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Digital Dancing

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As a choreographer and an inside observer looking at the recent development of Web dances and Internet performances, it appears to me that a dance community has evolved in cyberspace. The emergence of the World Wide Web has led to an upsurge of creative exploration by dance artists as they discover, in ever-increasing numbers, this new technology's potential. The pervasiveness of information and communications technologies has produced new levels of thought, new concepts, and new types of human interaction.

The 3D world of cyberspace features choreographers Stephan Koplowitz, Sarah Morrison, Mark Coniglio, Susan Kozel, Richard Lord, Tod Machover, Jean Marc Matos, Laura Knott, John McCormick, Amanda Steggal, Yacov Sharir, Paul Sermon, Gretchen Schiller, and myself. Although this isn't an exhaustive list, I single out these people because their work—involving synchronous and asynchronous partnerships—encompasses both Web dance and Internet performance. Such work helps define a big part of the *mediascape*, a term coined by Eduardo Kac.[1] Mediascape, analogous to landscape, implies that people are no longer surrounded by a natural environment but rather by media. It suggests that our experience of reality has become this new communications environment.

Figure 1. An interactive dance performance.

The world of dance is changing. The boundaries between public space and private space, between the professional and the personal, blur as theaters and computers continue to develop technologically. My colleagues and I envision a convergence of these spaces, leading to a radical change in the way we access our performing arts. While many think that technology causes increasing fragmentation and isolation in our society, I for one believe that it has brought the arts community closer together: the possibilities of artistic collaboration are infinitely richer and more complex in cyberspace. Since 1995, I've used the Internet for creating dances and view it as an integrated area where multiple perspectives can be shared to enhance the spirit of new and emerging artistic themes. An example of collaboration in cyberspace is the Cassandra Project (described below), a production that I was involved in as a dancer and choreographer for more than two years. The experience significantly changed my understanding of what's possible with dance and technology.

My involvement with all this began in 1993, at New York University, when some of us in music technology, computer science, and interactive telecommunications and dance started looking at ways to collaborate and present our ideas on stage and in installations, workshops, and cyberspace. We formed the Interactive Performance Group and began creating dance, music, and theater events over the Internet to connect members at one location with members at another location in New York City. Since then, I've worked with colleagues in the US, Canada, Europe, and Eastern Europe to present a range of dance and theater works in interactive settings that challenge how

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performing artists and audiences interface with new technology (see Figure 1). My motive for investigating dance performance through the Internet has been twofold: first, to impart a feeling of physical presence in virtual environments; second, to facilitate a recognizable position for dance practices alongside the development of telecommunications and computer-based art.

The Cassandra Project

The Cassandra Project began as an outgrowth of New York University's Commission on Arts and Humanities: Navigating Global Culture, an international long-distance learning effort to link the work of artists, educators, and technologies through the production of curricular materials distributed electronically. I worked with faculty and staff at New York University and Simon Fraser University (Canada), and with West Timisoara University and the Palatual Cultural in Romania to extend the collaboration between the institutions and to explore new media technology in the areas of dance, music, and theater.

A Cassandra Project performance uses a videoconferencing system over the Internet. Computer networks connecting performers in real time with other performers and audiences at remote sites allow for text, dance, and music to serve as improvisational material during the performance (see Figure 2). The physical space in which the performers are actually located is a specifically designed area equipped with at least one projecting screen, controllable lighting, and enough clear floor space for approximately three to five dancers and, in some cases, musicians. Video cameras, placed at all locations to capture the performers, feed the live images into an Internet-connected computer running Cornell University's CU-SeeMe software. Monitors display the incoming images so that the dancers and technicians can view all other performers at the remote sites. A video projector enlarges the images during the performance.

An event is advertised online prior to its publicly scheduled real-time performance, inviting any or all viewers who log on to participate. A performance begins by connecting the participants with a CU-SeeMe server. One member from each group opens communication with the others by typing in the "chat" window of CU-SeeMe (see Figure 3). Stage cues are relayed quickly to provide everyone with information about sound and image quality. The performers can view, in real time, information from the people who log onto CU-SeeMe. Depending on what point they're at in the structured-improvisation performance, they can choose to respond or not. Digitally enhanced images from a Web site and recorded images from videotape feed into the videoconferencing system. At the dance site, I manipulate and integrate the images in real time, acting as performer, choreographer, and videographer.

Figure 2. Dancers collaborating with dancers at a remote site (see projected session in background) during a Cassandra Project event.

The first performance delivered to an online audience around the world began with sound, initiated by musicians and actors in New York City. This live music and dialogue was amplified and delivered through loudspeakers at the dance site. As the choreographer at the dance site in Vancouver, Canada, I had a bird's-eye view of all activities and orchestrated the dancers' movements in such a way that the event would not lapse into a general state of chaos if all sites sent information simultaneously.

As a performer in an environment linked to other artists, one of my concerns is how we become aware of each other. How do I know they are there?

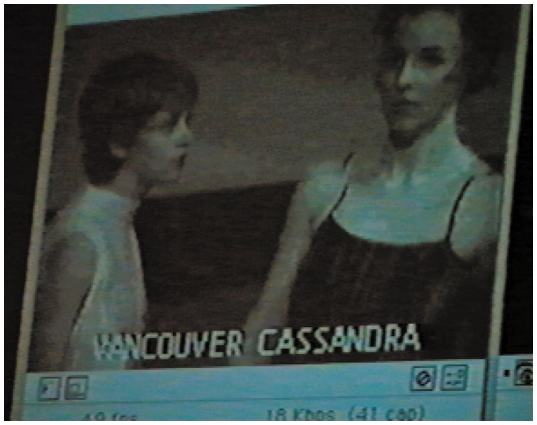

Figure 3. The chat window of a Cassandra Project session.

Figure 4. The Active Space environment.

How do I create the sensation of being with another dancer or musician who's trying to interact with me? Merely displaying images on the wall does not create a direct link between what the musicians send and what the dancers can hear or see as a representation of the music. In the actual performance setting of the Cassandra Project, I sometimes became the intermediary, a modern Cassandra figure, by wearing headphones and giving cues when a breakdown occurred.

Networked participation in an online performance represents a kind of "telepresence" art with real concerns for many of us who work as multiimage makers. Indeed, the tendency to focus on technology seems to dominate. In the Cassandra Project, we built options for participation, such as allowing time out to reload images if we had a slow connection. Each performing site was, in essence, self-sufficient, and interactions took place during scheduled interludes. If the structured improvisation between musicians and dancers went on longer, we allowed that to continue. Performing live over the Internet gives us an opportunity to redefine the social relationship between performer and audience. We don't necessarily have to accept a simple relationship between performer and audience, between creative activity on stage and passive viewing of this activity.

The Active Space concept

Until now, the multimedia portion of the Cassandra Project consisted of audio and video streams juxtaposed with performance, and the performance sites functioned alone. But the performance site itself serves as a creative environment, and it was this idea that urged me to work with another concept, that of "active space."

Inspired by the work of theater director and software designer John Crawford, in 1993 I began collaborating with him and choreographing in the Active Space—Crawford's term for a computer-mediated environment using touch sensors, motion tracking, video analysis, and voice sensors. These multimedia elements all interconnect with computer systems using MIDI (Musical Instruments Digital Interface) protocols and Opcode Systems' Max interactive programming system (see http://www.opcode.com/products/max/). The Active Space environment—an instrument "played" by its inhabitants—produces sound, lighting, video, and other effects in direct response to how and where people move, what they touch, and the sounds they make (see Figure 4). This cycle of interaction between performers and technical elements can provide materials to support a wide range of theater, dance, and musical performance activities.

For most performers, the Active Space is an environment very different from the one they're used to. Traditionally, when using technology in performance, it's not uncommon for performers to feel that the technology is "happening to them" and out of their control. The approach in the Active Space empowers performers with knowledge that lets them influence and interact with technical elements in a direct, immediate way. The quality of the interaction can generate new and different internal imagery, and inspire another level of individual motivation during the performance. This in turn stimulates new forms of interaction between the performers themselves as well as with the technical elements.

One of the technical elements of the Active Space is the Very Nervous System (VNS) video motion analysis unit, developed by David Rokeby (see http://www.interlog.com/~drokeby/vnsII.html). The VNS has received considerable attention for its artistic applications in music and dance. It performs frame-by-frame capture of a standard video signal, analyzes the motion in the video image, and sends the results to a computer for further processing. In previous applications of VNS, motion analysis data from the unit has been processed to create musical responses to a dancer's movements in front of the video camera. I've choreographed several projects where the capabil-

ities of the VNS unit were extended to include graphic visualization of the motion analysis as it's being performed.

The Watching Words Project

In 1995 and 1996, Crawford and I developed an interdisciplinary performance project called Watching Words, based on Active Space technology. We worked collaboratively with actors, dancers, musicians, and other artists in New York and Canada. The project investigated the relationships among language, surveillance, and behavior, and was based on the premise that while language is the first technology most people learn, we're often unaware of its powerful, even insidious effect on the way we think, feel, and act.

In the Watching Words project, we explored the technology of language through interactions between performers and machines. Peter Handke's play *Kaspar* provided the text on which we based the exploration. In *Kaspar*, an autistic child whose only utterance is one all-purpose sentence, learns to speak through the power of speech, guided and taught by the disembodied voices of offstage prompters. As he begins to talk, Kaspar moves from astonished innocence to pained experience, from chaotic unity to schizoid behavior. The journey is funny, poignant, and illuminating. As representatives of social forces or systems of constraint, the prompters use language as a tool that can distort perception and shape meaning.

Watching Words incorporates an Active Space environment in which the the Active Space system "plays" the Kaspar prompters, and the performers—called the Players— "play" the Active Space. Multiple performers also play the role of Kaspar. The Kaspars and the Players interact with the Active Space system using voice and movement. The system, in turn, creates the prompters' voices and an accompanying soundscape and controls the surveillance cameras and lighting instruments. It also provides a graphical visualization of the analyses, processing, and responses of the system as they occur. Through this visualization, the audience can observe the inner workings of the constraint systems to which Kaspar is subjected.

Where do we go from here?

Each time we present these works—the Cassandra Project, the Active Space workshop, or Watching Words—I become increasingly enthusiastic about the development of communication tools and applications, and the ways in which they shape our experiences and visions for the future of dance. The next step could be to tie the Active Space concept to the Cassandra Project and turn the Watching Words performance into distributed choreography over the Internet. This would let us look for ways in which the interface between performance sites can be more than just input from a camera that picks up and transmits images. Such a step would also give rise to other questions. For example, could the interface allow for direct changes based on how and when a viewer acted upon a particular site during a real-time performance? Or, could an increase in the number of options for the viewer support multiple perspectives and contribute to a fuller understanding of the work?

Performing live over the Internet gives us an opportunity to redefine the social relationship between performer and audience.

An area of research that we're investigating concerns how dance and theater movement in an Active Space can be delivered to another Active Space and trigger events at the remote location. In other words, can we send information over computer networks that will affect another dancer in a remote performance site? We're looking at developing two sensing environments that can support the dynamic quality of dance, music, and theater, which involves more than setting up computers that connect two performance spaces over the Internet. One of the problems to solve in this kind of work lies in the need for a dedicated site in which to conduct ongoing experiments. The design of such a space must allow for flexibility and easy access to Internet-enabled computers. During the design process, engineers should consult with performance artists when designing the technical elements—active spaces, hardware and software systems, and interfaces—for this kind of site.

One of the things I discovered while working on projects such as the Cassandra Project and Watching Words was that collaboration could occur in several ways within a matter of minutes,

and it was unnecessary to spend time and money traveling great distances. But using videoconferencing systems in this way means more than just cutting travel expenses—videoconferencing can invigorate communication between individuals and teams working on creative dance projects. It's an important artistic application, for reasons that we become aware of only through exploration and experimentation. Why not work toward using videoconferencing as standard practice in building a dance piece? Currently, when we have segments of on-site creative work, other participants in a videoconferencing project can view these segments. So, for example, if we're working on a dance piece in California that will be performed in New York, the musicians could create the score alongside the choreography via weekly previews of the development of the dance.

But what qualifies as dance art when the body ends up as digital material? Can we still call it dance? These questions and many more are being explored by a wide range of dance artists involved in multimedia projects, and it seems that we're poised between research, education, and creativity. As an artistic practice, dance ordinarily depends on the experience of viewing physical expression in a public way. In one sense, the fact that dance remains "alive" only for a series of fleeting moments is a problem, but it is also what makes dance and all the performing arts special. The apparent impossibility of dancing and traversing an infinite number of places for a finite amount of time is now challenging our traditional notions of what exactly is an "appropriate" place in which dance and theater performances can occur. Art, performance, and entertainment brought to us through technology involves a rethinking of social science as well as the design and engineering of interactive performance environments. Cyberspace extends the performing space by deconstructing the conventional use of physical space and democratizing the arena of activity.

Conclusion

As the performing arts and the Internet converge, a hybrid art form is emerging. While the Cassandra Project has had continuous exposure in various geographical locations and on the Internet, it may best be understood in terms of its achievement as an ongoing artistic collaboration involving a growing number of global participants who are dancers, musicians, and the like. Admittedly, we haven't quite figured out how to synthesize it all yet. Nonetheless, the project bridges the concepts of Web dance, Internet performance, and distributed choreography.

What has captured my interest in the World Wide Web phenomenon is the fact that live movement can be brought to cyberspace—an extension of place and time—using synchronous and asynchronous communication tools. As the meaning of the Cassandra Project and Watching Words continues to evolve for me as performer and choreographer, I see the collaboration between artists and engineers as a powerful instigator of change. We are, indeed, constructing new ways to enlarge our concepts and practices of art and technology. MM

Acknowledgments

Portions of this article were originally published in the IEEE Multimedia Technology and Applications Conference (MTAC 98) proceedings.

Reference

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