MelbourneDAC 2003

HeteroForm Organization and The Cinema of Braided Processes

Aleksandra Dulic

Computing Arts and Design Sciences
Simon Fraser University
E-mail: adulic@sfu.ca

Kenneth Newby

Computing Arts and Design Sciences
Simon Fraser University
E-mail: knewby@sfu.ca

ABSTRACT: This paper discusses an extension of the experimental cinema language through the possibilities opened by computational media. An investigation of the compositional potentials opened by computable cinema provides the ground for a new form of cinematic experience which involves an elaboration of conceptions of the traditional cinema image. The idea of braided narrative structure drawn from South East Asian performance traditions, in particular the Javanese shadow play, can act as a model for organization of media within computational environment. This heteroform organization of media can support a structured system of improvisation organizing a multiplicity of voices, negotiated order, distributed participation and direct dialog with oneself and others through the materials of the work.

KEYWORDS: computational cinema, computional poetics, generative art, new media

COMPUTATIONAL CINEMA

An experimental cinema based on process oriented computational media provides the ground for a language that extends the traditional cinema. This process orientation is enabled by the programmability of the computer and its ability to encode practices and mediate processes that organize or generate the various aspects of the audio-visual media and narrative elements of the cinematic experience. This provides a new kind of compositional environment that enables the expansion of both spatial and temporal resources of the conventional cinema.

The components of the processes that might drive a computationally expanded cinema involve fundamental conceptions of time and space in addition to relations among a variety of media elements: visual, audible, textual and generative elements—all constructed within an aesthetic of an open work in which a multiplicity of interpretations are implicitly defined into the work. The generative character of a process orientation is one of infinite variety; it becomes the playful ground for a significant variety of complex instantiations and interactions within the cinema experience. A new cinema composition can be structured as a creative system where narrative is constructed through the relationships of image elements that unfold in time. Here image is understood in the expanded sense of image articulated by Henri Bergson in which every element of experience is considered an image—a notion extended by Deleuze to include the image of thought itself. The process-oriented narrative takes environmental conditions into account and is capable of altering itself in response to its context. The encoding of the basic elements of cinematic practice constitutes a laboratory research into a new form of cinema—what we are calling a *cinema of braided processes*.

FORMATIVE STRUCTURES IN AUDIBLE AND VISUAL ART

Paul Klee's contributions to the theory of pictorial form (Klee 1956) 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 combined to create a simple pattern, which can be defined, in mathematical terms. Variations of these basic forms construct elaborations and ornamentations of that form. In the conceptual domain Klee's contributions to a theory of pictorial form finds an echo in the contemporary organization of form in digital art such as John Maeda's (Maeda 1999) formulation of the pixel and line as a basic element of computer mediated graphics.

In music the development of the serial method by Arnold Schoenberg and subsequent explorations of compositional process by post-Cage composers has established a formal analysis of many of the generative aspects of musical form.

An example of algorithmic compositional approach is *Computational Expressionism* by Joanna Maria Berzowska. Berzowska encodes 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[1]. Gesture input is treated as a deep structure from which to generate a "computational line," which she defines as a "sophisticated digital brush." The brush responds to various parameters of gesture, such as speed, direction, position, or order, to create the pictorial form[2]. This approach to composition in an explicitly procedural way suggests the analysis of the very nature of the drawing process, decomposing a practice to its basic elements.

In the audible domain the Voyager program by George Lewis is an example of a successful encoding of knowledge of basic musical forms and temporal processes allowing it to dynamically respond to musical input from another performer and even generate its own musical inventions.

ENCODING PRACTICE

The encoding of practice is an essential component to an art research that forms the foundation for computational composition (Newby & Dulic 2002). Code becomes an artistic material that orientates the production of the work away from a finished artifact and towards a process orientation.

Art and technology, while historically seen as antagonists of respective human inner and outer perspectives, are increasingly emerging as complementary modes of knowledge. Heidegger reminds us of a previous milieu where this state of affairs existed in his examination of the roots of the word *techne* as used by the ancient Greeks—referring as it does simultaneously to the activities and skills of the craftsperson, the arts of the mind, and the fine arts: technology, idea, and art. Technology as idea and poesis is made explicit in his characterization of the essence of technology as a mode of revealing or unconcealment of what is hidden—a coming to presence, a starting on its way to arrival, a responsible occasioning of this process in space-time. For Heidegger technology 'is the place where truth happens'. This initially strange conception of technology and truth is made more sensible in the epoch of the computer in which the machine itself is necessarily inert without the insertion of symbolic patterns of code—ideas—that allow the hardware to reveal the inner logic of the algorithm.

This is strikingly resonant with the contemporary view of an image of a 'becoming art' emerging from the descriptions of both theory and cinema articulated by Deleuze. The cinema, and we would argue the nascent new media as a whole, is a Deleuzian thought machine that can facilitate new modes of perception. Heidegger echoes this in his notion of art as "a becoming and happening of truth', an idea reinforced in Klee's famous dictum that art not merely reproduces what we already see but makes visible what we cannot see.

A cinema of processes is the landscape where the new 'images of thought' might emerge. We desperately need new ideas to confront the pressing social, economic, political and ecological exigencies of our present historical moment. An art practice that engages the deep structures of the creative process itself may begin to address the, as yet, unanswered questions of Lewis Mumford in his analysis of the relationship of art and technics: "Why has our inner life become so impoverished and empty, and why has our outer life become so exorbitant, and in its subjective satisfactions even more empty? Why have we become technological gods and moral devils, scientific supermen and esthetic idiots—idiots, that is, primarily in the Greek sense of being wholly private persons, incapable of communicating with each other or understanding each other?"

Our answers to these questions involve new ways to think of play. In particular the notion of winners and losers needs to be evolved. With James Carse let's consider an alternative to the notion of a game as a finite activity, played for the purpose of winning. Substitute rather an infinite game that is played solely for the purpose of continuing play. Rather than a game played within boundaries, let's play with the boundaries themselves. The game should be developed as a habitus with its own logic of practice as articulated by Pierre Bourdieau—replete with its own durable traditions of improvisatory inventiveness and playful novelty, analysis and intuition, research and practice.

Technology, idea and art—with idea at the center—the encoding of cultural practices both novel and traditional, contemporary and archaic, provides an opportunity to make external and objective something that is typically deeply internalized. In this way, quoting cognitive

---

[1] In the accompanying paper *Computational Expressionism, or how the role of random is changing in computer art* Berzowska and Walter Bender 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. They point to the fact that contemporary artists, while using commercial software, are not developing their technical skills.

[2] In his contributions to the theory of pictorial form Klee analyzed formative structures in nature— the articulation of gestural form composed through variation and ornamentation. Being first a musician he derived much of his formal approaches for composition from time-based musical structure. Time-based orientation is very important here because he articulated a gesture that unfolds in time.

musicologist Otto Laske: 'We have transformed ourselves into a partner of communication between two species of knowledge, one that is alive in us, and another that embodies us in the form of an external 'knowledge-base''.

HETEROFORM — FROM MUSIC TO MEDIA AGENCY

Heterophony is a musical term coming from ethnomusicology—an attempt to describe the difference between traditional European and certain Southeast Asian musical forms. A heterophonic music is organized in terms of how the different threads of the music relate to each other and is based on the emergence of an underlying yet unspoken structure that generates the overall composition. This form is commonly present in Japanese, Cambodian and Thai music but it probably finds it's highest degree of sophistication in large orchestral music of Java due to the sheer numbers of musicians and lines that are playing simultaneously.

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. 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.

This is a different approach to that of European polyphony, typified in the compositions of J. S. Bach[3], as a way of organizing a multiplicity of related voices. Polyphony mediates a balance between the independence of voices and harmonic constraints that need to be well designed to reduce the level of chaos potentially present within such a multiplicity of independent. Heterophonic form embraces chaos and uses a hidden deep structure to frame a complexity of simultaneous yet independent performances by its practitioners.

By extending this concept of ordered melodic chaos and drawing from related ideas of braided narrative found across a variety of complex performance traditions including Hindu theater, Javanese shadow theater, and Japanese Noh drama (Schechner 1985), we propose a comprehensive formal approach we are calling *heteroform*—a related form of braided processes emerging to form the core ordering structure of the process cinema. The threads of this complex braid are composed of the audible and visible images, textual, generative, kinetic and proprioceptive elements responsible for driving real time processes. The relationships between the individual elements of a heteroform braid are interconnected—"woven"—in different proportions and relations with all of the elements simultaneously accessible and correlated at some point to an underlying deep structure.

A useful model for a flexible, distributed and shared narrative system could be derived from the structure of the Javanese Wayang Kulit (shadow play). In the wayang orchestral music, puppetry, singing, poetry, narration, and lighting effects are woven over an extended time-frame of nine hours under the direction of a single individual. The performance is composed as a complex of layered temporal and spatial relationships. The three large divisions of the shadow play have a variety of metaphoric interpretations that suggest the simultaneous existence of different time scales: from a single day, a human life-span, to the history of a world itself. This large structure is further divided into smaller units in which narrative elements can be inserted. Relations of space and time with respect to the narrative elements are complex in the wayang. A narrative element has 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 Artistotelian notion of a narrative arc 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. 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 response to the context of the performance itself. And further, a strictly temporal logic of narrative unfolding can be augmented by a spatial logic.

Another interesting aspect of the complexity of this performance tradition for a new approach to cinematic narrative is the sustained multi-layering of language and character typical of the wayang performance. A.L. Becker (Becker 2000) points out that characters in the wayang are categorized into different types: divine, royal, courtly, profane; each with their own language and focused relationship to the narrative whole as well as spatial and temporal qualities. Each character type speaks

[3] In an attempt to translate music into graphical form Klee investigated the structure of Bach's Sonata no VI in G minor for violin and. Below the musical notation he mapped out a graphical system for representing the pitch of the notes and underneath this system he set out the schematically rhythmic groupings and dynamics as well as the structure of the bar as measured rhythmic units. He made a series of drawings he called polyphonic drawings using this generative system. In fact, Klee's drawings of the rhythmic movement and structure seem to be more an example of what we are here calling hetero-form: he draws a series of lines that all refer to the underlying structure as variation of that deep structure rather than individual elements, lines, that are distinctly different and carefully juxtaposed.

in a unique linguistic form, including archaic languages that the audience cannot understand but provide a powerful symbolic content to the performance. Each character has an appropriate spatial orientation to the left or right of the screen and above or below other characters present.

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 is reflected in the equally complex Javanese notion of calendrical time in which cycles of differing time-length run simultaneously. Each day is of varying significance in the temporal scheme as it represents the coincidence of different starting points in the various cycles or time.

Folding this sophisticated logic of semantic ambiguity, spatial and temporal coincidence together with Deleuze's proposal for a new logic of association the cinema of braided processes can fruitfully develop its own sophisticated logic of coincidence among the database of media threads it is composed of.

In the cinema of processes this 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. Audible threads, independent yet correlated in space and time; visible threads juxtaposed in space and time—sequenced and layered; textual elements composed of visible and audible forms—the ascii and spoken representations of language.

This complex braid of narrative elements suggests a new and dynamic version of Bakhtin's polyphonic voice in it's layered affinity with difference but also his more subtle notion of heteroglossia: the voice that is at once singular yet multiply composed—an assemblage of interilluminating elements in which dynamically shifting contexts allow the possibility for threads in the complex braid to converse with each other, identify affinities, form alliances, or suggest alternatives to interpretation. Different streams of the narrative allow movement from one to the other, always available to be mixed in different ways - to be montaged in time and accented with responsive processes.

The relationship among the braided threads is not simply one of stratification and association but takes into account the need for system agency, a taxonomy of generative techniques, and the identification of techniques and procedures for constructing these generative structures. This involves the encoding of editing techniques and media design competencies across disciplinary boundaries. How does the audible speak to and engage with the visible and vice versa? Where is the place of the participant within the complex resultant braid? These threads can be looked upon as a biodiversity with each narrative stream functioning as one element in the whole ecology of the work. The qualities of a functional eco-system are found here: a community of diversity and complexity all linked together by underlying mechanisms of balance, decomposition, circulation, and hysteresis.

CURRENT EXERIMENTS

The authors have been developing the cinema of braided processes on several levels. Composition tools are under development. The FlightControl system allows the interactive spatialization of multiple sound sources under process control including gesture-driven, orbital, and flocking algorithms. The CompoundEye system allows the composition and performance of correlated channels of video content. Experimental formal processes developed include temporal video collage techniques, interactive image compositing, and a heteroform 3D drawing machine integrating a motion capture system with a multi-voice algorithmic drawing system that draws points, lines, shapes, solids and textures in a representation of 3D space. An interactive editor for coordinating cinematic threads composed of audible, visible, and textual images is under development.

SUMMARY

□

The extension of a heterophonic organization of melody to a heteroform organization of complex media elements and processes is appealing because it is designed to support improvisation and variation. This structure suggests a powerful way of thinking of a new virtual cinematic form - a form that is never rendered perceptually as a whole. Heteroform endeavors to organize the individual aural, visual and narrative elements of the new cinema through a woven braid of real time processes, where every instance, individual element, or generation is unique but is referring to the shared inner melody.

A cinema of braided processes provides the ground for an analysis of new compositional techniques within a computational environment. The encoding of the basic elements of cinema practice extends the form and opens the door to a new cinematic experience. Since the temporal composition of the traditional cinema is fixed, the time structures in a process orientation need to be rethought. The improvisatory heteroform orientation of Javanese music and dramatic structure suggests a creative solution to the compositional and correlation of a complex cinema of braided processes.

BIBLIOGRAPHY

1. Bachelard, G. The Poetics of Space. Boston, Beacon Press., 1994.

2. Bakhtin, The Dialogic Imagination: Four Essays. Moscow , 1975.

3. Becker, A. L. Beyond Translation—Essays toward a Modern Philology, University of Michigan Press, Ann Arbor., 2000.

4. Bourdieau, P.. The Logic of Practice, Polity Press, Cambridge., 1990

5. Brandon James Ed., On Thrones of Gold – Three Javanese Shadow Plays. Cambridge, Harvard University Press (1970.)

6. Deleuze Gilles, Cinema II: the time image. The Athlone Press, 1989

7. Deleuze, Gilles & Parnet, Claire, Dialogues II, Columbia University Press, NY, 2002.

8. Eco Umberto, Opera Aperta (The Open Work).

9. Heidegger Martin, Basic Writings, Harper San Francisco , 1977.

10. Keeler Ward Javanese Shadow Plays, Javanese Selves;

11. Klee, P. The Thinking Eye, George Wittenborn., Inc., 1961.

12. Laske, O. The Humanities as Sciences of the Artificial, *Interface* 23:3-4, pp. 239-55., 1992.

13. Manovich Lev The Language of New Media, Cambridge, The MIT Press, 2002.

14. Mumford, Lewis, (1952). Art and Technics, Columbia University Press, NY.

15. Newby, Kenneth & Dulic, Aleksandra Encoding Practice—Visual Performer in Electronic Theatre. Journal of Media Practice, Volume 2 Number 3, Intellect, Bristol, 2002.

16. Rieser Martin, Andrea Zapp Ed., New Screen Media: Cinema, Art and narrative British Film Institute, 2002.

17. Schechner, Richard Between Theater & Anthropology, University of Pennsylvania Press, Philadelphia, 1985.

18. Sumarsam, Inner Melody in Javanese Gamelan, in Karawitan: Source Readings in Javanese Gamelan and Vocal Music, Becker, Judith, ed., Center for South and Southeast Asian Studies, University of Michigan. 1975.