Hybrid Space—Open Composition for an Immersive Environments

Aleksandra Dulic, Kenneth Newby and Martin Gotfrit
Computational Poetics Research Group, Simon Fraser University

The theoretical and practical concepts presented in this paper pivot around the composition and design of an interactive audiovisual installation *One River (running…)* developed by the authors as a form of open work documentary. This immersive media environment is a new form of participatory documentary that reflects the contemporary Surrey community it is presented in. This open composition takes advantage of a set of braided computational media and narrative processes as a dramatic model and integrates computation as a medium for composition, expanded immersive environment, performance and improvisation. The concept of braided processes provides a model for braided conversations and provides an open framework for describing an integrated relationship among various independent elements that comprise the complex media braid within the *One River (running…)* environment and is discussed in detail in this paper.

Open Composition

In a series of essays, "The Open Work," Umberto Eco (1962)—considering a variety of musical compositions making use of indeterminacy in their performance—articulates the concept of "openness" in the work of art, where the arrangements of the materials of the work are open to different interpretations on the part of the performer, audience and reader that 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 in the moment of its presentation. 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 plurality that makes them larger than any single instantiation, performance or reading can contain.

In the open work the participant is placed at the focal point of a variety of interrelations that make up the work, and therefore a creative response is demanded from the participant. This reaction 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. In this way 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. The open work supports structured improvisation—a dynamic balance between 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 that of ordering agent and source of novelty.

Situated media installation 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. The braid is formed by media streams 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 this form of interactive media art as situated media. *One River (running…)* is one such situated media system developed as part of the Computational Poetics research project and includes several related experiments in the area of computational media design for improvised cinematic installation.

Open composition of braided media elements, as a form enabled by the potentials afforded by computing technology, allows a database of prerecorded elements to be represented, constructed and generated in an improvised and flexible manner in the course of performance. This braided media form extends the cinema and other recorded media in that it inherits the capacity to automate the multimedia image in time in the same way linear media does; but in addition this interactive media enables processes such as reorderings, flexible juxtaposition, resynthesis, iterated mappings, functions of history, feedback, temporal dynamics (dilation, compression, counterpoint) performance and the body to be integrated in the artistic whole. Embodied performance and process are integral to this form of interactive media.

The outcome of a responsive interactive media art has the potential to be profoundly influenced by local events because of its performative nature. The situated interaction with media can act as a socially active agent through the composition of the media events that are embedded in the particularity of place. Performance with braided media symbols becomes an instrument for social action that can contribute to the healing and strengthening of the quality of social interactions within the group and place in which the work operates.

Braided Conversations

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 propaganda and 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 had 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 (1964) refers to it, as well as sensation and complementary expression, action, and reaction.

The model of conversation implied 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 a 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]. We developed the concept of braided processes as a narrative structure for interactive media in order to model the work of art and 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 a particular space, time and context. In this way the concept of braided processes contributes to strengthening and diversifying the place and locality of its presentation. 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.

Braided Processes — a Narrative Structure for Situated Media Art

The compositional and dramatic model which we 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 drama, and is particularly used in our work as a model further articulated to enable research and design of situated and performative media compositions. 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 the 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 Balinese shadow play (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 traditions such as the Balinese shadow theatre provide case studies in media performance. The Balinese shadow-play performance traditions embody this braided model, producing possibilities for flexible and interactive responsive multi-media events as well as socially engaged 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 Artistotelian 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 lays in the fact that the same story can be told in a flexible fashion not only from performance to performance but within a single performance as 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 the 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 the performance are continuously renegotiated. The braided narrative structure allows this continuous reworking and renegotiating of the narrative material in that it provides a framework within which the new elements—musical, textual or chorographical— 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 typically less fixed in the rehearsal process but more fixed in the performance with the rehearsal process based on a search and discovery of the idea of the work leading to a relatively fixed presentation of that idea in performance. 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. As a result 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.

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 layering and 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.

The dramatic model of braided processes bridges various elements that go into the development of the artistic whole within situated media work. 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 us to conceptualize the interaction mediated by computing technologies in interactive media art as a form of ritual performance. In this context 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

The braided process as a compositional model in our work functions across several parallel and interacting spheres. Braiding together spatial, temporal, contextual, and socio-political considerations within which the work is experienced, presents a first level in which this concept can be understood. This aspect of braided processes refers to a philosophical approach to interaction in the way the work is conceived. A situated media artwork is now not conceived solely 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 a 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 functions, driving the developments of particular technologies 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 a braiding together of 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.

Heteroform

Within the dramatic model of braided processes heteroform organization provides a formal method for ordering structure drawn from musical concepts of an ordered melodic complexity—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 melodic 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 from 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 complexity 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. Applying the idea of heterophony to include visual and dramatic mediums constitutes a 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 written and spoken representations of language.

One River (running…)

One River (running…) is an immersive documentary installation— developed by the Computational Poetics Research Group—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 represents 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 braided conversations contribute to the construction of an idealized image of the community by provoking intersections of different social groups that in everyday life might not have the opportunity to come together.
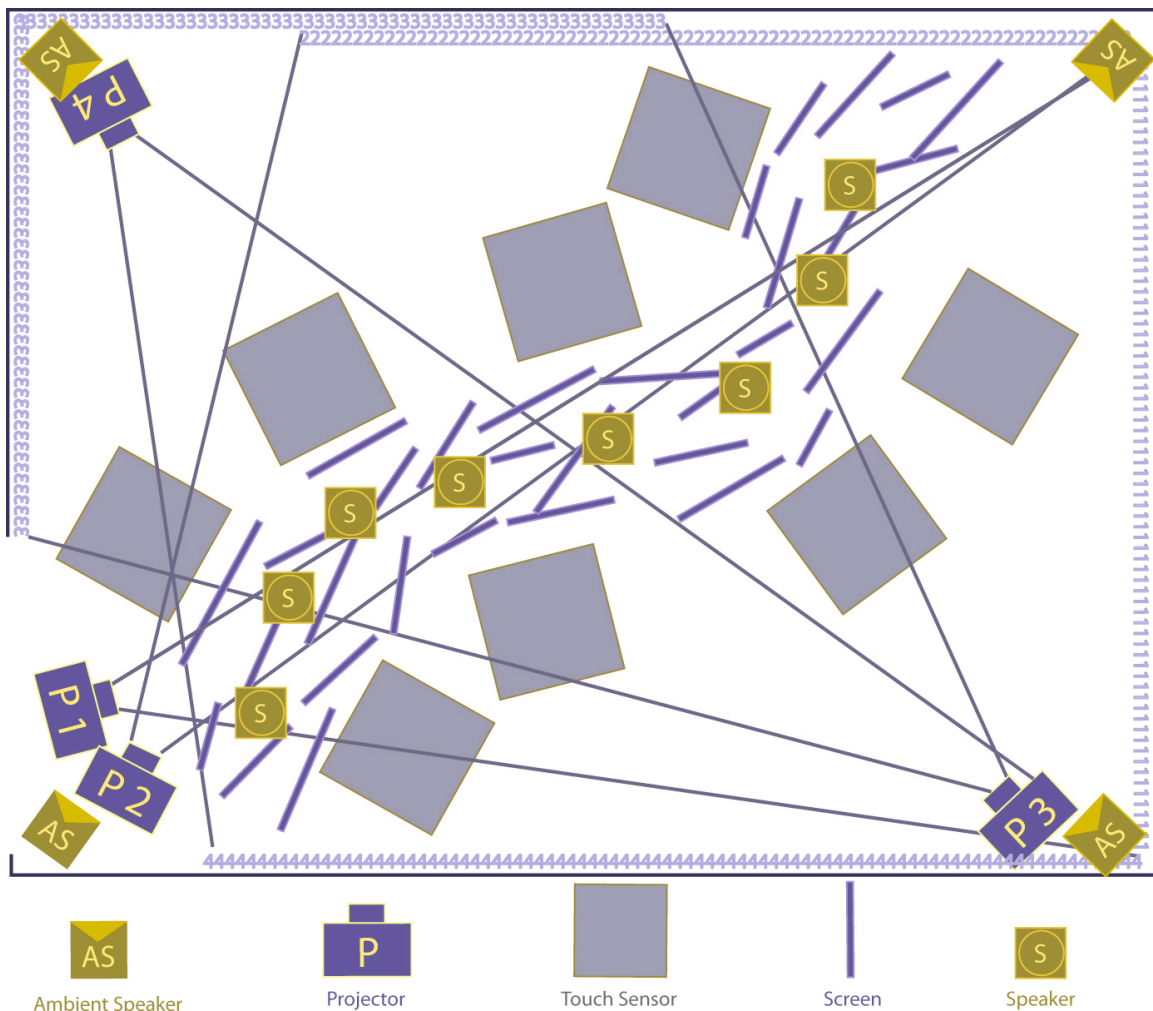

Figure 1 *One River (running…)* installation space at the Surrey Art Gallery on October/December 2005

One River (running…) was presented in the Surrey Seen exhibit organized to celebrate the 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 constitutes a 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. An immersive 13-channel audio diffusion system projects audio around the participant and moves the voices of the Surrey residents along the river of screens. Projected images cover the screens and the four walls of the gallery. Scenery and animations are 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 the ecological community.

Figure 2 *One River (running…)* installation design plan.

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 visited 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 while visiting the Kla-how-eya 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.

The audio material that we recorded is structured as an open work documentary that allows all of the voices to sound. This structure tended to subvert 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 structure in time. The topics include reflections on the Fraser River, urban development, the soundscape of Surrey, culinary preferences, social issues etcetera. The recordings were done in the native languages of the speakers where possible.

Each topic is presented within a time frame that is not sufficient to display all the audio files contained in that topic. The members of a topic are shuffled out like cards from a deck until the next topic is called. At any given moment eight voices are sounding to create an image of community and diversity. Individual voices regularly emerge from this river of voices to provide a textual focus and combine with previous foreground voices and provide context for those not yet heard. The meaning of this river image emerges through a re-combinatory poetics of the open work that provides ever-changing associations. This emergent complex web of associations begins to form a generative conversation.

Images of the community are represented by disembodied animated lip characters that originate from digital photographs of the mouths of people interviewed by the team. The lip characters take the form of digital puppets that are animated by a voice-recognition software program created by the artists. The mouths are animated by the foreground 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.

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 – running water, frogs, birds, a mosquito — 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. A series of sixteen sensors embedded in the floor and running along either side of the river, when stepped on, cause the highlighted voice and its associated animated mouth, to halt at that location thereby bringing the content of the work into focus for the visitor. This is not a conscious form of interaction but rather a hidden mechanism designed to facilitate the visitor being at "the right place at the right time" for such moments of personal focus.

Figure 3 *One River (running…)* installation space at the Surrey Art Gallery on October/December 2005

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 a new idea of pulling the two-dimensional screen apart and redistributing it in the space of the installation, thus deepening the sense of immersion and increasing the theatricality of the experience.

The gallery walls disappear through the projections of animated objects in the three-dimensional space. In this work the two-dimensional animations are distributed in real space of the gallery to create a sense of space that is further emphasized by atmospheric effects such as fog 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 work sits at the juncture of theatrical and cinematic composition that is in this case distributed in 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 an open composition through the expansion of both spatial and temporal resources. The *One River (running...)* installation work is an automated and expanded cinema performance that uses sound, space, screens and projection methods to encourage audience participation.

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