the island is safe again. ...The fact that the Balinese, who live in the world's most populous Muslim nation, were able to resolve their conflicts peacefully through art and prayer, is a story that has not received the international attention it deserves." I Nyoman Catra and Ron Jenkins 2004

Balinese people island-wide answer terrorism and violence with art and ritual. After the Kuta bombings, a spiritual cleansing ceremony took place in every Balinese village across the island. I Nyoman, with the Dharmaswara Gamelan orchestra, conducted a parallel ceremony in the same time at the site of the World Trade Center bombing in New York.

The performance of *Caliban remembers: Balinese Tempest* (2004) is the result of a collaboration between director I Nyoman Catra,³³ a master of traditional Balinese Masked Dance and Shadow Puppetry, and American director Ron Jenkins. I Nyoman Catra and Ron Jenkins staged *The Tempest* in New York city to highlight the theme of non-violent response to aggression and terrorism, drawing parallels between the lessons Prospero learns on the island about forgoing vengeance, and the response of the Balinese people to the terrorist bombings of October 12, 2002.

Shakespeare's story reminds us to forgive those who have done wrong to us, and to look inside ourselves for the cause of violence. Prospero responds to Caliban's attempts to kill him with: "This thing of darkness I acknowledge as mine."

The play is retold from the perspective of a shadow puppet. *The Tempest* is set in Bali one year after Prospero has left Caliban's island. Using the sacred form of Balinese shadow play (*wayang lemah*), Caliban re-enacts Prospero's last day on the island. The actors/dancers embody Caliban's two-dimensional puppet characters on the stage behind him, exemplifying the characteristic choreography of traditional Balinese puppets in the spirit of sacred mask dance movements, in order to portray characters represented by flat puppets. In place of a screen a string is drawn across the

puppets. In place of a screen a string is drawn across the width of the stage and the actors/dancers performance was choreographed to resemble the movement of two-dimensional puppets. Shadow puppet figures are translated into mask dancers who hold the postures of shadow puppets. As we've seen, shadow play performed with a string to symbolize the screen is a sacred form of Balinese puppetry, wayang lemah, and is performed only for gods, inside the temple, as a part of temple ceremonies. The electronic component in this work was a video projection of an eternal flame, displayed to the rear of the stage and used to create shadow effects. This Ron Jenkins and I Nyoman Catra presentation is highly stylized and artificial, which encourages focused contemplation on the symbolic values and themes of the play.

The mask dance included Balinese masked figures, the dragon-god Barong and the witch Rangda, which represent the ongoing struggle between good and evil. I Nyoman Catra played the puppeteer Caliban, and the role of Ariel was sung and danced by Desak Made Suatri Laksmi, who composed and adapted Shakespeare's lyrics to the Balinese music of sacred chant. The music was performed by the twenty-five members of the Balinese gamelan orchestra Dharmaswara of the Indonesian Consulate in New York, under the direction of I Nyoman Saptanayana.

Purwaning Bali (beginnings of Bali), I Wayan Mardika's wayang listrik from 2005 was performed at the Bali Arts Festival. , It used the traditional Balinese history story, Wayang Bebad. The screen was expanded to cinematic scale, with five dalangs manipulating the puppets and Wayan



Figure 76 I Wayan
Mardika, Purwaning
Bali, 2005

Mardika's narration. This work somewhat resembled Sidia's wayang listrik in its use of power-point slide projectors and electronic keyboard. Komang Ariawan, who played electronic keyboard, produced sound effects-signifying storms, thunder and other sounds of nature-adding another cinematic technique to wayang. The Slondeng Old Balinese orchestra with 13 musicians played contemporary work composed by Ketut Buda Astra, with singing by Eca PutriKarini.

The sounds effects are triggered by the keyboard in the scene where god gives revelations to Rsi Merkandya, which resembles a cinematic sound design.

Figure 77 I Wayan
Mardika, Purwaning
Bali, 2005



Figure 78 I Wayan
Mardika, Purwaning
Bali, 2005

The story follows Rsi Merkandya, a Javanese who hears the voice of God giving him light, in the form of fire with thunder, to direct him to a beautiful and prosperous mountain, Besakih. After his meditation he tells the villagers to go east. "We will settle there and start life anew in that fertile area."

About 8 000 people move to Bali with Rsi Merkandya. Once in Bali, people clear the lands, without the permission of

Djinn Satan, the master guardian of that area. After several trees are chopped down many people die. Wondering why so many people have died of sickness, or were eaten by wild animals, Rsi Merkandya goes back to Java to meditate. He returns with a new revelation, saying that he has to ask permission from the guardian, Djinn Satan, to open up a settlement.



Figure 79 I Wayan Mardika, Purwaning Bali, 2005, behind the screen.

The second time he travels east, along with 4,000 Javanese villagers, And before chopping up the trees, asks permission from the guardian of Mountain Agung. In a small ceremony he asks for safety in opening the land. People successfully settle and the place where they first arrived is named Besakih temple. He has one message: don't stop the ceremony here at Besakih temple, because if you stop the ceremony then Bali will meet its doomsday.

The purpose of this story, according to Mardika, is to address the fact that many people came to Bali from Java. The undertone suggests that the people who came to Bali did not take care of the forest, plants, animals and did not respect the people who already inhabited the island.

Conclusion

The contemporary tradition of wayang kulit and its intercultural re-invention point to ways in which the contextual compositional approach embedded in Balinese shadow play can be integrated with contemporary multimedia media performance. This transference is exemplified in contemporary experimental wayang

performances.

The ritual form of Balinese shadow play is articulated to provide a framework for understanding this tradition and its influences on my work, on the contemporary plays of American shadow masters Larry Reed and Maria Bodmann, on collaborative productions between Ron Jenkins and I Nyoman Catra, as well as on the Balinese contemporary electronic shadow plays of Made Sidia and Wayan Mardika. The examples of cross-cultural shadow plays discussed in this chapter extend the philosophy, technologies and materials of traditional Balinese shadow play. Their style employs cinematic ideas and utilizes spatial and temporal montage that allows the blending of bodies with shadows. This blending of puppets with performing bodies creates a new kind of improvisational, reflective, immediate and performed cinematic experience. These cross-cultural shadow plays represent a form of media performance extended by new technologies.

The examples discussed here combine cinematic projection, the performing bodies of dancers and the world of shadow puppets. While the examples of shadow plays staged in North America, even when based on Balinese tradition, do not recreate a particular religious context of traditional shadow play, they certainly provide a spiritual and contextualized experience by extending Balinese spiritual philosophy to the North American context. These hybrid productions reflect the space, time and context of our contemporary world. These experimental shadow play works, on the technical level, extend the tradition of Balinese wayang, but in a larger sense, these new creations employ

the holistic Balinese philosophy of integrating art with history, mythology, ancient wisdom and contemporary reflection.

The contemporary shadow play productions discussed here displace the notion of cinema and filmmaking (recorded media, a kind of projected, but temporally fixed shadow play) to the performance space, a kind of cinematic zone where shadows are allowed to bloom in an improvised context.

“Automaton is a mechanic being, an aesthetic, lucid object that contains its own principle of motion. Film is close to such an object, for it, too is an aesthetic and scientific toy whose seductive imaging contains its own principle of motion.”

Giuliana Bruno, 2002

Chapter 5: Genealogy of European Shadow Theater in the Context of Cinema

In order to get to the root of practices that gave birth to the interactive media image, one must travel back in time. The genealogy of interactive media lies beyond the origins of mechanical reproduction. Media performances and narratives can be found centuries before the mechanization of time images. Tracing the different aspects of the language of media back to the origins of media performance opens new paths to research. Markers within this shifting field are: ancient screen-based performances of projected light and shadow; the invention of cinema through various technologies of vision, including camera obscura, photography, and motion camera; technologies for projections of light such as magic lanterns, halogen lamps, film and video projectors; viewing boxes, and various kinds of scientific toys for capturing movement and optical games. The genealogy of Shadow Theater in the context of cinema practices is aimed at investigating the influences of various scientific discoveries and developments, particularly those that manipulate the representation of perceived space and time, and their effect on art practices in general and shadow play in particular. These complex relationships are

investigated with regard to the language of shadow play, multimedia, performance and Ninetieth century pro-cinematic cultural forms.

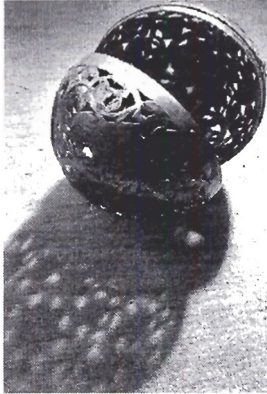


Figure 80 The Chinese perforated metal ball, 1967, (Used by Permission)

The filigree patterns on the ball are thrown upon the wall by means of alighted candle inside it which remains upright when the ball is rolled.

The theatres of projected shadows provided a seed that sprouted into the automated art of cinema through the spirit of the 19th century Euro-American culture carried from the Enlightenment area. The cinematic image is rooted in a directly inherited code of perspective, built on the scientific model of the Quattrocento. The fascination with realistic representations and illuminations of our world inspired many inventions and elaborations of technologies for making shadow projections of the reality. And those technological elaborations eventually led to the development of the moving camera, media projectors and cinema. Cinema machines captured and fixed shadows in time. The transformation of shadow-play performance into the automated art of cinema carried this art form from the embodied performative practice to a virtual reality of recorded moving image.

“[...] The visual culture of a computer age is cinematographic in its appearance, digital on the level of its material, and computational (i.e. software driven) in its logic” (Manovich 2002). In *The Language of New Media*, Manovich foregrounds the current dominance of software logic, but casts it in a historical context of visual and screen-based communication, approaching new media from the perspective of visual arts in general and cinema in particular. Computational media with its performative character call for the extension of cinematic concepts in the contexts of the real time embodied action. Cinema, as it has been popularly developed today, can be positioned as the art of automated

shadows, a mechanical double, whose automatic motion reproduces sensory emotions. The mechanical body of film unfolds as the imaginary world of virtual projections progresses through movement in time. Cinema borrowed magic and mystery from shadow theatre. Ancient shadow theatres of the East evoke the religious, mythical and supernatural, showing magical transformations and super-human endeavors. The audiences of shadow theatre and cinema alike engage in the emotional space of image by watching the action of figures formed in light and shadow on the two-dimensional surface of the screen. Shadow theatre shows in its essence the two basic principles of cinema: the principle of capturing moving images traced by light, and the principle of projection. In addition, shadow theatre integrates direct contact with the audience during the performance. The performative characteristics of interactive media art suggest revisiting the concepts of the shadow theater. This performative genre in its contemporary form is extended by developments of cinema and mechanical media to establish new kinds of cinematic theatres that integrate direct bodily exchange by means of live performance joined with mechanical media.



Figure 81 Chinese Puppet, The Monkey King, from Havoc in Heaven

Shadow Play

In Asia, shadow puppetry appears to have originated over 2000 years ago in China and perhaps India. From India and China, the art spread to Persia, Asia Minor, Egypt, North Africa and Europe and to Southeast Asia, achieving high popularity in Java and Bali, with distinctive Javanese and

Balinese styles of shadow-puppet design and performance. In most areas, including its ancestral home of India, shadow-puppet theatre had all but disappeared as a popular art form by the middle of the 20th century. Today, shadow theatre of Indonesia continues to play an important cultural and social role. The traditional shadow play of southern Thailand and adjacent parts of western Malaysia is very similar to Indonesian wayang kulit, but whereas shadow play in Java and Bali has remained a popular and vital art form, in Malaysia and Thailand the tradition has been in decline, as rural populations are drawn to the cities and village folkways give way to urban lifestyles. These diverse shadow-theatre traditions across the world developed their own distinctive character.



Figure 83 Malaysian Puppet, Siti Dewi (Sita), Ramayana

In various countries, at various times, shadow-play performances were presented in remote rural villages, urban streets and squares, or in the palaces of the royal court. Artisans and performers in India, China, Thailand, Cambodia, the Indonesian and Malay archipelagos, Egypt, Persia, Turkey, Greece, France, England, and central Europe adapted local story-telling, musical, and decorative art styles to the presentation of shadow plays. Shadow puppet shows were a popular and widespread form of art in the centuries before the development of recorded and broadcast media technology.

The repertory of shadow theater is mythical and mystical, showing magical transformations, super-human endeavors, histories, legends, folktales and incidents of everyday life. Traditional shadow puppetry uses flat leather figures, often ornately carved and painted in bright colors, made opaque or



Figure 83 Welcoming Procession for Javanese Wayang Puppets, donated to Simon Fraser University, Photo Kenneth Newby

transparent, with articulated joints. The puppets are positioned between a light source and a cloth screen and may be operated by rods from below, as in the Javanese theatres, by rods held at right angles to the screen, as in the Chinese and Greek theatres, or by threads concealed behind the figures, as in the European theatres. There may be one or many puppeteers, live music, dancers (the Nang Yai performed at royal cremations in Thailand featured the world's largest shadow puppets, wielded by a troupe of court dancers), and perhaps a separate narrator to the side or in front of the screen. The screen separates the audience from the puppeteers, although in Indonesia, wayang kulit audiences are free to watch the show from the performing side as well. In southern India, a weeklong performance of the Ramayana, involving the recitation of hundreds of thousands of lines of poetry, may take place with no audience present at all.

European Shadows

If the shadow-play show originated in Asia it would have spread to Europe from China by way of the Middle East. Known among Europeans as *magic of the East*, shadow play became very popular in the 17th century with the opening of trade with Asia. Excitement from contact with Eastern shadow arts inspired experimentation with projected light and shadow, which resulted in numerous technical innovations for projecting light.

Early shadow plays in Europe were called *Sombras Chinescas* in Spain, *Ombri Cinesi* in Italy, *Ombres Chinoises* in France, and *Chinese Shadows* in England. It is interesting that, apart from their names, nothing in these performances pointed to their oriental precursors. Some scholars suggest that European shadow play was influenced by Javanese tradition, with opaque puppets that cast black shadows (Rawlings 2003), and others suggest that shadow play came to Europe via Turkey (Mannoni at all 1995).

Silhouette art can be traced back to classical Greece and to the profile images of the Egyptian mausoleum wall paintings. Silhouettes had also been widely used on antique coins and medallions.

Silhouettes were very popular in Europe from the end of the seventeenth century into the early years of the nineteenth century. A life-size silhouette portrait would be taken from a subject's shadow. Later this portrait was reduced to smaller size using a pantograph, a mechanical scaling device. Artists would "take" a silhouette, rather than draw or cut it, in the same way the photograph is "taken."

This European fascination with silhouettes may explain the difference between the striking colors of Chinese shadow theatre and the opaque black figures of the European theatre.

Figure 84 J. F. Schenau, L' Origine de la peinture (Origin of Painting). Engraved by J. Ouvrier, 18th century, (Museo Nazionale del Sinema, Torino) (Used by Permission)



Figure 85 Silhouette Chair from a Dutch edition of Lavater's Physiognomy.

European shadow play distinguishes itself by taking great care that the source of puppet movement and the technology by which animation is achieved remains hidden from the audience. European artists invented elaborate systems of strings and wires fixed to the backs of the figures to move the puppets vertically from below. This provides a special



Figure 86 The early permanent shadow theatres of F.D. Seraphin in the Palais Royale, opened in 1784. Seraphin's Chinese Shadow Play: "Le Pont Casse" French woodcut about 1830.

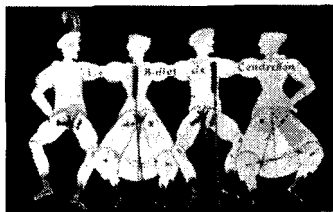


Figure 87 A group of Seraphin's puppets. (Used by Permission)

illusion for their audiences. Chinese artists placed no significance on whether the rods could be seen or not. Another difference between the European and Asian versions of shadow play is that in Europe the individual artist defined the character, quality and the narrative of the play, while in China (and the East), shadow shows were (and are) a part of continuous folk tradition.

In 1775 an Italian shadow showman called Amrogio, who modified his name to Ambroise, opened the earliest shadow theatre in western Europe. He gave elaborate performances in France and England, displaying various transformation scenes, such as a bridge broken into pieces and a shipwreck, complete with lighting and thunder. Seraphin Dominique Francois, who in 1771 played his first shadow shows to packed houses in Versailles, was a formidable rival for Ambroise. In 1784, Seraphin was honored by royal patronage and opened the very first permanent shadow theatre in Europe in a gallery of the Royal Palace. Seraphin's theatre established the classic repertory for the European shadow plays (Von Boehn 1972).

A century later, silhouette performances at the Cabaret du Chat Noir, a fashionable meeting place for the Parisian bohemia, contributed to a revival of the shadow show. Rodolpi Salis started the Chat Noir in 1881 and Henri Rivière started improvising with shadow shows in 1887. The avant-garde shows of Chat Noir developed more as participatory events that attracted artistic and literary audiences, because they provided means by which people could record and share their daily histories and voice their views on contemporary events through art and poetry. Henri Rivière,

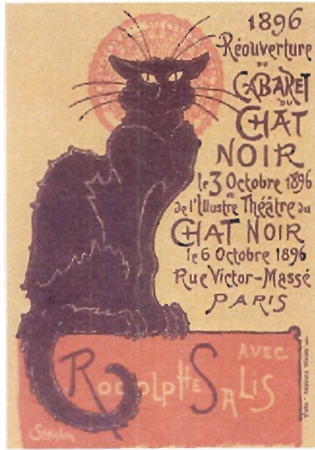


Figure 88 Postcard of 1896 announcing re-opening of the Chat Noir, rue Victor Masse, Paris. (Used by Permission)

Caran d'Aches and Amede Vignola produced masterpieces of pre-cinematic animation. This work extended a theatre of animated figures to tableaux, with complex lighting effects, which involved a whole team of technicians and operators. These tableaux depicted songs and poems by contemporary avant-garde artists of the day. artists of the day.

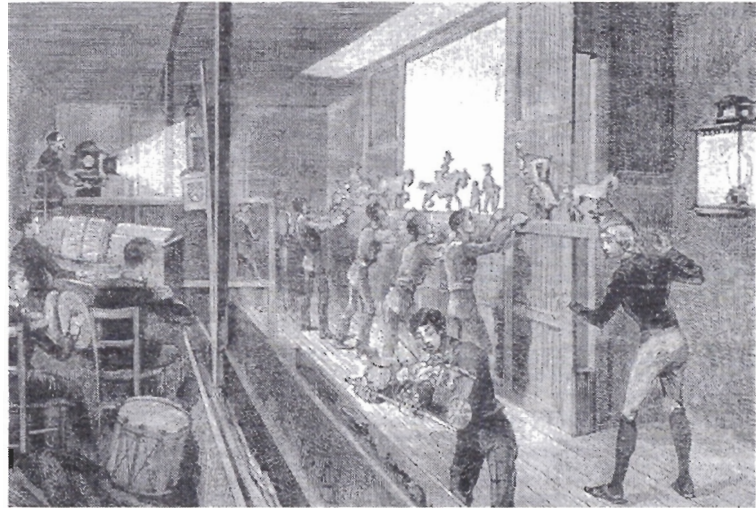
Henri Rivière was the guiding spirit of the *Cabaret du Chat Noir* and the most famous innovator of shadow plays. Rivière developed his shows with the help of many collaborators, building remarkable spectacles combining words and images, color effects, textures, sound and movement. He supplemented zinc cut-out figures and scenery with multiple-plane scenography. The latter consisted of glass panels painted with transparent colours and illuminated by double-optical lantern. This elaborate system allowed Rivière to play with perspective, and arrange shadow puppets of figures, animals and landscapes to suggest regression in space.



Shadow shows as popular theatre spread across Europe (Italy, France, England, Germany, Austria, Czech Republic, Russia, Greece, and Turkey), and gave birth to numerous theatrical productions, popular entertainments and scientific toys, from which eventually evolved the mechanical apparatus of cinema.

Figure 89 Henri Rivière, *The Devil and St. Anthony*, 1887-90, Zinc cutout, *La Tentation de Saint Antoine*. Jane Voorhees Zimmerli Art Museum, Rutgers, The State University of New Jersey, Photo by Jack Abraham, (Used by Permission)

Figure 90 Behind the screen at the Chat Noir cabaret, 1890. The illustration shows multiple puppet masters, musical accompaniment, the team of operators and the zinc silhouette figures. (Used by Permission)



Magic Lantern

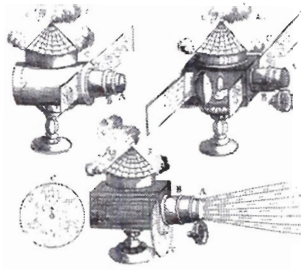


Figure 91 Magic lanterns and slides described and illustrated by Johannes Zahn in *Oculus artificialis teledioptricus sive telescopium*, 2d ed Nuremberg, 1702. (Bibliothèque nationale, Paris) (Used by Permission)

Europeans' fascination with the art of shadows inspired the developments of technologies for projecting light. The Jesuit priest, Athanasius Kircher, extended the creative terrain of Della Porta and his imaginative technologies, and devised multi-media experiments in optical and acoustic automation.

In *Ars Magna Lucis et Umbrae*, he describes a magic-lantern mechanism with a flat painted mirror and lens mounted on a wooden support, and illuminated by sunlight, that permits the projection of non-inverted images on the wall of a dark room. Kircher's investigations into light and shadow turned into art projections. His version of magic-lantern spectacle came to represent shadow as the body of the dead and the body beyond death (Kircher 1671).

The theme of death commonly inhabited the space of magic-lantern projections. Christiaan Huygens' first animated slides represented ten skeleton figures, based on Holbein's *Dance of Death* (1659), which have survived only in the form of a drawing captioned, "for representation by means of convex glasses with the lamp."

Figure 92 Athanasius Kircher, *Ars Magna Lucis et Umbrae*, Amsterdam, 1671: excerpts from (pagin tratte da) extraits de *Magia catoptrica; Cryptologia nova*. (Museo Nazionale del Cinema Torino). (Used by Permission)

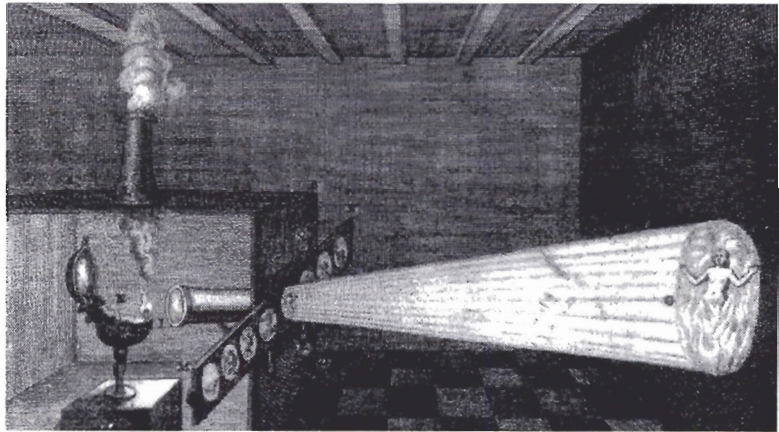
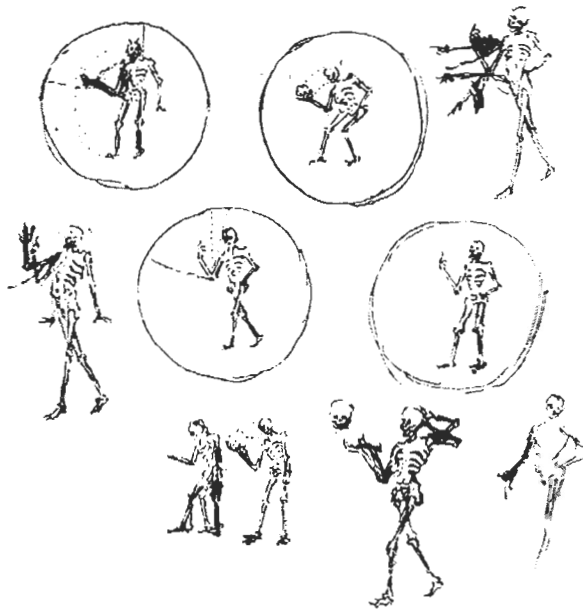


Figure 93 *Dance of Death*, Drawing of skeleton by Christiaan Huygens, Hague 1659. "for representation by means of convex glasses with the lamp" Ms Hug. 10, f 76 v (University bibliotek Leiden) Source Light and Movement. 1995. Laurent Mannoni, Donata P Campagioni, (Used by Permission)



This invention caused wonder in those who witnessed the exhibitions. They believed the images, especially the representations of the supernatural, were created by the hand of a magician.

¹ Magic lanterns are an equivalent of today's slide projectors. It consists of the lamp, reflector, condensing lens, lens tube, body, base, and smokestack. The lamp is the source of light, which often came from burning oil or gas. The reflector reflects the light from the lamp toward the condensing lens, which focuses the light onto the slide being projected. The lens tube serves to magnify the illuminated slide, so that large-scale images could be projected. The shapes of the slides were different than the ones we use today. Magic lantern slides came in strips of large pieces of glass held together with metal or wood and they often included mechanical parts that allowed movement and animation of one or more slides within the projector.

The Magic Lantern¹ was conceived as an optical instrument and as such continued to be developed through scientific study and experimentation. In this way, along with the camera obscura, it became a permanent element in physics laboratories of the time. Throughout the 17th and 18th centuries both the screen and the audience grew larger, and large-scale entertainment was made possible by the development of more powerful lamps. The magic lantern was recognized right away as a powerful tool for entertainment, destined to grow and spread rapidly.

Robertson's Phantasmagoria performances contributed largely to the popularity of the magic lantern.

Phantasmagoria was initiated by Paul Philidor in 1798, but made popular by E'tienne Gaspard Robert, who called himself Robertson. Robertson's horror spectacles of demonic and ghostly images sought to create a breathtaking effect on audiences. Following the French revolution in 1798, Phantasmagoria spectacles enjoyed popularity through to the end of the 19th century. Slides replaced the use of shadow puppets. The audience was presented with images projected from behind the screen and the showmen heightened the sense of mystery by hiding the complex apparatus of the fantoscope behind the screen.

The effect of Robertson's entertainment was enhanced by its

setting in the abandoned chapel of a Capuchin monastery near the Palace Vendome.

Figure 94 The impressions of the Phantasmagoria show dating from 1798. The apparitions and specters were made to advance or withdraw by means of lenses and concave reflectors. This show can be considered an early media performance. (Used by Permission)



Phantasmagoria performances opened this pro-cinematic spectacle up to the third dimension, thus permitting apparitions to exist in our own world to powerful effect. The lantern, moved back and forth along rails, distributed into the space of the semi-transparent screen the effect of shadows and figures flying along halls. The projection would seem to grow, creating the illusion that the magical figures of goblins and skeletons were moving toward the audience. Some images were projected on smoke, which would further contribute to a sense of the mysterious. These performances were staged using several lanterns and a group of showman, all hidden behind the large-scale screen.

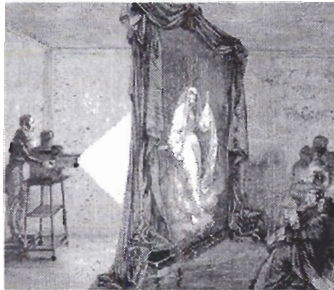


Figure 95 The Phantasmagoria, engraving from *Le Magasin Pittoresque*, 1845. (Used by Permission)

Performers sometimes combined multiple projectors and rapidly changed slides, with musical accompaniment to create popular spectacles.

The magic lantern artists extended the strategies for hiding

their equipment and creating magical and mysterious effects by distributing shadow projections in the three dimensional space — phantasmagoria performances present a form of immersive environment. We associate virtual-reality worlds with computer simulation and think of them as contemporary phenomena. Yet the roots of virtual reality go back to the first shadow-play performances and the extraordinary spectacles of magic-lantern shows. These immersive environments present a space where human beings and illusionary beings can interact — where live actors interact with projected characters that are distributed in the space.

In 1849, the American photographers Wilhelm and Langheim began to issue photographic slides, and the mass production and industrial development finally began to gain importance in the world of magic lanterns. Magic Lantern reached its peak of popularity by the end of the 19th century and was presented in schools, halls, theatres, churches, and homes, as a regular part of home and public entertainment. Magic lantern slides accompanied lectures on moral, religious, and scientific subjects, world events, geographical expeditions, and tours of exotic lands. The illusion is created of the speaker standing in front of the subject he addresses. The interaction of the image and the physical body of the lecturer prefigures the modern interface of virtual reality. Magic-lantern spectacles enable performers and presenters to interact with the virtual image constructed by the projected shadows. The invention of photographic slides allowed images of the world to be re-presented and communicated in a new way by means of magic-lantern projections. The influence of the photographic image on graphic art in general

was immense.

“Make a hole pointing toward the part of the sky in which the eclipse of the sun appears, in the roof of the closed house or in the window, and make it the same size as the hole made in a barrel in order to extract the wine. When the sunlight comes through this hole. Place something flat for instance a board at distance of twenty or thirty feet and you will see the light present itself on a board in a round shape, even though the hole be angled”
Guillaume de Saint-Cloud, A
Imanac 1290 (Mannoni at all 1995: 40)

Artificial Eye

Photography as a form of pictorial art makes extensive use of the Renaissance conception of human vision as it was still understood at the time of photography’s invention in the early nineteenth century. This means that it follows certain procedural rules, such as linear perspective, which provides the solution to the problem of representing three-dimensional objects on a two-dimensional surface. Visual principles and insights into the visual process were discovered from the many experiments that artists and architects made in carrying out their craft.

The camera obscura is an apparatus that enables the projection of solid objects onto a two-dimensional surface. The camera obscura as an artificial eye provides a blank screen — the dark chamber onto which the exterior is projected. It is a simple pinhole aperture, with no optical parts, through which light can pass to be projected onto a surface. The basic phenomenon of the camera obscura has been known since ancient times. A rudimentary form of the instrument was described by Ibn al-Haytham (ca. 965 – 1039). It was referred to by Aristotle in his *Problemata* (350 BC), and has long been exploited for viewing eclipses of the sun. Beginning in the 15th century Renaissance, its magical power to reproduce the images of life around us has been emphasized. Leonardo da Vinci (1452-1519) describes the camera obscura as an illuminated object, which penetrates

through some kind of round opening into a very dark habitation. Da Vinci regarded the camera obscura as an "artificial eye," making an analogy to the aperture of the pupil an attempt to understand human eyesight. He was troubled by the fact that the image in the camera obscura was inverted. In his notebooks he suggests that this occurred also in the human eye. In order to account for the fact that human beings see objects the correct way up, da Vinci put forward a suggestion that the eye had several lenses to re-invert the image (da Vinci 2004).

The camera obscura further inspired many studies with regard to its technical aspects. Scientific investigations that introduced the use of various optical devices continued to influence the practice of pictorial art. A larger aperture could function when combined with a convex lens to produce brighter projections of images focused on a screen. This discovery significantly influenced the artistic aim to realistically capture our world. Daniel Barbaro, in *La Practica Della Perspectiva* from 1559, describes how painters, sculptors and architects achieve accurate representations of reality simply by taking the projected shadow of the world by means of the camera obscura (Mannoni et al 1995). To achieve maximum results and a sharp image, one needs to insert "an old man's eye glasses" in the hole and place the sheet of paper at a certain distance from the lens (Barbaro 1559). The artist would "capture" the image in the same way the photograph is taken by camera.

Giovan Battista Della Porta, an Italian philosopher and scientist, wrote on the subject of optics, geometry, alchemy and natural philosophy. In *Magiae Naturalis*, 1558 and 1559,

he describes the use of a concave mirror to produce images with the camera obscura that are bigger and not inverted (Della Porta 1558). In his accounts Della Porta dreamed the cinema mis en scene and contributed to the great popularity of the camera obscura. He describes "how you may see hunting, battles of enemies and other delusions," transforming the camera obscura chamber into a shadow-play machine.



Figure 96 Drawing inside the camera obscura, manufactured by Compagnia Italiana Liebig. Card color print. Milan, Italy, c.1930. (Used by Permission)

" Let there be over against that Chamber, where you desire to represent these things, some spacious Plain, where the Sun can freely shine: Upon that you shall set Trees in Order, also Woods, Mountains, Rivers, and Animals, that are really so, or made by Art, of Wood, or some other matter. You must frame little children in them, as we use to bring them in when Comedies are Acted: and you must couterfeit Stags, Bores, Rhinocereses, Elephants, Lions, and what other creatures you please: Then by degrees they must appear, as coming out of their dens, upon the Plain: The Hunter he must come with his hunting Pole, Nets, Arrows, and other necessities, that may represent hunting: Let there be Horns, Cornets, Trumpets founded: those that are in the Chamber shall see Trees, Animals, Hunters Faces, and all the rest so plainly, that they cannot tell whether be true or delusions: Sword drawn will glitter in at the hole, that they will make people almost afraid. I have often showed this kind of Spectacle to my friends, who much admire it, and took pleasure to see such a deceit; and I could hardly by natural reasons, and reasons from the Opticks remove them from their opinion, when I had discovered the secret. Hence it may appear to Philosophers, and those that study optics, how vision is made" (Della Porta 1558: 364)

Della Porta describes the camera obscura as an optical device "picturing" the narrative space with moving scenes that unfold to tell a story (Della Porta 1558). His account transforms the camera from a mere representational device into a tool that reveals the space of imagination and narrative fiction through the shadows projected into a dark chamber. For the audience sitting in front of the white projection screen

in the dark Chamber, the performance involves an interplay of light and shadow with acting, set design and music. In Della Porta's account, the camera obscura becomes a movie camera.

When astronomer Johannes Kepler provided an account of how light passed through the transparent structures of the eye to form a focused image on the retina, the analogy of the eye with a camera, containing a lens, could be exploited fully. Kepler's incorporation of a lens into the camera obscura led him to this discovery and enabled him to understand and articulate how the human eye works. He described the correspondence between the camera obscura and the eye, the upside-down image formed on the retina, and took the comparison further than had da Vinci in identifying the role of the lens and retina.

Kepler also invented a portable tent form of the camera obscura. In the early 1600s, Kepler gave the camera obscura its name. Latin camera means a room, or chamber, and obscura means dark (Kepler 1604). The origin of the word camera imprinted its meaning in the space of the cinema apparatus. The cinema becomes a room inhabited by moving shadows, a chamber of imagination.

The scope of visual art and visual science was extended by the application of many novel devices, particularly those invented in the early nineteenth century. When Joseph Nicéphore Niépce combined the camera obscura with photosensitive paper in 1816, or Louis-Jacques-Mandé Daguerre combined the lens-camera with light sensitive metal plates in the 1837, or when chemically coated paper by

William Henry Fox Talbot was invented between 1834 and 1850, their influences on art were immense (Newhall, 1986; Weaver, 1986). Although camera obscura with lenses had long been known, fixed images formed within them was a revolutionary novelty. This period was also distinguished for the invention of a variety of instruments that could assist both artists' and scientists' purposes. The photographic camera, as an artificial eye, enabled artists to capture scenes in perspective with relative ease, whereas scientists could consider the eye as a similar optical instrument.



Figure 97
Chronozyklography, in
Rene Fueleop Miller. *Das
Gesicht des
Bolsschewismus*. Zurich
Vienna – Leipzig 1926.
(Used by Permission)

Philosophical Instruments

The moving picture depends on a physiological phenomenon known as persistence of vision. The simple demonstration of this is the effect produced when a light point is rapidly moved in a dark space, producing the illusion of a continuous line. Technically speaking, the cinema owes its development to a variety of philosophical toys based on this phenomenon. Persistence of vision forms the basis for creating the magic of continuous movement by means of representing the succession of frames.

In 1824 John Ayrton Paris, with his thaumatrope, discovered the very first demonstration that evokes this miraculous impression. Two strings are attached to opposite sides of a paper disk; when a person pulls the strings, the disk rotates and images from each side of the disk merge into one image. Afterimage is the engine embedded in this mechanism; it



Figure 98 Thaumatrope
by John Ayrton Paris,
1926 (Used by
Permission)

represents a form of virtual reality in that it builds upon the discovery that we see things that are not there.



Figure 99 "The Stroboscope no. 2 by Professor Stampfer",
English edition of the original published by Trentsensky &
Vieweg, Vienna. (Used by Permission)

Belgian physicist Joseph Antonie Ferdinand Joseph Plateau invented the phenakistoscope in 1833; at the same time, yet independently, Simon Stampfer of Vienna produced a similar toy, the stroboscope. These inventions combined the principle demonstrated in the thaumatrope, with Peter Mark Roget's research on the illusion observed when spokes of rotating wheels appear stationary when viewed through the gaps in a series of vertical bars. Roget realized that this illusion was produced by the phenomenon that visual impression persists.



Figure 100
Phenakistoscope by
Joseph Plateau, 1833,
(Used by Permission)

William George Horner invented the Zoetrope in 1834. Another scientific toy based on the persistence of vision, it consists of 13 slots for 13 pictures that spin round in a metal cylinder to simulate the movement of a figure that could be viewed by several people at once.

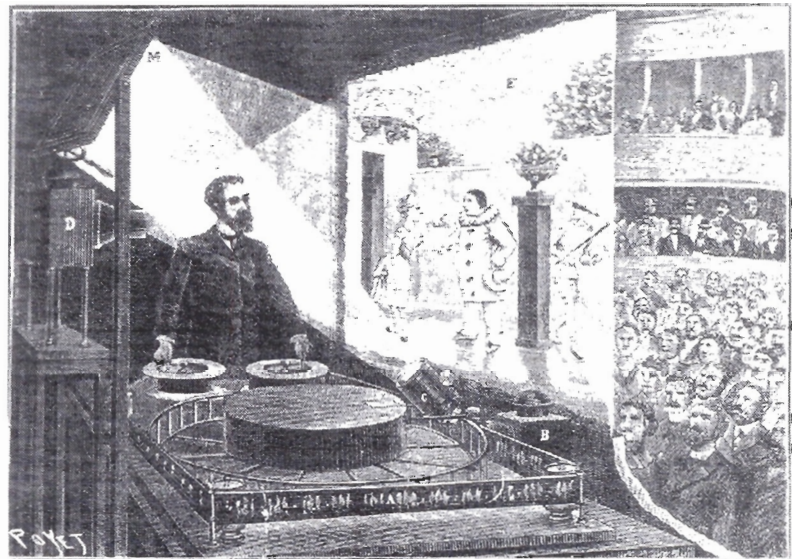


Figure 101 The Zoetrope, is another toy based on the principle of persistence of vision, was invented by W.G.Horner of Bristol in 1834. (Used by Permission)

Further development of moving images was for a short while held up by the idea of these animated toys. In 1877, Professor Emile Reynaud refined the Zoetrope to create a device called the Praxinoscope. Here the slots were eliminated and replaced by rectangular mirrors set round an inner drum to reflect the circling images. Movement exhibited with the Praxinoscope was much smoother and less dazzling than that shown by the Zoetrope. Reynaud went on to invent the projecting praxinoscope and the theatre optique.

With the invention of the series of scientific toys and the ability to fix on a sensitized copper plate the images captured by camera obscura part of the cinema dream was already realized. But this dream needed to be realized further. In 1871 Richard Leach Maddox of England created instant photography with gelatine-silver bromide plates.

Figure 102 "Le theatre Optique" Published in La Nature, 25 July. Reynaud painted the images on transparent perforated celluloid and used rear projection with apparatus concealed behind the screen. He realized the supreme attraction of the narrative film and accompanied his pictures with specially written music and synchronized sound effects. (Used by Permission)



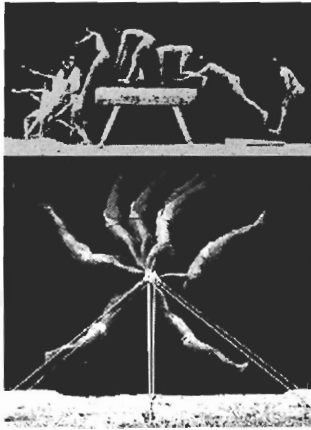


Figure 105 Leaping over gymnasium horse; Seven stages of giant swing; Étienne-Jules Marey, Chronophotography, Scientific American, The Human body in Action February 1914, (Used by Permission)

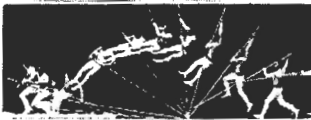


Figure 106 Étienne-Jules Marey, "La Chronophotographie", November 1891, (Used by Permission)

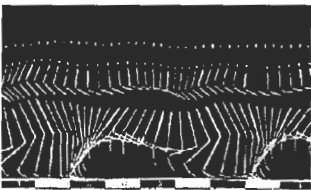


Figure 107 Étienne-Jules Marey, "La Chronophotographie", November 1891, (Used by Permission)



Figure 103 Eadweard Muybridge, projected photographic sequences of animals in motion in 1880 by means of his Zoopraxiscope. Muybridge's photographic sequences of a cat. (Used by Permission)



Figure 104 In 1886 Eadweard Muybridge began to take photographs of human beings. Muybridge's photographic sequences of a woman dancing. (Used by Permission)

This invention allowed Eadweard Muybridge and Étienne-Jules Marey to study the dynamics of biological motion by means of sequenced photographs. Eadweard Muybridge's extensive studies of human and animal motion, and his work with serial photography, led him to the invention of the Zoopraxiscope—a motion picture apparatus that recreated movement by displaying individual photographs in fast progression. Muybridge's Zoopraxiscope is a modification of Plateau's phenakistoscope that enables viewing of the sequences of photographs, so that they could be projected via magic lantern onto a screen.

In 1878, Muybridge recorded the first sequence of 12

photographs that represented a half second of motion of the horse 'Abe Edgington.' Inspired by Muybridge's work, Etienne-Jules Marey explored high-speed gesture and movement, produced chronophotographic sequence cameras, and demonstrated the principles which formed the basis of cinematography. The serial photography of Muybridge and Marey, Goodwin's development of celluloid emulsions, Dickson's invention of the film camera, along with numerous other efforts, reflected the spirit of the 19th century—the desire to create a machine that can insert life into the still image.

Edison's Kinetoscope was the first device to use 35mm film—but moving pictures still could only be viewed by one person at a time. People paid to peep into a black box and watch sixteen seconds of film. The Lumiere brothers, Auguste and Louis, had the vision of projecting animated scenes and people in movement onto a screen. They produced the cinematographe, which was both camera and projector. Their first movie was of workers leaving the Lumiere factory, and the first cinema show, with the presentation of their Lumiere Cinematographe, was to a paying audience at the Grand Cafe in Paris on 28th December 1895. This year marked the automation of image in time.

Cinematic Image and Reality

"The cinema is an idealist phenomenon. The idea of it existed already set up in men's minds as in some platonic heaven. What strikes us most of all is the obstinate resistance of matter to the idea, rather than any stimulus from the technical field to the imagination of the pioneer. Moreover, the cinema owes virtually nothing to the scientific mind. Its fathers are not scientists (with the exception of Marey, but significantly he was only interested in the analysis of movement, not in the inverse process of its reconstitution). Even Edison was basically no more than a do-it-yourself genius: a giant in the Inventors' Competition. Niepce, Muybridge, Leroy, Demeny, Louis Lumière himself were monomaniacs, reckless dabblers and improvisers, or at best ingenious industrialists.... A real understanding of the discovery of cinema cannot be arrived at by way of the technical discoveries which made it possible." From "The Myth of Total Cinema" (1946): André Bazin on the origins of cinema

Drawing on theorists like Bazin, Bordwell, and Comolli, Lev Manovich (Manovich 2002) transposes and adapts cinema theory on realism to new media. In his account he distinguishes between technology and style. When speaking of technological development, the history of realism is one of addition. "Each new technological development (sound, panchromatic stock, color) points out to viewers just how "unrealistic" the previous image was and also reminds them that the present image, even though more realistic, will also be superseded in the future—thus constantly sustaining the state of disavowal" (Manovich 2002). In other words, Manovich proposes that the ideology of visual technology is asymptotic, an infinite progression towards a goal of reaching objective reality. For Manovich the roots of the representation in new media are to be found in the cinema

representation in new media are to be found in the cinema machine extended to computation, which together represents a nominator for the sum of all available techniques for coding visual information.

There is a common question that both the cinema and computational media continuously pose: what is the relationship of image production to reality? Manovich suggests that these technological forms are granted existence through a quest for objective representation. But we can separate this quest for objective representation that aims at realistic image from the quest for representing subjective reality embedded in the image. These two opposing tendencies can be traced throughout the entire history of pictorial art. To achieve goals unique to its character, the cinematic image faces and employs certain graphical questions, which have continuously been posed and solved throughout the history of pictorial art, but in its own way. The static character of pictorial art and the fact that the cinematic image is a moving image, does not separate cinema from pictorial art, since film in its own way deals with the static image, while graphic image also deals with movement. Since the cinematic image is pictorial in its character, it inevitably meets the same questions that were explored by graphic arts; and vice versa, cinematic solutions to these questions inevitably influence contemporary pictorial art.

The pictorial realization of space on several occasions throughout history completely changed its character, facing itself over the centuries with two utterly opposite ends: objective realizations and subjective conceptions of image. Each time after the long research into representation of space

reaches its realistic values, the structure of the image is destroyed in the name of new subjective compositional principles.

An example of such a struggle between illusionistic and non-illusionistic goals is between Roman and early Christian art. Since the first realizations of the objective representation of the third dimension during the fifth century B.C., Antiquity persistently defended a realistic conception of the image, which was developed in Roman painting to its ultimate illusionary dimensions. However, the penetration of new conceptions introduced by early Christian art disturbed the balance of the image structure developed by Antiquity by introducing new relations between people and space. Antiquity, in the realm of painted composition, was directed towards the realization of the visible world. Christianity, to the contrary, was committed to establishing the independence of the painterly act in relation to nature. For this reason the principles of this aesthetic develop primarily elements that are the most responsible for the objectification of painted content (Stojakovic 1970). Christian art is no longer interested in a realistically optical structure of the image; rather it is concerned with the symbolic whole, which is lifted above profane objects. The architectural structure of the image gains a new function.

Concern with perspective during the Renaissance became a general phenomenon; hence that period produced a number of written accounts that theoretically investigate this question. In the Renaissance objective scientific research suppressed the subjective and intuitive. And it was this scientific spirit and research that eventually produced the

camera, photography and the cinematic image — in technical terms products of a way of representing the world by means of linear perspective.

The scientific and technological progress of the nineteenth century, along with the developments of various structures of photographic representations, initiated a new struggle between illusionistic objectivism and subjectivism in imaging. The well-established academic structures for pictorial representations were based on the knowledge of linear perspective. But modern art destroyed the realistically/illusionary structure of the image constructed with the rules of perspective. The academically conceived structure of pictorial representation solved by the principle of perspective includes two factors: space that provides fixed interrelationships of shapes, and time reduced to a single moment. If we change either of these two factors, the image reveals itself as subjective in character and is no longer objective. The work of art leaves the impression of the image as constructed outside of the temporal and spatial character of the natural world. Impressionism and fauvism, for example, eliminate the third dimension, while the other elements are left within the realm of natural representation, so the image perseveres in the sphere of human vision. The eye of the observer maintains its fixed position, while the relationship of rendered shapes, even though stripped of the third dimension, remain within the borders of realistic representation.

The major turnaround in the conception of the image was brought about by Cubism and Futurism. Cubism poses and solves the problem of the structure of the image by

reintroducing volume, but in no way does it treat the objectively understood third dimension, which would bring this artistic quest back to classical academic conceptions of space. For that reason it accepts geometrization and re-composition of shapes achieved by the movement of eye position.

Cubism leaves objects in space in a static position while the observer is given freedom of movement so that these objects are viewed from all sides; in the natural world it is impossible to view an object from different perspectives simultaneously. In contrast, futurism leaves the observer in a static position, while the objects are free to move in the space. In this way, instead of one moment represented by the means of perspective, multiple moments and moving shapes are rendered within an image.

Concurrently with these subjectivist experiments in modern painting, early cinema witnessed a struggle between objectivist and subjectivist understandings of the image. The tendency towards the "objective" representation of reality is clearly exemplified in the very first public screening of Auguste and Louis Lumière (December 28, 1895) and their depiction of scenes from everyday life. The early films of Georges Méliès, however, demonstrate the immediate counter-path for the development of cinema. While Auguste and Louis Lumière were capturing reality as it reveals itself through daily encounters, Méliès was concerned with constructing the subjective reality of the image. These parallel paths, positioned at utterly opposite ends, develop continuously throughout the history of cinema, as they have through the entire history of pictorial art.

These two distinct and opposing approaches to the representational structure of cinematic image, one that is seeking an objective realistic image and the other that is seeking the reality of a constructed image, have been characteristic markers of the European cinema. Pascal Bonitzer (1998) points to another parallel development of the structure of cinematic image, characteristic of North American film and particularly exemplified in Hollywood productions. This structure reveals a new balance between reality and image — the cinematic image is highly constructed, but represented as a reality itself. This tendency, Bonitzer (1998) characterizes as hyperrealist cinema, which signifies the transformation of the American dream into a reality of the image and that image into a reality itself. The entire American school of special effects, today present in film industry as well as the game industry, evolved to serve and enable this hyperrealist image.

These differences in understanding and positioning of the structure of cinematic image reflect not only aesthetic but also ideological differences. The discussion on the ideological nature of cinematic illusionism marked cinema theory of the 1970s. The critique of illusionism is represented, for example, in Pleyne's (1970) thesis that the photographic camera is an ideological apparatus, because it produces a kind of perspective that is inherited from the Renaissance. Pleyne's view positions film technique as the product of ideology and therefore as machinery that is not politically neutral. The camera image is constructed according to the formula based on scientific laws of perspective established during the Renaissance. The camera does not record what it sees: rather

it constructs a spatial and temporal configuration to conform to a particular way of seeing. The industry of film is made up of specialists trained to create the effect of the camera as a transparent device in the generation of cinematic narratives. The antithesis to this view was articulated by Jean-Patrick Lebel (1971), who argued that the camera, as a scientific instrument, is ideologically neutral.

The terms used in this debate are somewhat outmoded today. The understanding of the reality of the subjective and objective structure of the cinematic image today goes far beyond the debate of the ideological and non-ideological properties of camera apparatus. But this debate points to an important philosophical question that every artistic image continues to pose — that is the question of image production in relation to reality.

The question here is whether the camera produces the kind of perspective observed by Renaissance artists, or produces a system of visual observation that corresponds to natural human vision. The problematic outlined here points to the fact that the artificial eye of a camera is an analogue to natural vision. If the laws of perspective established in the Quattrocento could be called scientific, it is because they mathematically articulate the conditions according to which natural observations emerge by means of the visual sense. The premise that the camera reproduces conditions according to the natural way of seeing does not mean that it objectively represents the reality it records. The natural perception by means of the visual sense is structurally conditioned by optical illusion, and therefore the representation based on the way visual sense operates is conditioned by recreating optical

tricks and illusionary effects. And contrariwise, as shown through the entire history of painting, an image may represent objective reality without the reproduction of the space and reality in the way the human eye observes it. Scientific recording devices, such as X-ray, magnetic resonance imaging or ultra sound, best exemplify this phenomenon. Even though these representations are abstract and do not reproduce spatial reality as seen by people, these images are objective.

This points to the fact that even though the camera reproduces a certain perspective, the cinematic screen may serve to represent abstract and non-figurative elements that can have a dramatic role in narrative cinema, or a purely pictorial function. A well-known and consistent example of an alternative to perspectival illusionism in cinema is in the writings and films of American experimentalist Stan Brakhage. Brakhage's works characterize the direction of subjective, personal, and visionary cinema that treats the camera as an epic character. Brakhage as an expressionist filmmaker is concerned with utilizing subjective means towards expressing a personal vision (Grauer 1998).

"Imagine an eye unruled by manmade laws of perspective, an eye unprejudiced by compositional logic, an eye which does not respond to the name of everything but which must know each object encountered in life through an adventure of perception. How many colors are there in a field of grass to the crawling baby unaware of "Green?" How many rainbows can light create for the untutored eye? Stan Brakhage (1963)

Brakhage (1963) recommends "remedies" designed to wrench

the apparatus free from perspective and its attendant rigidities: spitting on the lens, throwing it out of focus, speeding up or slowing down the shutter, hand-holding, over or under exposing the celluloid.

Cinematic Image and Shadow Play

Cinema and shadow play share many characteristics. Both art forms are multi-dimensional in that they combine a variety of media-narrative elements, poetry, sound, music and visuals — in a time-based composition. The cinema is essentially a technologically sophisticated, but temporally fixed, shadow play — the shadow of our world is captured on film stock and later projected onto a screen through a linear succession of film frames.

The structuring of space, place, situation, scale, illumination, and characterization — the forming of human experience— occupies every composition that unfolds in time. In cinema time flows forwards and backwards; it can speed up and slow down. The time that has already passed can be represented in the form of a flashback; the time that has not yet come can be represented in anticipation through foreshadowing. The time of a dream can intersect with reality.

The cinematic image uses a two-dimensional surface that acts as an imaginary window where the participatory attention of the audience is directed. The images, icons, together with text

and music, interwoven into an emotional tension, are the linguistic elements of film. True engagement within a conceptual space is achieved by life and its extremes that unfold in time. The image that unfolds in time is a multifaceted and ephemeral concept and has an important symbolic dimension because it is able to signify in our relationship with the natural world. The time image as articulated by Tarkovsky (Tarkovsky 1986) is the relationship between idea and form, an organic linking of observations tied together by camera movements in time. Objects, space and characters are revealed by the camera through rhythmic movement in time.

The element of time also plays a key role in the action performed by a puppeteer, but in shadow-play performance time unfolds through the embodied presence of the performer. The image is developed, unfolded, completed and changed continuously in real time during the performance. The audience participates in the formation, transformation and disappearance of the performed image. Images and situations have a potential to be developed with the spectators' responses included in the play. The puppeteer can observe and evaluate the effect of the performance and accordingly improvise and modify the performance. The dynamic process of immediate interrelation between actor and spectator adds a new dimension to the element of time. Flexible time becomes a dramatic medium.

The pictorial character of a shadow play presents many opportunities for representing space. In shadow performance, objects can affect perspective depending on their distance from the light source. The closer the puppet is

to the light source the larger the area of the screen it occupies. In this way the same object can appear in different scales within the same scene.

The relationship of the cinematic image to that of a shadow play is explored here in two ways. Firstly, through discussion of the application of shadow play animation techniques to cinematic image, exemplified through the work of Lotte Reiniger. And secondly, through the discussion of work that employs cinematic image combined with embodied performance on the stage, which is comparable to that of shadow play, but explicitly drawn from the early history of Magic —Lantern shows. This intersection of cinema image and embodied performance is exemplified in the work of Burian, Kouril, Svoboda and Radok. The form of media performance that emerged with shadow play and Magic-Lantern shows continued to be explored with the complex apparatus of cinematic projection.

It is not surprising that very early on the shadow play found its way back into the motion picture. In Germany, a number of early films brought shadow plays to cinema, beginning in 1916 with "Die Schöne Prinzessin von China" ("The Beautiful Chinese Princess"), directed by Rochus Gliese, with Lotte Reiniger's costumes. This live-action silhouette film, with its extraordinary sets and special effects design, and with actors only seen as shadows, created a silhouette cinema. German expressionist film, for example Robison's 1923 *Warning shadows* (*Schatten*), used shadows to excite mystery and horror in audiences.

In cinema's first feature-length animation, Lotte Reiniger,

Karl Koch, Walter Ruttmann and Berthold Bartoch attempted to unite traditional shadow play with the new shadow play of film. "The Adventures of Prince Achmed," from 1926, was a stop-motion animation of a shadow-puppet play created from elaborately cut, multi-jointed paper silhouettes, which used very complex scenography and over 100,000 images. For this film, Reiniger did not perform her shadow-play animation in front of the audience but rather frame by frame underneath the movie camera. She developed an elaborate animation technique using layers of glass for several planes of foreground, middle ground and background that were simultaneously animated. This arrangement echoes Riviere's multiple-plane scenography for his shadow play. Figures, lights, transparencies and sand were animated across all layers of glass. In this kind of work, animators depend on their own memory of the movement flow, because the material does not carry the memory of what happened in previous frames-unlike the techniques of animation drawn on paper. This performance, slowly progressing frame-by-frame, took almost three years to complete. Animated shadow play, produced in this way is fixed by the recording medium of cinema. Reiniger draws from shadow play a puppet-based technique for animation. She also performed with her shadow-play characters. Her work is significant in that it pioneered these techniques in the context of cinematic animation.



Figure 129 Extended performance of Lotte Reiniger,

³ Edgar Bergen and his wise-cracking ventriloquist's dummy Charlie McCarthy made their radio debut on "Rudy Vallee's Royal Gelatin Hour" in 1936 and were an instant hit.

Early television, and even radio programs, promoted a number of 'puppet TV stars', ³ whose media appearances drew audience attention, and their popularity helped promote a recovery of live theatrical puppet performance across Euro-American cultures. Lotte Reiniger's series of

fairy-tale films were often seen on English and American TV screens in the 1960s. Her productions kept the shadow play form alive through the medium of animated film for children. Inspired by the potential represented in productions such as Reiniger's, and reacting to the loss of the interactivity and immediacy of the theatrical performances, media performance revival was underway. This prompted the formation of many new theatrical troupes that used light, shadows and media.

The early films, before the introduction of recorded soundtrack, were highly performative. Silent film never really existed. Cinematic presentation was accompanied by a number of performers making music and sound effects and reciting dialogue. With developments in cinema 1885-1905, various kinds of theatrical performances began to incorporate moving image into their spectacle-mixing moving-image projections with live performance and music analogue to magic lanterns shows. This hybrid of cinema and performance opened an alternative path for the development of cinema. This alternative follows the structure of the work previously explored in Magic Lantern shows.

The Czech theatre director E. F. Burian, in collaboration with Miroslav Kouril, developed the "Theatergraph," a technology for the stage that integrated film and slide projections that could be operated to respond directly to the action on the stage. Theatergraph was first put to use in the production of Wedekind's *The Awakening of Spring* in 1936 in Prague. Stage design by means of light and projected images marked new forms of audiovisual multi-media performance and these in turn contributed to the development of new forms of theatre. The Theatergraph established a direct visual



Figure 109 Josef Svoboda, *Laterna Magika*, 1962, Source: Future Cinema, *The cinematic Imaginary after Film*, 2003 eds, Shaw, J & Weibel, P, The MIT Press (Used by Permission)

theatre. The Theatergraph established a direct visual relationship between projected moving and photographic images within onstage action. This arrangement across the prerecorded moving and still-image projections and performed action extends the magic-lantern show's ability to represent complex moving image.

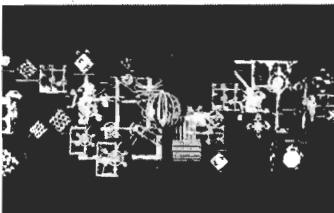
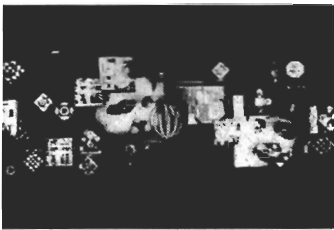


Figure 110 Josef Svoboda, *Polyvision*, 1967, Source: Future Cinema, *The cinematic Imaginary after Film*, 2003 eds, Shaw, J & Weibel, P, The MIT Press (Used by Permission)

Laterna Magica 1958, more explicitly explores this connection. It was first presented in the Czechoslovak pavilion in 1958, for the World Expo in Brussels, combined dance, theatre, film image and sound. Stage-designer Josef Svoboda and theatre director Alfred Radok created this "polyphonic" work—a synthesis of the live action of theatre and virtual world of film. The magic of the lantern gave the impression that the film image came to life through the fluid transition between the stage and the film projection. The actors would disappear from the projection to reappear on the stage, creating the unity of the real and the virtual. The automatic image of film interacts with the action on the stage to give a sense that the virtual projection responds to the events that are performed on the stage. Some hundreds of years later, magic lantern performance, now extended by the film image, still enchants the audience, this time with the illusion that the film image can come to life, can respond to real life events. *Laterna Magica* was a multi-layered synthesis of film and theatre: exact, synchronized, scored and coordinated performance that gave an impression of interactive and structured improvisation. In this work the performers had to confront the fixed time of prerecorded cinematic image, and therefore timing had to be scripted in great detail. The fixed time of a projected prerecorded image provided the timing structure for the performance.

An Image of Time: Cinematic Performance of Canada Shadows



Figure 111 HP, Hank Bull, Patrick Ready, (Used by Permission)

The shadow play collective, Canada Shadows, initiated in the mid 70s by Hank Bull and Patrick Ready, was a major contemporary shadow-theatre troupe in Canada. Canada Shadows employed the use of modern technologies and shadow casts with live performance and interactive music in an innovative way. The example provided by the work of Canada Shadows points to a form of media performance that combines performance, projections, puppetry, photography, moving and other forms of graphic images. This work connects the kind of explorations enacted by Magic-Lantern shadow with shadow-puppet performance. Their work came out of interest in 19th century inventions and Alfred Jarry's Pataphysics, proto-Dada approach to art and technology, and was prompted by the desire to create cheap movies. Film technology was very expensive and therefore inaccessible to the independent artist. As Hank Bull describes it, "We thought we'd just hang a sheet and create shadows behind the screen and most people would think it is a movie... In effect, when we did that a lot of people did think it was a movie, because they never saw anything like it, except in a movie theater."

Canada Shadows Theatre created a contemporary world of shadows quite independent of the shadow-play tradition. Hank Bull and Patrick Ready, at the time of their first performance, were not aware of the rich shadow-play



Figure 112 Canada Shadow, Vis A Vis 1983 (Used by Permission)

⁴ From the Interview with Hank Bull

traditions across cultures. The world of Canada Shadows was inspired by industrial life in Canada; it celebrated radio, photographic and recording technologies, and explored the possibilities these technologies were offering. Hank Bull, referring to the power of radio media, said: "With sound you could easily ring a huge bell or go to the moon, go backwards and forwards in time... anything is possible on the radio." Hank Bull and Patrick Ready saw Canada Shadows as an extension of the radio program they broadcast from Vancouver *Co-Op Radio*, which was produced using cheap and accessible tape recorders. The desire to add pictures to sound set off the first Canada Shadows production. "We put our cardboard puppets behind the screen and performed a play," says Hank Bull. ⁴

The first Canada Shadows performance turned out to be a big success and they expanded the core group to include visual artist Kate Craig and electro-acoustic sound composer Martin Bartlett. The desire to use popular media in a way that engaged the community brought Canada Shadows performances into existence, and through a marriage of technology and shadow play, the collective brought live performance into recorded media.

Canada Shadows' success and popularity assured the continuance of productions through the 80s. While their initial inspiration to create shadows was fueled by the fascination with media technology, further exploration of the medium of shadow play led them to travel to Asia and inquire about different forms of shadow play tradition. Canada saw the birth of shadow play inspired by film technology, and then this new "play" began to explore its

origins.



Figure 113 Canada
Shadows The exploits
and opinions of Dr
Faustrole play from the
Alfred Jarry's narrative
(Used by Permission)

Cinema and shadow play share many characteristics. Both art forms are multi-dimensional in that they combine a variety of media—narrative elements, poetry, sound, music and visuals—in a time-based composition. The cinema is essentially a technologically sophisticated, but temporally fixed shadow play—the shadow of our world is captured on film stock and later projected onto a screen through a linear succession of film frames.

The structuring of space, place, situation, scale, illumination, and characterization—the forming of human experience—occupies every composition that unfolds in time. For Gilles Deleuze (Deleuze 1985), the fluid concept of cinematic time is an image of thought itself; it is what makes cinema a time image. In cinema time flows forwards and backwards; it can speed up and slow down. The time that has already past can be represented in the form of a flashback; the time that has not yet come can be represented in anticipation through foreshadowing. The time of a dream can intersect with reality.

The cinematic image uses a two-dimensional surface that acts as an imaginary window where the participatory attention of the audience is directed. The images, icons, together with text and music, interwoven into an emotional tension, are the linguistic elements of film. True engagement within a conceptual space is achieved by life and its extremes that unfold in time. The image that unfolds in time is a multifaceted and ephemeral concept and has an important symbolic dimension because it is able to signify in our

relationship to the natural world. The time image as articulated by Tarkovsky (Tarkovsky 1986) is the relationship between idea and form, an organic linking of observations tied together by camera movements in time. Objects, space and characters are revealed by camera through rhythmic movement in time.



Figure 114 Vis A Vis, Canada Shadow Excerpts, 1983, (Used by Permission)

The element of time also plays a key role in the action performed by a puppeteer, but in shadow-play performance time unfolds through the embodied presence of the performer. The image is developed, unfolded, completed and changed continuously in real time during the performance. The audience participates in the formation, transformation and disappearance of the performed image. Images and situations have a potential to be developed with the spectators' responses included in the play. The puppeteer can observe and evaluate the effect of the performance and accordingly improvise and modify the performance. The dynamic process of immediate interrelation between actor and spectator adds a new dimension to the element of time. Flexible time becomes a dramatic medium.

The pictorial character of a shadow play presents many opportunities for representing space. In shadow performance, objects can affect perspective depending on their distance from the light source. The closer the puppet is to the light source the larger the area of the screen it occupies. In this way the same object can appear in different scales within the same scene.

The basic technology used by Canada Shadows was a cotton sheet, a slide projector with no slide and large cardboard

puppets with very simple articulation. The projector sends a beam of light through a lens from a focused point. They used the entire cone of light between the lens and the screen to create a kind of zoom effect where puppets, objects and images could get bigger and smaller while maintaining a clear and sharp projection. This simple arrangement resembles the magic lantern used by 19th century European shadow play.

In further developments, Canada Shadows created more articulated moving parts for their puppets, and integrated the two-dimensional world of puppets with the three-dimensional world of people. They used colored gels, lenses, prisms, and various other optical devices between the projector and the screen to create a variety of light effects. By moving shapes and characters among projected shadows that unfold in time they achieved productions that possessed a kind of magical attraction. The time image that unfolds through the movement and successive organization of figures and objects across a screen creates a sense of witnessing the living world.

A screen with limited surface area frames the shadow play. The choice of screen format and shape distinctly influences shadow performance and the way figures and objects move. The two-dimensionality of the screen and the contrast between the light and darkened areas of the screen articulate the space for the action of the play. Shadows that appear on the screen relate to its format, continuously dividing and interpreting it into alternative worlds that unfold through each scene's time structure. Shadow characters reveal the story through their movement (choreography) across the

screen using the basic components of lines, planes, light, shadow, to which is added text, voice and music.

The puppeteer animates the projected shadows. The turning of the puppet's body and manipulation of its arms is of particular significance on a two-dimensional screen, because it extends the animation achieved by speech to include the whole complexity of body language.

Although shadows are tied to the plane and follow its rules, an audience interprets the plasticity in the shadow image by constructing a volume within the shape. The movement achieved by twisting and bending the puppet against the light that projects shadows onto a screen adopts the trace of three-dimensionality of the real space where the puppet is manipulated.

Canada Shadows created a strict cinematic experience, in the Western sense, in that the audience could not see behind screen. This arrangement is very different from traditional Balinese performance, which is open for the audience to view on both sides. In Canada Shadows plays, curtains covered the space around the screen so that audiences could not see the technology. This arrangement produces a dramatic moment when the performer comes from behind the screen onto the stage.

Shadow play has an important characteristic that distinguishes it from other forms of theatre and puppet play. Human and puppet stages are alike: the characters move around in the architectural space with a real and direct distance from each other and the audience. The space of

shadow play is flattened onto a screen.



Figure 115 Canada
Shadows Vis A Vis, 1977,
(Used by Permission)

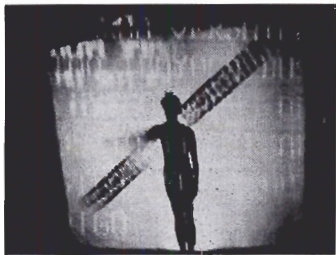


Figure 116 Canada
Shadows Vis A Vis, 1977,
(Used by Permission)

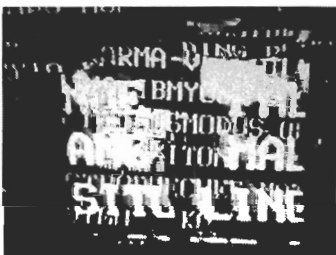


Figure 117 Canada
Shadows Vis A Vis, 1977,
(Used by Permission)

In Vis a Vis, Canada Shadows experimented with the contrast between the flatness of the screen and the three-dimensionality of the stage. Vis a Vis was a multi-media shadow-play performance that combined live actors, shadow puppets, multiple moving screens, performance stage, and complex visual texture. The latter was created with several projectors casting several images at once, combining slides with 8mm and 16mm film. In one scene, the screen, which was hanging from the ceiling on a system of pulleys and ropes, suddenly raised and opened like a door, and moved from a vertical position to a horizontal position. The audience could see the whole machinery behind the screen and all of the projectors at the back were shining into the audience's eyes. Then a new screen was introduced, made of thin strips of white plastic cut into ribbons, so that the performers could walk through and back and forth. The whole stage turned into a three-dimensional play with light, with performers in costumes dancing on the stage, and at the end of the scene the screen lowered, returning to its vertical flat position.

Cinematic techniques of montage, blending, transitions and special effects generate new possibilities in shadow-play performance. While in conventional cinema these techniques are fixed by the linear progression of time (the succession of frames), in shadow play they become a part of the language of the performance.

The screen acts as an interface between actors and the audience. As with cinema, the effect of a shadow play is indirect. The screen filters the action of actors, and the puppet

filters the puppeteer's movement. The presence of the bodies behind the screen is indirectly experienced. Only the actor's voice carries a direct connection.

In *Vis a Vis*, Canada Shadows created a spoken language called "Pygmy Adlib." This came out of a desire to present a universal shadow play that would communicate across language differences. *Pygmy Adlib*, a European meta-language, is made up of words that are common and easily understood across most European languages. The writers listed hundreds of these words, such as "pesto," "spaghetti" or "basta," that everybody understands. They used these to construct conversations that took place in the play.

Vis A Vis took the form of an opera, interpolated with a recurring scene in which two people discussed the opera in *Pygmy Adlib*. Canada Shadows used a format from radio, in which experts analyzed and discussed the opera during intermission. In *Vis a Vis*, Martin Bartlett and Kate Craig came out and discussed the opera scenes in their newly designed language. This inter-cultural discussion was easily understood by people speaking European languages, and provided comic moments in the play.

"... we had this sort of naive idea that you could develop a universal language, but that gets replaced by the idea that in all communication, there's a great deal that is missed. And even if two people are speaking in English, we're still projecting so much onto each others words, half of our communication is fantasy and is fiction and misunderstanding and is contradiction and so on, interruption, all these things come into communication. We

think of it as being very transparent and in fact radio and television promotes the idea that they can communicate perfectly but of course that is not true. So there comes this idea Opacity. It's like the opacity of the screen: you can't see through it. There's a certain amount that passes through the screen, that can communicate to the viewer and there's a certain amount that will remain forever hidden and occulted behind the screen, and that's true with words and with language in general. So then you go into a situation where it's fine to do something that people don't understand, it's fine in fact even to construct situations that are anti-communication, which are designed not to be understood, and that what you're contemplating is that blankness and that failure." Hank Bull ⁵

⁵ From the Interview with Hank Bull

The language in *Vis a Vis* resembles the complexity of language arrangement found in Balinese shadow play, where the comic servants provide interpretations of the drama spoken in Kawi, which appears as abstract to local audiences. When Kate Craig and Hank Bull went to Asia, their intention was to expand *Pygmy Adlib* to include Asian languages. They discovered that the concept of *Pygmy Adlib* was a completely Eurocentric fantasy and could not be understood in Asia. There, English language is commonly understood and represents the *lingua franca*. On the other hand, Kate and Hank discovered a complexity of language in Balinese shadow play that resembled the multi-lingual attempts they had employed in *Vis a Vis*.

In *Aka Nada, Canada Shadows* further experimented with multiplicity of language by constructing a highly symbolic dialogue between God and the Devil entirely made up of

commonly used citations in Greek and Latin that they extracted from the back of the dictionary. The cliché expressions used in common speech and often quoted in literary texts represent a kind of meme coming down through the history of literature. Here the reference to language complexity found in Balinese Shadow theatre is quite explicit. The ancient language of the European Church is used for conversations between God and the Devil.



Figure 118 Canada Shadow, Aka Nada, 1983, (Used by Permission)

Puppets were presented together with the puppeteers responsible for their movement and the articulation of their jaws, while the voices came from off-screen. This construction shows the unique power of shadow play that integrates speech, movement and visual representation. The moving image is extended by speech. This situation strengthens the spectator's participation, in a Brechtian sense, creating a critical distance by revealing the artificial nature of dramatic action. The spoken word supplements the picture in such a way that encourages the spectator to critically evaluate the presented image as a whole, and to draw meaning from this experience. This co-projection of reality and illusion gives, in Hank Bull's words, "the idea that God and the Devil in fact are shadow puppets manipulated by hierarchies of priest classes and all the mechanisms of civilization. They are themselves constructions, mechanisms, and here they are being operated, like the Wizard of Oz, standing behind and operating, and signify another way of seeing behind the screen."⁶

⁶ From the Interview with Hank Bull

The shadow screen presents a window to artistic creation and imagination. In the darkened space, the viewer experiences the projections of characters and objects in the play; these

projections come to life through ideas, thoughts and imagination.

Canada Shadows explores diverse possibilities with extended and multiple screens and projections, using fairly accessible low technology, with one exception— sound. Canada Shadows with Martin Bartlett pioneered interactive electronic sound composition for their shadow play performances. Bartlett designed and manufactured his own synthesizer and computer software. He combined live electronics, recorded sounds, sound effects and live music played on stage. At first interactive live electronic sound was created by a program that Bartlett would operate on the computer during the performance in response to the other performers. He made devices out of cheap electronic resistors and capacitors put together in such a way to make sound, then combined several of these in a box to create a kind of a musical instrument.

His electronic instrument grew into a sophisticated, home-made, analogue computer, the famous Black Box, which is still at Simon Fraser University. Having done that, he started exploring sensing technologies such as microphones, light sensors, photo resistors that would send a signal to the synthesizer and trigger sounds in a more or less predictable way. But, Bartlett was interested in less predictable interactions with the computer during the performance. His next step was to have the synthesizer interact with a live musician. The musician would have guidelines to play in certain ways that would trigger sounds from the synthesizer. Bartlett expanded his electronic instrument to include a computer system that could control the interaction with sensing technology and for which he wrote custom software.

"Martin, who was a big part of the shadow plays, really saw them as a kind of musical performance, and he was quite unusual in the way that he wanted to add theatrical elements and visual elements to his music. So he wasn't a musical purist, that people are just going to sit there and listen, he wanted to give them some kind of visual performance as well. But he wasn't going to go the traditional way of opera, because he was part of a generation that was rejecting the concert hall. He was a post John Cage, and studied with David Tudor. He was interested much more in a kind of Fluxes-oriented reinvention of the idea of a performance. He did a lot of performances of his music, which had very strong visual elements, and it was one of the things, which made him a bit of an outsider or a bit of an odd ball in the world of music because he was always subverting the accepted codes of presentation. And similarly with us, our presentation, we were anti-theatrical, we detested the theatre and all of the hierarchies of the theatre. It was very important to us that this work was collaborative, that there was no one who was the director, no one who was the writer, there was no one who was controlling the whole operation. We came into the collaboration each with our own ideas for images and sounds and stories, and we mixed them together in a big pot, and sometimes it was very difficult, and there were tears, but this was important to us, this sense of the anarchy of this moment." Hank Bull⁷

⁷ From the Interview with Hank Bull

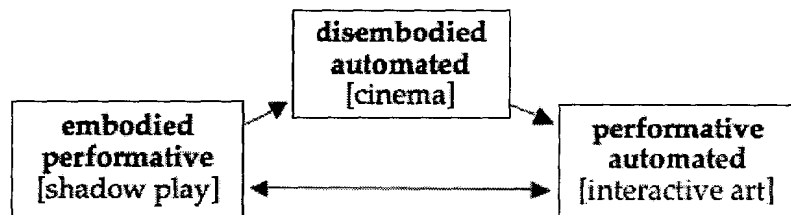
Conclusion

In this chapter I discuss the history of cinema as it interweaves with media performance. Early European shadow and magic lantern shows act as precursors to cinema and by extension to media performance. The contemporary form of the cinema industry strips away performance. However, even this contemporary form found its way into the performative theatre work of Joseph Svoboda and the shadow plays of Canada Shadows. This chapter is not meant to represent a comprehensive overview of the integration of technologies of projection and mechanical reproduction with performance, but rather it features selected examples that act as pointers to the continuous need to integrate electronic and non-electronic media with performance.

Chapter 6: Braided Processes

The genealogy of media performance recedes behind the origins of mechanical reproduction. Media performances and narratives can be found centuries before the mechanization of time-based images. Tracing the different aspects of the language of media back to its roots opens new paths for research and contributes to the articulation of an emerging field of media performance. The centuries-old history of pre-electric screen-based performances of projected light, shadow and sound enriches contemporary computational media performance praxis. The transformation of shadow-play performance into the automated art of cinema transformed this art form from an embodied practice to mechanically recorded time-based images.

Figure 119 The media performance relationship among shadow play, cinema and interactive art.



The histories of cinema and animation are interwoven with that of shadow play in a shared legacy of stories animated by moving shadows. A significant difference is that shadow play

is fundamentally performative in a way the mainstream industrial cinema and animation art are not. The cinematic apparatus mechanizes the art of shadows. With computational technologies we have an opportunity to extend cinematic media toward real-time performance and improvisation. The work with computer based real-time animation and media invites us to revisit shadow play and reinterpret it from the perspective of performative action. The diagram above depicts this relationship.

The idea of braided narrative structure, drawn from Asian performance traditions (Schechner 1985), which include Hindu theater, Indonesian Shadow Theater, Japanese Noh drama, and in particular the Balinese shadow play, provides a model for the organization of media within a computational environment. A related form of braided processes is emerging to form the core ordering structure of composition in a computational environment. The threads of this complex braid are composed of the audible and visible images, together with textual, generative, kinetic and proprioceptive elements responsible for driving real-time processes within the performance. The relationships among the individual elements of braid are interconnected in different proportions and relations, with all of the elements simultaneously accessible and correlated.

We drew the dramatic structure of braided processes from a study of the contemporary tradition of shadow play. This structure supports research into and design of performative media compositions and live cinema performances (Dulic & Newby 2003). The dramatic model of braided processes is developed in order to enable a form of situated media

performance that integrates computation as a medium for composition, performance and improvisation. This structure extends cinema as a linear medium, with its ability to encode practices and mediate processes that organize media, performative and narrative elements, using formal organization of media elements drawn from shadow play performance. Older multidisciplinary and braided performance tradition such as the Balinese shadow theatre provides case studies in media performance. The Balinese shadow-play performance traditions embody this braided model, producing possibilities for flexible, interactive and responsive multi-media events and response to the environment.

In Balinese wayang kulit, the structure for a flexible, distributed and shared narrative system is comprised of orchestral music, puppetry, singing, poetry, narration, and lighting effects that are braided together over an extended time-frame of three hours under the direction of a puppeteer. The performance is arranged as a complex and layered temporal and spatial composition constructed in relation to the narrative told. Narrative elements have the flexibility to begin and end at any time but must occur in the right structural and spatial unit of the overall structure. This suggests an interesting alternative to the Aristotelian notion of a narrative arc, continuous action with beginning, middle and end, in which events unfold as causal chains ordered in time. The cinema has already begun to explore alternatives to this received concept of narrative in its use of flashbacks, foreshadowing, reorderings of narrative time and so on, as well as through the alternative performative cinematic practices discussed in chapter five.

The suggestive power of the wayang is that the same story can be told in a flexible fashion not only from performance to performance but within a single performance, in dynamic responses to the context of the performance itself. During a ritual or a play, even in the most traditional genre of Balinese performance, new elements are integrated into a play and old ones are eliminated. These performances are always adjusted to suit the relationship between performers and audiences or between a religious leader and the faithful. Performances and rituals are not dead repetitions but contain continuous eliminations and overlays. The general shape of the performance maintains an overall form, but various aspects and actions within performance are continuously renegotiated. The braided narrative structure allows this continuous reworking and renegotiating of the narrative material, because it provides a framework within which the new elements—musical, textual or choreographical— can be introduced in an improvised manner.

In Balinese shadow play every detail of presentation is worked out but variable: the setting of the play, music, types of play, the proper occasion, etc.. While these contextual details are worked out to a level rarely encountered in Euro-American theatrical tradition, there is much liberty in the scheme because the parts are variable. Euro-American theater is less fixed in the rehearsal process but more fixed in the performance. The rehearsal process is based on search and discovery of the idea of the performance, while the outcome is a fixed presentation of that idea. In Balinese performance forms the training and rehearsal are more fixed, but what is being transmitted is not the means of discovery but rather the

performance elements themselves. These independent elements are braided together within the fixed contextual structure usually created in relation to some well-defined family or community religious event, each of which is nevertheless unique to the occasion, truly novel and ever changing. The braided narrative structure allows the re-contextualization of classical narrative in relationship to the particularities of each event. This open structure also allows direct interaction among the performers and audience. The more experienced the performer, the more he/she can vary the performance, improvise and interact more directly with the players and audience. Shadow play masters rarely tell the same story twice. This is also possible because the characters in the play are not "acted out" by the dalang, but rather the characters "speak in their own true voice" which is channeled by dalang, and therefore every dialog in the play is a unique event. Within the overall performance, too, improvisational elements abound in the way the performers interact with one another, the story, the audience, and the accompaniment. This system provides a braided form that has a number of fixed elements yet is fundamentally improvisational.

As in Greek theatre, there is a start and finish to each performance, but within braided narrative structure there is no definite beginning and end. Richard Schechner (1985) describes Asian narrative as a system of braids of several strands of activities that bring performers and partakers together here and now. Relations among the strands are ever changing. No strand is necessarily more important than any other. No strand necessarily causes another. Greek drama, on the contrary, is based on causal chains across idea, climax

and resolution. The difference between the Greek and Asian systems affects not only the performance, but also the way the work is created and rehearsed.

The braided relationships between time, space, spectator and performer are based on participant enjoyment and agency. Some participants can savor one aspect of the performance while others, through choice or circumstance, savor another. This aspect of Asian drama is one that attracted Brecht to the technique of independently variable elements, and inspired him to develop his theory and practice of *verfremdung* (estrangement or alienation) (Brecht 1964). Braided narrative structure actively engages the audience that interacts with these diverse symbolic elements: performative, contextual and narrative. Braided narrative structure includes the procedure of improvised juxtaposing and it functions as a form of conversation or dialogue with a natural interplay of multiple aspects woven into an overall performance. This interplay of independent elements and responses, is braided together to generate insights, discovery or the sudden awareness within a complex process of association and interaction.

This notion of braiding mirrors the Balinese philosophy of *desa, kala, patra'* that intersects space, time and contexts aimed at significant spiritual, environmental and communal purpose. The improvisational structure of a braided process gives a sense of place on both social and metaphysical levels. It acts as a way of putting human activity into the larger environmental context by intersecting with forces greater than those of human design.

Heteroform

In the cinema of braided processes, *heteroform* organization provides a formal method for ordering structure drawn from musical concepts of an ordered melodic chaos—heterophony (Dulic & Newby 2003). Heterophony is a musical term from ethnomusicology, and is an attempt to describe the difference between traditional European and certain Southeast Asian musical forms. A heterophonic music is organized in terms of how different threads of music relate to one another, and is based on the emergence of an underlying yet unspoken structure that generates the overall composition. Javanese musician and theorist Sumarsam proposed the concept of the inner melody to describe the heterophonic organization of a piece of complex Javanese orchestral music (Sumarsam 1975). The inner melody is the deep structure of a generative grammar over which the musicians elaborate their own material - the surface structure of the music. Sumarsam's idea of inner melody is a useful model for the organization of a computer-mediated improvisational system and a key concept in the cinema of braided processes. Heterophonic form embraces chaos by using a hidden deep structure to frame a complexity of simultaneous yet independent performances by its practitioners.

Heterophony of multi-modal voices offers ways to arrange improvisatory musical co-creation in large orchestral music. The challenge in composing with computing technologies is in balancing the multiplicity of potential media voices that

come together to articulate the artistic image. Extending the idea of heterophony to include visual and dramatic mediums is a related form of braided narrative structure, again drawn from South East Asian performance traditions. In particular, the Balinese shadow theater can act as a model for the organization of media within a computational environment. The model of shadow play can support a structured system of improvisation organizing a multiplicity of voices, negotiated order, distributed participation and direct dialogue with oneself and others through the materials of the work. In the cinema of braided processes the notion of the heteroform associative narrative braid is taken up as the central compositional strategy - weaving and intertwining a variety of threads at several levels of the work.

The heteroform organization of media can support a structured system of improvisation organizing a multiplicity of voices and direct dialogue with the materials of the work. This complex braid of narrative elements allows different streams of the narrative to be available for mixing in different ways. Streams can be montaged in time and accented with responsive processes: audible threads, independent yet correlated in space and time; visible threads juxtaposed in space and time, sequenced and layered. Textual elements may be composed of visible and audible forms - the ASCII and spoken representations of language.

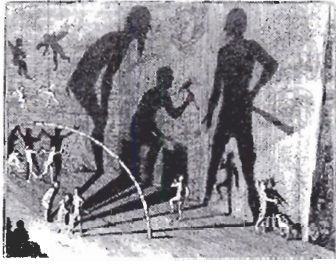


Figure 120 People play game with shadows, in: Samuel van Hoogstraten, Inleyding tot de Hooge Schoole der Schilderkunst, Rotterdam 1678. (Used by Permission)

Situated Media Installation

Rafael Lozano-Hemmer transforms the public space using interactive technologies that enable participants to become part of the artwork in what he calls "relational architecture." His work *Body Movies*, 2001/2003, twines several elements together into an ever-changing braid that develops by engagement of passers by. Thousands of portraits are projected on a facade using elevated robotically-controlled projectors. The portraits are washed out by powerful xenon light sources placed at ground level. When people cross the square their shadows appear on the screen and the portraits are revealed within them. Silhouettes range between 2 and 30 meters high, depending on how far participants are from the screen. Lozano-Hemmer's shadow play allows audiences to project themselves large scale onto screens that stretch over entire buildings.

This shadow interface is a direct reference to Samuel van Hoogstraten's engraving "The Shadow Dance," made in Rotterdam in 1675.

In Lozano-Hemmer's work, shadow plays constitute the starting point for investigating the crisis of urban self-representation. In *Body Movies* he transformed the building of a cinema to bridge the distance between the people and architecture as well as situate people in public space. Passersby are motivated to overlay the bodies on the screen with their shadows.

Figure 121 Body Movies, Relatiotial Arcitecture 6, Rafael Lozano-Hemmer 2002, 2 Robotic xenon projectors, 1000 -square-meters screen, custom-made shadow tracking system, 1200 portraits on duratras film, PA system, control computers, Installation at City Hall, Linz, Austria/ Canadian Art. 2002. volume 19, Number4. (Used by Permission)



Lozano-Hemmer achieves this invitation by using a camera-based tracking system that monitors the location of the shadows in real time. The computer/vision interface triggers quiet feedback sounds when a shadow and a portrait match in scale. When the shadows have revealed all the portraits in a given scene, the scene changes to the next set of portraits. This way the people on the square are invited to participate in different representational narratives. Over sixty people may take part at any given time, creating a collective experience that nonetheless allows discrete individual involvement. In *Body Movies* Hemmer counts on audience participation as integral to the unfolding of the work. This work is situated through audiences participation, which defines the work as unique each time it is presented.



Figure 122 Leaves, Aleksandra Dulic and Kenneth Newby, screenshot.



Figure 123 Leaves, Aleksandra Dulic and Kenneth Newby, projection on the window of Interurban Gallery.

The work of situated media installation, the Leaves, is developed as a collaboration between Kenneth Newby and myself, which was presented as a part of RiverRun exhibit at the Interurban Gallery. The RiverRun exhibited outcomes of a collaborative research project between Kenneth Newby, Aleksandra Dulic, Christoph Runne and First Nations artists Margo Kane and Russell Wallace.

The images Leaves and words falling like in autumn are projected on the floor-to-ceiling windows fronting the street outside the gallery. The windows were treated with a special “glass etch” plastic coating to make them suitable for rear-screen projection from inside the gallery. The projections were made continuously 24 hours per day for the duration of the exhibition. This was intended to provide an “illumination” of the neighborhood for its many inhabitants—many of whom are living on the street and are awake through the night.

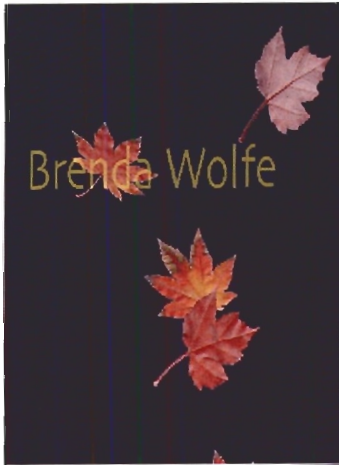


Figure 124 Leaves,
Aleksandra Dulic and
Kenneth Newby



Figure 125 Leaves, Aleksandra Dulic and Kenneth Newby,
projection on the window of Interurban Gallery.

A video camera is focused on the sidewalk in front of the window. As passersby walk in front of the projection the camera senses the amount of movement and animates the cluster of leaves and words with a virtual whirlwind, dispersing the cluster. Each leaf is a character and the audience itself takes on an unwitting role as animator. The leaves and words are 'animated' by people on the street passing by the gallery window; their movement triggers a gust of 'wind,' which involves them in virtual space. In an effort to make a dialogue with the downtown east-side community that hosts the Interurban Gallery, a text component was integrated into this work in the form of a sequence of names of missing women — the many women who have disappeared from the streets of this neighborhood over the past twenty years. This 'gust of wind,' invites passersby to think for a moment about the reality of this neighborhood in downtown Vancouver. The wind is like a magical voice spoken for women who now live only in

memories.

The effectiveness of this interactive technique lies in both the directness of the interaction with the virtual objects by the gesture of the audiences, as well as the poetic quality of the content and its relation to the core themes: cycles of birth, death and renewal as well as the relation of human to the natural world. The leaves installation provides a kind of mirror of the neighborhood.



Tony Oursler's *The Influence Machine*, 2000, uses the space of Madison Square Park as an expanded screen that depicts voices and images of people and ghosts from the history of early developments of technology. Oursler recreates an experience that recalls 19th-century magic lantern projections. Large faces are projected onto smoke and trees with corresponding narrative and poetic texts written by Oursler. *The Influence Machine* includes a variety of soundtracks: segments of radio feedback, the unusual sounds of a glass harmonica performed by Dean Shostak, and a score by Tony Conrad commissioned for this project.



This work makes an attempt to situate the historical and current impact technologies. It recalls Robertson's *Phantasmagoria* performances with images projected on smoke, which creates a sense of the mysterious.

Figure 126 *The Influence Machine*, 2000, Tony Oursler, Madison Square Park, (Used by Permission)

Images of knocking hands were projected onto trees and surrounding buildings with corresponding knocking sounds that alluded to Morse code. Texts ran over construction fencing and trees, pronouncing intimate and encoded messages. All of these elements reference early technological



Figure 127 The Influence Machine, 2000, Tony Oursler, Madison Square Park, (Used by Permission)



Figure 128 One River (running) Computational Poetics Group, Surrey Art gallery, 2004, Martin Gotfrit, Aleksandra Dulic, Kenneth Newby, and Dinka Pignon

developments in order to relate to societal responses to technology and the spiritual affinities often assigned to them, all increasingly relevant as contemporary society throughout the course of daily life finds itself constantly engaged with telephone, television and the Internet.

An immersive installation One River (running) — developed by the Computational Poetics Research Group, of which I am a part — was presented in Surrey Seen exhibit organized to celebrate 30th anniversary of the Surrey Art Gallery on October/December 2005. One River (running) is composed of braided ensembles of visual, aural, and procedural media objects that converge into a river. This site-specific installation uses the metaphor of river and flow as a core element around which this work is developed. The flowing river represents both a social and an ecological image of community. This interactive, immersive media environment is a kind of participatory documentary that reflects the contemporary Surrey community. The river forms the backbone of the Fraser Valley, from which a rich and complex ecology is nourished, and provides the gateway for the great salmon runs that are increasingly imperiled in this region.

A river of thirty-two oval screens forms the scenery that reflects video images. Multiple screens positioned through the gallery space create a kind of sculptural presence that delineates the river. Projected images cover the screens and the four walls of the gallery. Virtual scenery is projected on the walls of the gallery space to create the virtual environment where the river flows. A dynamic relation between screen architecture and the space contained by the

walls allows a theatrical situation to emerge. The aural and visual images shift from the representation of a community of people speaking to moving images of the river that represent ecological community.

The work is founded on a documentary process in which the production team recorded interviews with people for several days. We focused on the interview recording process, aiming to capture a series of reflections about Surrey. These interviews were mainly collected from the particular Surrey community that would visit The Surrey Art Gallery, students from Simon Fraser University campus in Surrey and people we knew who live in Surrey. The interviewees were a multicultural group, generally reflecting the ethnic makeup of Surrey. Since we did not encounter First Nations participants in our initial interviews, we decided to extend the process and interview people visiting the K'la-how-ey-a Aboriginal Centre of the Surrey Aboriginal Cultural Society. The voices are of those who desired to be heard in this context: families, individuals, members of the community from homeowners to the homeless - people with an interest in this place.

Figure 129 One River
(running),
Computational Poetics
Group, Surrey Art
gallery, 2004



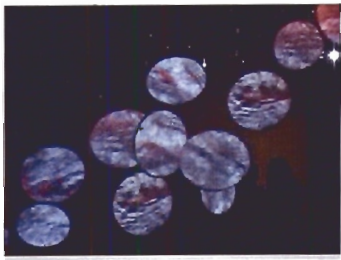


Figure 130 One River
(running),
Computational Poetics
Group.

The audio material that we recorded is structured as an open work documentary that allows all of the voices to sound. This structure inhibited any editorializing and honored every voice that contributed to the river of oral reflections. The large amount of material that we gathered was categorized by topics arranged in time to form a larger narrative. The topics include reflections on the Fraser River, urban development, sky train, safety, social issues etcetera.

Each topic was presented within a time frame that is not sufficient to display all the audio files at once. Individual voices regularly emerge from the river and combine with previous voices and with those not yet heard. The meaning of this river image emerges through a re-combinatory poetics of open work that provides ever-changing associations. This emergent complex web of associations begins to form a kind of conversation.

Images of the community are represented by disembodied lip characters that originate from digital photographs of the mouths of people interviewed by the team. The lip characters become kind of digital puppets that are animated by a voice-recognition software program created by the artists. The mouths are animated by the voices that emerge from the river—lips speak the words as they hear voices. This synchronization is occurring in real time as an autonomous element of the work – the video is “listening” and responding to the audio.

Figure 131 One River
(running),
Computational Poetics
Group, Surrey Art
gallery.



The narrative of the work emerges at the intersection of urban and natural representations in the work. The image of the community is contrasted with images of Surrey's natural environment – frogs, birds, a mosquito, water — as well as with sounds of the urban environment — the Skytrain, traffic, children playing, the noise of construction or a shopping mall. Visitors can explore the interactive aspects of the image and sound as they walk through the exhibit.

Each sound, voice, character, moving image and other animated objects represents a strand in the braid. The media diffusion system provides the ability to place these media events in space and time. The diffusion system allows independent control of projections on screens and walls. This independence enables the experience of immersion and intensifies the image of a multiplicity of media objects. In this work we explored with the new idea of pulling the two-dimensional screen apart and redistributing it in the space of the installation, thus deepening the sense of immersion.

The gallery walls disappear through the projections of animated objects in the 3D space. In this work the 2D

animations are distributed in 3D space, and that creates a sense of space that is further emphasized by fog amount and scale.

The One River (running) installation acts as an open work documentary that represents the materials of the work each time in a new way. The documentary quality resembles a cinematic composition that is in this case distributed in the space through the placement of audio-visual elements. This media installation is situated both through the content of the work drawn from Surrey citizens as well as by the audience's interaction with the space of the installation and media animation.

Conclusion

Braided processes provide a dramatic structure that can take advantage of the programmability of the computer and its ability to encode practices and mediate processes that organize or generate various aspects of the audio-visual media and narrative elements for interactive media art. This provides a new kind of compositional environment that enables the expansion of both spatial and temporal resources. Two parallel interdisciplinary forms emerged from working with the situated media performance approach: media installation and media performance. The work discussed in the situated media installation section looks at the work that expands the space, screen and projection methods to encourage audience participation. Media performance is

discussed in chapter seven, which focuses on the extension of cinema towards performance and improvisation with audio-visual media.

Chapter 7: Improvisation with Animated Media

Many theorists of cinema and animation have examined shadow play in the context of cinema history (Mannoni, L Campagnoni, D P Robinson, D 1995; Ge 2002; Higton, H 2002). In cinema studies the focus is often on the mythical narrative that unfolds in time through the interplay of light and shadow on the screen. The historians of animation, on the other hand, focus on a very specific resemblance between the animated objects of shadow theatre and film animation, stressing often the techniques of actually animating puppets or shadow characters such as the work of Lotte Reiniger (1970).

While these numerous parallels drawn between shadow play and cinema inform this study, here the key concern is the dramatic principle that underlies animated performance of shadow theater. The dramatic structure that enables one to make an inanimate non-moving object come to life by movement, while the performer, or puppeteer, stays outside the audience's focus. The audience focus is centered on the animated events taking place on the screen. Again the main concern is what happens in the improvisational context of the performance. The concept of a cinema of braided processes supports the improvisation and real-time animation driven

by the body of the performer. The model supports different presentation contexts ranging from live media performances to interactive installations. The composition and presentation of audio-visual electronic media, using capabilities offered by computation, provides an extension of the cinematic media. Braiding encoded process with various media and narrative elements in the real time of the performance positions interactive media art close to shadow play.

Like many other art forms, shadow play theater is transforming under the influences of new technologies. The play with light and shadow forms a big part of contemporary theater and cinema, and naturally it is extended to computational media. With computational media the performative characteristic of media is a key consideration.

Shadow play in the professional performance world of Europe and North America today integrates acting, dancing, pantomime, fine art, cinema, montage, photography, scenery design, sound design, computational media, multiple light sources, expanded and multiple screens, urban spaces—the list is long and incomplete, but points to the way shadow play extends itself towards new forms of art. By crossing over to these different artistic disciplines and different presentation contexts, shadow play demonstrates its continuous growth and its ability to reflect the ever-changing ways of contemporary living.

New forms of shadow play are enabled by new developments in technology. The invention of the halogen lamp in 1958 in the USA, enabled the shadow artist to make new experiments. The halogen lamp allows greater distance between performer and screen with sharp definition



Figure 132 Videoplace, Myron Krueger, 1968.



Figure 133 Shadow Bag, Scott Snibbe 2005



Figure 134 Zack Booth Simpson, Mariposa 2001



Figure 135 Messa di Voce, Golan Levin and Zach Lieberman, with Jaap Blonk and Joan La Barbara, 2003.

between performer and screen with sharp definition maintained. The puppets and actors can move freely across the stage to achieve wide range in scale and framing without losing sharp definition (as shown in Larry Reed's work). The movement of multiple halogen lamps across the stage, together with puppets, actors and objects, changes the stage's shape. The multiplicity of light sources breaks the screen into pieces and creators can escape the fixed rectangular frame. The halogen lamps also made it possible to expand the screen, allowing performances on a large cinematic scale. These new possibilities broke away from the two-dimensionality of shadow theatre and allowed the representation of a third dimension.

The integration of computational media with shadow play performance allows an even greater expansion of shadow screen space. Virtual space and moving images can accompany the world of puppets, as shown in the wayang listric performances of Sidia and Mardika.

Contemporary shadow play found its place in gallery installation through works such as Boltanski's light-and-shadows settings. His installations evoke a mystery world created by candles or small altar-like lamps. Boltanski's spaces are animated by floating shadows of puppets that he makes from simple found material.

Shadow puppet techniques have found new uses in interactive computer art. Myron Krueger's Videoplace, developed in 1970, combines the live video 'shadow puppet' of a human performer with real-time computer-generated animation, guided by algorithms to track the shadow's



Figure 136: Boltanski Christian, 1986, Les Ombres (The Shadows), Musee de Nice

outline and identify key areas like hands. Recently Krueger's technical and aesthetic innovations have been adopted by many media artists, using the ubiquitous digital video-cams and readily available image-processing software (for example the work of Scott Snibbe , Golan Levin and Zack Booth Simpson).

Despite these transformations in form, a key characteristic of shadow play performance, one that carries on, is that it acts as the situated media performance. This somewhat broad consideration leads to an exploration of the evolution of shadow play toward situated media performance.

Situated Media Performance

Situated media is commonly defined as a physically grounded systems — a place that act as a filter or a trigger for information — where information is linked to objects and locations in physical space to provide the ability to access and interact with information in context. The common focus is often on how meaning can be communicated through novel approaches to sensing, modeling, interaction, and feedback, e.g. an intelligent space. In this work I refer to situated media as an artistic practice that acts as more than a mere functional linking of physical and digital information space. The contextualization of media in this work extends the linking of physical and digital towards spiritual and social.

This approach is drawn from shadow play performance, which provides a model for situated media art - braiding together contextual, spatial, temporal and social

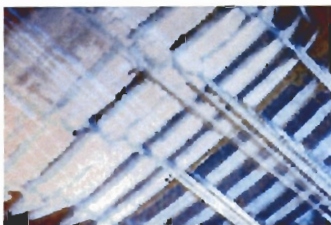
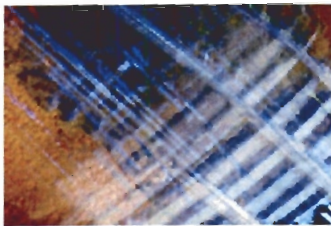
considerations. The artistic method shifts from working towards final product and outcome towards the development of processes, methodologies and performance systems, in which performers and participants can interact, transform and improvise. The creative engagement among performers, audience and media materials brings together communities and allows new visions and communal identities to emerge. By situating media performance we can provide meaningful, secular events for a diverse community celebration that honors the interrelatedness of every aspect of our lives as exemplified within the communal and cultural milieu we live in. In this way situated media provides space that contributes to cultural exchange and articulation. This approach is best exemplified in the One River (running) installation that was designed to celebrate the connections among Surrey citizens and to explore Surrey as a meeting place for diverse cultural groups. The connection among participants, with their different cultural perspectives, was grounded in common appreciations of Surrey as living space and meeting point. This work represent an idealized image of the Surrey community in a way that allows new conversations, dialogues and insights to emerge, through the braided process of symbolic juxtapositions. These new braided conversations contribute to the construction of an idealized image of the community by intersecting different social groups that in everyday life might not have the opportunity to come together.

As discussed in chapter 1, Anthony Giddens' (1991) articulation of post-traditional order provides a framework for an understanding of the concept of place in the context of modernity. Cultural interaction under the post-traditional

order is changing the very nature, the heritage and the values of the local. Situated media performance emerges within post-traditional order as a contemporary form that provides a meaningful space for the transformation, articulation and redefinition of the rules of society. It provides space and time for cultural dialogue and political intervention. All of these elements braided together contribute to social healing.

Within situated media performance the experience of place is acknowledged through direct interaction in a given space, time and context among performers, participants and media. The interactive installation *Leaves*, discussed in the previous chapter, provides a kind of cultural dialogue, staged as a media mirror that reflects voices once present but no longer among the living in downtown Vancouver. This immense absence points to political shortcomings and the inability of our society to protect those in need. This work represents a particular aspect of this neighborhood but its reflection is meant to reach everyone that passes by. For people who live in the neighborhood this work initiated memory of their loved ones, continuously stimulating stories about mothers, sisters, spouses, neighbors or girlfriends. People would gather on the street, in front of this curious window, and the reflections would begin. For people only passing by, the work stands as a reminder that the issues present in this neighborhood go beyond its boundaries and are a much larger concern that extends to society as a whole.

Turner's concept of liminoid phenomena as creative anti-structure that allows social transformation is relevant here. The potential of situating media in this way lies in its ability to provide reflexive space where diverse cultural groups and spiritual realities of complex post-traditional communities



are shared. In this situated media work we have an opportunity to create a space and time where ordinary reality transforms into a new 'idealized and imagined' reality. This special space/time provides us with an opportunity to articulate our world and to reconstitute new meanings and future paths into a regenerated communal culture. The new vision of community shared by means of media situated in this way stimulates social action that is inclusive of the common goals articulated within the work. The articulation of shared contemporary realities is achieved by providing a place where neighbors meet and interact within a creative and cooperative environment grounded in the specifics of a locality. The work *Leaves* marked the section of the street as a meeting point where people would begin to share their stories, experiences and passions. This situation enables the issues that mark this particular reality of place to be explored and discussed among people affected by it and people who accidentally pass by this imaginary mirror.

Performance Systems for Situated Media

Situated media performance emerges through the interaction between artists, performers, and audiences with the multimodal media and materials of the work. The flexible, open-ended character of this structure allows the performance to respond to political and cultural events. Media situated in this way have the potential to be profoundly influenced by local events and provide a space for cultural dialogue, political intervention, and social healing.

Figure 137 [previous page] image sequence from Gradual Prelude, Animation Aleksandra Dulic; Music composition Kenneth Newby.



Figure 138 SKIN Live animation: Aleksandra Dulic and Kenneth Newby; dance and choreography, Harry Daniel.

Figure 139 [next page] image sequence from SKIN, Live animation Aleksandra Dulic and Kenneth Newby.

The suggestive power of this open structure is that the same work can be presented in a flexible fashion not only from performance to performance but within a single performance in dynamic response to the context of the performance itself. Every new performance allows for new elements to be integrated into a play and old ones to be eliminated. Every performance is adjusted to support the relationship between performers and audiences continuously redefining its outcome. The shape of the performance maintains an overall form, but various aspects and actions within performance are continuously renegotiated.

This flexible character of situated media employs the dramatic structure of Asian narrative as a system of braids of several strands of activities that bring performers and partakers together here and now (Schechner 1985). The truly novel and ever-changing performances are created through the interactions among performers and audiences. The braided relationships among time, space, spectator and performer are based on participant action. This process allows different participants to engage in different aspects of the work through independently variable elements that call for audience participation.

In a series of essays, "The Open Work," Umberto Eco (1962) articulates the concept of "openness" of the work of art, where the arrangements of elements of a work are open to different interpretations on the part of the performer, audience and reader that then become significant parts of the complete work. Openness of the work of art leaves the work unfinished and flexible in order to be completed by the

participants. Eco notes that, although a certain level of



openness is intrinsic to every work of art in the flexibility of its interpretation by individual spectators, these new works are intentional, and explicit, in allowing a new level of interpretive potential. These works are based on a semantic plurality that makes them larger than any single instantiation, performance or reading can contain.



In open work the participant is placed at the focal point of the variety of interrelations that make up the work, and therefore a creative response is demanded from the participant. The action involves constructing an experience from a disparate number of elements that do not exist in the absence of the participant whose role is to articulate closure of the work. The participant collaborates in the construction of a particular meaning of the work, but in no way exhausts the potential for other meanings in the form of other instantiations.



Open work supports structured improvisation—a chaos and cosmos negotiated between the art system and a group of participants. Improvisation for the participant allows an instantiation of the work within a co-constructed context—a form of distributed dialogue with oneself and others—where the role of participant is both as ordering agent and as source of novelty.



Situated media performance is a form of open work that braids together spatial, time-based and contextual factors. The concept of braided processes provides a structure for animation that extends the media forms to include the body and performance. A situated media performance system

developed as part of the Computational Poetics research

project includes several related experiments in the area of electronic media design for theatre, dance, and improvised cinema. This evolving performance system for situated media was used in various interdisciplinary projects that integrate music, dance and choreography and theatrical scenography using machine vision, listening and other sensing inputs. Each performance brings new approaches and new developments of this system. This performance system is evolving into an instrument for situated media.

Every instrument that is used by a given culture has some kind of cultural encoding embedded in it and carries cultural information, which means that it will perform differently and elicit different responses in another culture. For example, tuning systems across cultures are significantly different. Tuning systems can differentiate one culture from another, which makes them into carriers of cultural information. There is a difference between the tuning system on a Balinese gender and a tuning system on piano keyboard from Germany. The differences between these tunings one might call cultural information, after Gregory Bateson's (1972) definition of information being a difference that makes a difference, or a difference that is significant in some way.

Using a unique combination of embodied practice skills expressed with custom-designed performance software allows artists to situate, improvise and perform with media. The production of situated media work includes the design of software and hardware for performance systems. The design of technology is extended towards the design of an

instrument that has the ability to support performance with various media objects, methods and processes. This new instrument becomes an interface through which content and meaning is generated in an improvised and performative manner.

By developing performance instruments we articulate specific characteristics of contemporary culture. Kenneth Newby and I designed different approaches to performing animation are now evolving into a complex performance system. In the work *Skin 2003/2005*, which we developed in collaboration with choreographer Henry Daniel, computation is combined with videography and used to create a fluid composition with electronic moving images within the context of dance scenery. Electronic visual media in this work are composed from live and recorded video feeds that are animated and transformed in real-time processing of the source image that depicts the performers on stage. The concurrent projection of moving images and animation provides an extension of the theatrical space. The greater integration of media practice with live performance promises to powerfully enhance the production with an augmented, hybrid scenography, bringing cinematic techniques to the theatrical context.

In this work the role of the videographer is no longer that of an operator, but that of a painter or a creative performer. The synthesized effects and images captured and created in the moment of performance in this work extend the dance stage with animated scenic space. The video recording and editing/processing are done on different devices: the camera records the live performance while transmitting the video



Figure 140 Improvised Animation, Aleksandra Dulic and Kenneth Newby, Music performance, Intermission Arts Society Mercury Theatre III, 2004

signal to a separate computer equipped with software that processes the video signal, alters the image, composites it with other visual materials and sets it in a virtual space that is projected on stage.

For the presentation at the Mercury Theatre III in Vancouver 2004, we used the same performance software designed during our collaboration with Henry Daniel, but instead of dancers the animation source was composed of a slice of the moment in our contemporary lives illustrated by current newscasts and media images that signified them. This performance was composed as a reflection on the symbols of the global information society. Current events were questioned through juxtaposition of the diverse media images, such as images representing our ecological reality, the representations of natural catastrophe happening at that time, images of current wars and depictions of symbols that commonly represent Canadian identity and values.

Figure 141 Improvised Animation, Aleksandra Dulic and Kenneth Newby, Music performance, Intermission Arts Society Mercury Theatre III, 2004





Figure 142 Reason, stop motion animation, Aleksandra Dulic and Kenneth Newby

The various images and symbols that I collected were recombined so that the authority of their original context of presentation breaks down, and new contextual reality forms through the connections shaped by juxtaposition. Here the skeleton of the tale was defined by the choice of media images I encountered in a week while coming to a performance: the procedural structure was defined by the animation processes embedded in the software; but the performance itself was truly novel in that new connections appeared through this process, because the image was constructed intuitively within the presence of an audience. This improvised animated collage projected on the screen becomes an image of the thought process that reveals itself through performance. This performance engages the viewer in such a way that it enables one to construct, complete and find closure for an image. The relationship between performance and audience is creative in that this animated collage engages the viewer's imagination in the space in between that Reed talks about, where everyone's attention and focus converges on the screen. The images are braided together into a composition that interprets them through their re-contextualization. This concept of braiding media materials and sources within a structured but flexible system is inspired by Balinese shadow play. The media documents from my immediate reality are used as material for a symbolic reordering that is reflexive of global media and its connection to the locality of Vancouver.

The stop-motion animation tool has a digital video camera attached to the computer that runs custom designed software. The software assembles and displays captured frames in real-time. The frames are captured in buffers,

which are distributed across three layers with luma keying and dissolves. Every layer has its own unique controls that can be manipulated in parallel. This tool differs from other digital animation software such as Frame Thief, in that it is designed to enable the working with stop-motion animation in the performative context. It allows the performer to build multiple animations, and store them in buffers, as well as mix stop motion animation with prerecorded movies, special effects and other camera sources.

A performance system for displaying and navigating animations and other visual objects in 3D space is another aspect of this system. Here the pre-animated 2D objects are moved around in the 3D space that provides a virtual stage for the action. This work functions like an electronic shadow play. This approach to animation was furthered explored in *One River* (running) and *Leaves* discussed in Chapter 6.

Electro-acoustic composer Barry Truax (1984) describes man-machine systems as existing on a continuum between generality and strength. At the general end, a low-level programming language is said to have weak procedures. This allows for maximum flexibility for the user, but it also means that one has to constantly input information to generate any results. At the strong end of the continuum, the specific purpose, powerful programs have procedures that allow the user little flexibility, but consequently require much less information (tending therefore towards automation). Somewhere in the middle is an area where a trade-off between flexibility and information requirements allows the user maximum interaction and productivity.

In terms of the Generality versus Strength dichotomy, we intend our performance system to lie somewhere in the middle – the “sweet spot” where, as Truax pointed out, there is a maximum potential for user interaction in the performance context.

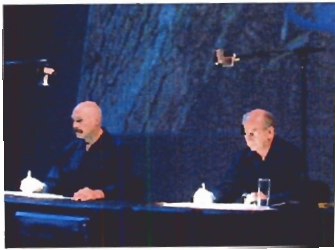


Figure 143 Bob Ostertag [left] and Pierre [right] performing on the stage.

Animated Performances of Pierre Hébert

The work of Pierre Hébert extends animation toward performance. Pierre Hébert started performing animation in 1984/85 because he was not happy with the way his films were viewed and distributed. He first showed his animated films with live music performance, where he would play sound effects on stage with musicians. The main idea was to project the silent film and produce the music and soundtrack on stage, thus creating a theatrical situation.

Because Hébert felt the musicians were taking all the risks of live performance while his films were presented as a finished product, in 1986 he came up with the system that would allow him to create animations live while the projector was running. This was a turning point for Hébert’s performative animations. The system consisted of a 16mm projector placed in front of a light table. There was a forty-second loop of black leader. Hébert would pick up the loose part of the loop and scratch on it for as long as the projector’s pulling would allow. Then he would take another loose section of the loop and work on it, until eventually he’d scratched the whole loop, building the work through interaction with the

musicians. Hébert's main reason for collaboration with musicians was because they were improvisers. This collaboration allowed him to express his long interest in the movement of the body of an animator. This impulse relates to the work of Len Lye and Norman McLaren.

Hébert created a system with two projectors, one projecting on top of the other on a white scrim, behind which were the musicians. The top projection played loops from previous performances. The bottom projection showed the loop he was scratching and working on in that specific performance. After every performance the newly created loop was added to the film that included all the previous performances. This film was edited and composed by Hébert. In this way he took on the risk of performing film animation live on the stage.

The limitation of physical loops is that it is not easy to change the order of the film and not possible to rearrange any one section. The performer is bound by this loop running twenty-four frames per second, forty seconds long, always the same. To create a more dynamic system, Hébert built a mechanical shutter, operated with a bass drum pedal, to allow him to block the projection.

All the issues around the inflexibility of loops are completely solved in the digital domain. In the year 2000 Hébert in collaboration with San Francisco-based composer and musician Bob Ostertag created Living Cinema ensemble. Ostertag and Hébert actually perform an improvised animated movie live on stage. Hébert creates animation using diverse media ranging from drawing to stop motion, while Ostertag generates musical accompaniment with various



Figure 144 Living Cinema Pierre and Bob Ostertag

performance techniques such as drawing on a graphic tablet that transforms doodles into melody. The success of Living Cinema performances is largely attributable to real-time image and sound-processing techniques enabled by software that is designed to allow various animation and sound techniques to be created in the real time of the performance. Ostertag created both animation and sound composition software for improvised performance. The work does not celebrate technology but rather questions it and its relation to the bodies of performers, the world around us. This questioning of the relationship of our bodies to technology is reflexive of the issues that arise from our interaction with the world of technology, and aims to illuminate its aftermath. In this sense their work provides metacommentary about the nature of interaction mediated through technology, as discussed by Huhtamo (Huhtamo 1995). Living Cinema illuminates these questions through critical and reflective perspectives on the technological properties, influences and contexts.

The body is the fundamental bond between the performer and the audience, and the basis for "performance." Since we are interested in technology, our performances always involve putting technology and bodies together. [...] We believe that the uneasy relationship between human bodies and machines is merely one instance of a much bigger uneasiness between machines and life on our planet. This too must not be hidden in the shadows, but illuminated. For example, the exponentially increasing power of computers is something we find extraordinary and we choose to explore this in our art. However, exponentially accumulating piles of garbage are a necessary and integral part of constantly

increasing power of computers. They are two sides of the same coin. Art that investigates the bright side and not the dark side ultimately can only become yet more props for an increasingly oppressive technological culture we wish to challenge." *Living Cinema*, Bob Ostertag and Pierre Hébert 2005

The improvisational character of this cinematic composition enables Hébert to introduce new elements in his animations each time the performance takes place. In this way he continually reflects on a particular space, time and context of the experience he is creating. In the work *Between Science and Garbage*, *Living Cinema* incorporated the front pages of local newspapers, windup toys, and symbols of consumerist culture, such as coca-cola cans and potato chips. Hébert builds sumptuous textures out of drawings and frame-grabs, from which he utilizes artistic reference points: combining watercolors, stop-motion, drawn and collage animation. He braids these familiar cultural images into an accessible visual poetry reflexive of our global and local media environments and symbols.

Within the animation performance system loops can be organized, the order of frames and speed can be changed; any one section of the loop can be played independently. Hébert can superimpose two sections of the same animated sequence with different speeds and durations. In this new work Hébert combines and plays with finished animated sections.

Figure 145 Living
Cinema Pierre Hébert
and Bob Ostertag



This new digital animation system solved many problems that arose from working with mechanical equipment. While doing scratch animation Hébert had to turn his back to the audience, which influenced the performer's relationship with the audience. Since 16mm film is so small, the audience could not really see what he was doing.

Hébert combined several animation techniques, such as drawing on paper, painting on glass, and manipulating objects. All animation work is captured with a camera that looks downwards, focused on the 8 x 12 surface of the table.

For "between the science and garbage" Hébert used two specialized computers with one camera attached to each. The main computer was used for camera-captured animation, while the other was used for fixed elements, newspapers or pictures for example, and pre-recorded quick-time movies. These two computers were plugged into a video mixer with a

third camera attached directly into the mixer to record 3D stop motion animation. Images from the three cameras are separately mixed so that animation processes do not interfere with one another.

It took Pierre Hébert a while to learn and develop this animation system, to find solutions to the problems he was facing.

The software elements that Bob designed for Hébert allow keying, mixing, color manipulation. The key feature of the software is the video buffer technique that allows capture of animation frames. There are four different buffers with independent settings. The same material can be placed into different buffers and manipulated by elements such as speed, forward and backward directions and duration, to create different segmentations. One can combine and key the animation that is being created in the moment with previous animations and other pre-recorded materials. In the keying mode each buffer becomes a layer.

“There are two dimensions to the process of creating the work. Because our performances have to do with the things that develop in the world, we introduce new references to new events and things that happen recently. Sometimes we make reference to the city we are performing in. Since we are working from scratch every time it is easy to add new elements. We adjust the work to the new situation even to a point that it is not exactly possible to repeat the same performance twice.

The other dimension is the process of learning the software

that is constantly changing and developing. There was a learning curve for me from the first time I performed with the software five years ago. The turning point in my performance with the system was when I learned how to use buffers and asked Bob to add more buffers. I turned toward manipulating controls that are specific to each buffer. In this way I can introduce cinematic controls to the performances. Developing the moving images on the screen into a complex layered fugue.”¹ Pierre Hébert’s animation software becomes more and more like a musical instrument. His new system provides many new opportunities for situated performance. “The more it is as an instrument the more I have a pleasure to play and perform with it and articulate the image more expressively.” Pierre Hébert’s² live performances are profoundly improvisational, influenced by the improvising musicians he works with, particularly with respect to the way they approach the recording studio, how they develop and compose work in the studio, having in advance only a general idea of what they want to achieve.

¹ From interview with Pierre Hébert

² From interview with Pierre Hébert

“Improvisation is the process that builds on previous experiences and develops them further. I consider my animation work a form of writing. Where the process itself is leading you to different directions.” Pierre Hébert’s³ interest in puppetry evolved from working with dancers. “Animation is a bit like choreographed dance of forms. It is based on using motion as a main element. It is not uncommon to find animators talking about their work as a sort of choreography. There is a technical apparatus between the animator’s body and the motion that is projected on the screen. I came to an idea that there is in animation a situation of erasing the body from the work.” Pierre Hébert’s⁴ work is a situated media

³ From interview with Pierre Hébert

⁴ From interview with Pierre Hébert

performance that braids together previous performances, animation in the moment of the performance, and reflection on the current situation and place. His work was very influential in the development of our Computational Poetics animation system and live performance ensemble. Our system of animating with 2D and 3D space, developed in "One River," is extended to include a stop-motion animation and similar buffering system for the performative context. His work was also influential on a content level; this is exemplified especially in the animated collage performance we presented at the Mercury Theatre III with Intermission Arts Society playing music. This work, similarly to that of Living Cinema, constructs an image that is reflexive of the particular moment, and recombines media symbols into a critical commentary.

Conclusion

The relationship between shadow play and media performance pivots around the common dramatic structure that supports improvisation and animation in the moment of the performance.

The dramatic principle that underlies animated performance of shadow theatre is used here to enable one to animate objects and graphical and aural elements by body movement. Here a new situation emerges for the animator. The movement of an animator in a presentation context becomes central to the work — a situation very similar to the one found in shadow play performance. Hence, the concept of

braided processes, derived from shadow play, enables improvisation and real-time animation driven by the participants' action.

The composition and generation of electronic media in the real time of the performance is easily enabled by the flexibility offered by computation. Computational media provide an extension of cinematic media. The braiding of encoded process with live animation, narrative elements and participants' actions positions situated media art as a continuous development of shadow play theatre.

Conclusion

I have sought in this dissertation to answer the following key questions: How can the formal structure and social context of Balinese wayang kulit inform media performance practices in interactive computer-based art? How does the formal structure of wayang kulit reflect its social purpose and contribute to the articulation of significant cultural meaning? How do computational technologies integrate with cinematic media in the context of performance and installation art?

A broad survey of primary and secondary literature has been undertaken to inform this research. I have drawn from my field studies of shadow play across North America and Bali between 2003 and 2005. As well as from my practice as a professional artist engaged in developing methods, processes and techniques for situated media performance and installation. The artistic outcomes of the work presented in this thesis are treated as a series of ongoing studies developed between 2001 and 2005. The outcome of each study defined the structure of the one that followed. These outcomes functionally enfold many perspectives related to the production of culturally significant meaning. In particular specific questions regarding the relationships among the artists, participants, community and materials of situated media work have been articulated. The process of creating a performance mechanism for situated media was complex because of the diversity of foci that oscillate across socio-political, artistic and technical considerations. The concept of

braided processes is a key notion that holds the diverse elements of this interdisciplinary research into an integrated study.

In the Cinema of Braided Processes the braided process as a compositional model functions across several parallel and interacting spheres. Braiding together spatial, temporal, contextual, and socio-political considerations, within which the work is experienced presents first level in which this concept can be understood. This aspect of braided processes refers to a philosophical approach to interaction mainly in the way the work is conceived. Situated media artwork is not any more conceived as a final product. Even when the same story is presented in different places it is always situated within the particular space, which does not only refer to the geographical location, but also addresses specific cultural and ethical characteristics in which the work functions. The temporal consideration refers to the particular moment in which the work operates, while contextual braiding refers to the particular purposes and aims with which the work is developed. These various foci are positioned as processes that influence the formation of artistic concepts and have socio-political and ethical function, driving the developments of particular technology and artistic production.

On the second level, braiding together multi modal media—audio, visual, textual, procedural, generative, kinetic, and proprioceptive elements—defines an internal formal structure of the cinema of braided processes, which is enabled by computing technology. Here the braided processes articulate the formal way in which various computational and media elements can be integrated into an

artistic whole. Finally, the third level refers to braiding together computational media algorithms with any number of inputs to drive real-time interactive processes. Here the braided processes link the internal structure of computational media with environmental factors, such as the input of the skilled performer and/or audience participation.

The original artwork developed as a part of this thesis has been shown nationally and internationally. Public presentation of the work, as a dissemination mechanism, was an important element of the overall research process. This provided an opportunity to test anticipated outcomes within a public space.

Commentaries based on the cross-cultural examples of Balinese, European and North American electronic and non-electronic shadow plays that are discussed and analyzed in this dissertation tend to be suggestive rather than conclusive. Thus the research uncovers artistic and technical nuances that contribute to the expansion and regeneration of artistic methodologies for situated media performance.

In this research I have taken an approach consistent with my aims and objectives as an artist/scholar. Computational technology was implemented as a means to extend my practice as an animator towards interaction as facilitated through performance and improvisation. This work attempts to link the new field of interactive media art with other disciplinary contexts and to find connections between this new technological time and other historical periods. The emergent practice of interactive media art is positioned as a moment within the continuous development of a tradition.

Historical and contemporary examples of shadow play performance practices were used to contextualize this emergent form and provide a dramatic structure appropriate to performing with computational media.

As an artist I approached this research as a practice-led endeavor, which meant that my praxis and contextualization, both historical and methodological, led me to formulate a particular approach to interactive media art as situated form. As a scholar I developed the theoretical model of braided processes as a dramatic structure to support performance, improvisation and interaction with computational media. This concept evolved to provide a design framework for my work.

I placed the activity of artistic practice at the base of theoretical articulation and contextualization. This thesis is a set of critical and discursive positions taken along the axis of relationships among interactive media art, shadow play, cinema and computational technologies, all from the perspective of the artist practitioner. Thus the thesis is concerned with artistic innovation in which both artistic techniques and new technologies are developed as a means to articulate socially significant meaning and action.

The research contributes to new knowledge in three areas:

1. Compositional approach, techniques, tools, methods and artistic outcomes in interactive media art

This thesis makes a contribution to the development of artistic methods and computational tools to support the creation, composition and execution of media performance,

based on practices exemplified in traditional shadow theatre. The ideas developed throughout this research (derived partly from the process of adopting the encoding of practice as an artistic methodology in order to take advantage of the computational environment and the emerging media from within that environment) suggested new ways of integrating techniques, tools and outcomes. I brought to my research a background in visual arts, mixed-media installation, film and animation, and extended my skill-set to include improvisation and performance by means of computation.

A series of art projects and studies investigated the computer as artistic medium to provide a focused exploration of the basic elements of a computer-based composition that would support interaction, improvisation, open work and performance. Through this artistic research the issues surrounding emerging media-performance practice enabled by computing technology were explored and analyzed.

2. Antecedents to media performance

If we consider computational media performance as a development of shadow play tradition we can study a form that has had thousands of years of continuous development. Media performance is contextualized through intersections across cinema and shadow play. Shadow play performance in Bali and North American cultures was studied in relation to the history of cinema.

Giving life to inanimate objects in the moment of performance is the quality shared by shadow play and media performance. The main focus of this research has been on the

dramatic structure that supports animation of inanimate objects in an improvised manner. The idea that media can be performed and situated led me to the study of older multidisciplinary and 'braided' forms exemplified in Balinese shadow theatres. The living contemporary tradition of Balinese shadow play offers a fruitful source of philosophy and praxis relevant to the creative and compositional process of media performance.

This work was carried out in the spirit of an inter-cultural exchange of artistic and creative processes and methodologies across the contemporary shadow theatre (wayang kulit) of Bali and the shadow theatre of North America. The numerous examples of contemporary approaches to shadow play provide a catalogue of methods, tools and techniques for shadow puppet theatre augmented by computing technology.

3. Braided Processes as a dramatic structure for situated media

The dramatic structure of braided processes was developed to accommodate artistic composition that integrates computation as a medium for composition with performance and improvisation.

The braid is formed by media strains and processes shaped by audience participation. This structure relates to Eco's notion of an open work that integrates active participation of the audience in order to complete the work. The processes and materials of the work are designed within this open structure to enable the integration of the space, time and

context in which the work is presented. The focus on the creation of a collaborative, improvised and participatory environment characterizes interactive media art as situated media.

Since performance in the context of computational media art is positioned at the center, performance study and theory provides a framework for an analytical approach to media performance. The aim of this research, to enrich the field of interactive media art by extending the interaction mediated by computing technologies towards ritual performance, has been met in the following way. This research has advocated interactive media art as an interface for a ritual performance that acts as a social agent and embodies ideas through encoded action. Ritual performance, as articulated by anthropologist Victor Turner (in terms of the relationship between theatre and ritual), has been extended here to refer to contemporary interactive media art. Turner's distinction between liminal and liminoid ritual performance provides a framework for understanding the difference between traditional and posttraditional ritual. The ritual within interactive media art, parallel to that exemplified by the intercultural media performances of Sidia and Reed, is understood as liminoid space: time and context that is characteristic of the posttraditional condition. The DVD archive of artistic and technical studies focused on interactive media art and its potential to provide a ritual interface for structuring social interaction, is an attempt to document practices and multimodal artistic outcomes that were created as a result of this research. This documentation is not meant as a substitute for interactive and situated-media public artwork, but is aimed at capturing the artistic process and

necessary technical characteristics of these performative media works.

The textual discourse provided in this document articulates issues that arise from the research and seeks to frame the cultural, artistic and technical functionality of a series of integral art-based experiments.. Thus my initial claim that interactive media art as a situated performance acts as ritual performance and as an interface for secular, social and cultural articulation — a process that provides this form with social action — has been demonstrated through complex interrelationships across artistic outcomes, reflection and contextualization.

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Appendix 1: Artwork Documentation, DVD

About the Artwork

Document Abstract

Artwork Documentation

Computational Processes for Media Performance

Illumination Machine, Aleksandra Dulic and Kenneth Newby, 2002

Electronic Sphere, Aleksandra Dulic, 2002

Videojoiners, Aleksandra Dulic and Kenneth Newby, 2001

City Mirror, Aleksandra Dulic and Kenneth Newby, 2004

Metro, Aleksandra Dulic and Kenneth Newby, 2003

Media Installation

Two Visions, Aleksandra Dulic and Kenneth Newby, 2004

Leaves, Aleksandra Dulic and Kenneth Newby, 2004

One River (running...), Computational Poetics Group, 2005

Media Performance

Gradual Prelude, Aleksandra Dulic and Kenneth Newby, 2005

Reason, Aleksandra Dulic and Kenneth Newby 2003

Cosmicomics, Animation Aleksandra Dulic and Kenneth Newby, Music
Composition Ben Wilson, 2004

Colored Bodies, Real-time Animation by Aleksandra Dulic and Kenneth
Newby with choreography by Henry Daniel 2004

Skin, Real-time Animation by Aleksandra Dulic and Kenneth Newby
with choreography by Henry Daniel 2004/2005

Appendix 2: Interviews from Field Studies, DVD

1. Interview with Hank Bull, Aleksandra Dulic and Kenneth Newby, Vancouver, 2003, interview transcription, html;
2. Interview with Hank Bull, Aleksandra Dulic, Vancouver, 2004, audio file;
3. Interview with Larry Reed, Aleksandra Dulic and Kenneth Newby, San Francisco, 2003, audio file;
4. Interview with Wayan Wija; by Aleksandra Dulic; advisor Kenneth Newby, Bali, 2003, audio file;
5. Interview with Wayan Wija; by Aleksandra Dulic; advisor Kenneth Newby, Bali, 2005, audio file;
6. Interview with Wayan Mardika; by Aleksandra Dulic; translator and advisor Kenneth Newby, Bali, 2003, audio file;
7. Interview with Wayan Mardika, by Aleksandra Dulic; translator and advisor Kenneth Newby, Bali, 2005, audio file;
8. Interview with Pierre Hebert, Aleksandra Dulic, Montréal, 2005