Digital Dance Theatre: The Marriage of Computers, Choreography and Techno/Human Reactivity

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Abstract

This article uncovers the ways in which Troika Ranch artists, by integrating emerging digital technologies as interactive components of live performance, are reshaping dance practices in the twenty-first-century. The article begins with an overview of the 2002 Summer Live-Interactive workshop. Next, I explore specific media technologies both designed and employed by Troika Ranch artists. I then consider the company’s mission of integrating media and live-action performance and investigate the unique techno/human connections such works construct. I examine some of Troika Ranch’s current works and, the applicability of their methods to theatre. Finally, I discuss the future directions of digital dance theatre research and analyze how new technologies are influencing the direction of contemporary performance scholarship.

1. Introduction

Composer Mark Coniglio and choreographer Dawn Stoppiello founded Troika
Ranch Dance Theatre in 1994 to create works that fuse traditional elements of dance, music and theater together with interactive digital media. Probing the relationship between organic and electronic stimulus is key to their artistic exploration, and is manifest on stage by the movements of the dancers to interactively controlled video, sound and light. It is the company’s goal to unify the digital and corporeal elements of their works into a unified expressive whole that will leave their audiences both delighted and challenged.

Troika Ranch artists utilize digital software tools to construct the visual and aural material for their works, and to provide new means for an individual dancers to express him/herself from within the performance. Believing technology to possess the same vivacity as the human bodies it accompanies on stage, the company brings media to life through its interaction with the dancers. The typical technology setup includes one or more sensory devices, worn on the body or placed on the ground, that allows the computer to track and respond to a dancer’s movements on stage.

In order to experience Troika Ranch’s innovative approaches to digital dance composition, I traveled to Brooklyn, New York for five days this past June to participate in the Live-Interactive (Live-I) workshop. The workshop, an intensive seminar for artists and advanced students is intended to introduce participants to the technological tools that allow their gestures, movements and vocalizations to control various media on stage. In addition to the workshop, I conducted several interviews with Coniglio and Stoppiello and attended the company’s rehearsal sessions.

This article documents what I learned as a participant in the 2002 Live-I workshop. My purpose for writing it is to place the study of Troika Ranch within the larger context of digital performance research (which investigates the integration of computer-generated imagery and effects into live-action performance). I am hoping that the article will highlight what research on groups like Troika Ranch offers the academic community in terms of interdisciplinary opportunities and cross-school incentives, as well as underscoring the importance of documenting groundbreaking artistic practices that push contemporary performance scholarship into uncharted methodological terrain.
2. Workshop Overview

Led by Coniglio and Stoppiello, the Summer Live-I workshop introduced participants to the available technological tools employed by Troika Ranch artists and offered them hands-on experience acquiring the techniques required to use them. The workshop balanced technical training and experimentation with critical discussions regarding the impact of technology on the creative process.

In the workshop we were presented the basics of Isadora, a software program designed by Coniglio as a graphic programming environment that allows dancers to manipulate sound, video and light in performance. We received daily instruction by Coniglio and Stoppiello on the various uses of the software and were encouraged to freely experiment with the program (both on our own and in groups) during the afternoon sessions. Beyond strengthening the skills necessary to utilize Isadora, these experiments demonstrated the challenges of combining live performance and media. Using these initial experiments as a starting point, we began to conceive and construct our own projects—experimental models that integrated audio, video, movement and text into previously explored interactive environments. The workshop culminated with the presentation of these experiments to the group.

The 2002 Live-I workshop attracted eleven participants, from various artistic backgrounds, ages, nationalities and countries (including: Australia, Brazil, Canada and Israel). A majority of the workshop attendees were employed as professional choreographers or dance instructors, while two of us studied the medium of theatre. It should be noted that, although the workshop was intended as a means of disseminating information about digital technology and its application to the creation of interactive dance works, some of Troika Ranch’s methods, insights and practices could be directly applied to theatre production, and other related art forms. I will discuss both the challenges and possibilities of doing so in the final section of this article.
3. Workshop Tools

The primary purpose of the workshop was to explore Troika Ranch’s approaches to digital dance composition. This involved, first, mastering two unique media tools designed by Troika Ranch artists: *Isadora* and *MidiDancer* (described below). Second, we learned the skills necessary to create our final projects: the capacity for manipulating the media with software, basic programming abilities and video and audio capture.

*Isadora:*

*Isadora* is a graphic programming language designed by Coniglio that provides interactive control over digital media, with special emphasis on the real-time manipulation of digital video. In performance the program functions as the engine that drives the visual manipulation components of the dance works. By linking together graphically represented building blocks, each of which performs a specific function (such as: playing or manipulating digital video, capturing live video, controlling a DV camera, etc.), the modules allow information to travel from one source to another inside the computer, and from the computer to outside interfaces. Over seventy basic building blocks, called actors, are available within the Isadora environment. Some actors perform simple functions like watching for a signal from a *MidiDancer* sensor, while others allow more complicated functions such as warping video imagery. By connecting several operators together, a dancer can determine the level of interactivity in the performance.
Isadora is used, primary, as an authoring tool, intended to provide dancers and choreographers a means of designing and directing input from a number of sources. By viewing the modules on a computer monitor or screen, the dancer can see how data is moving through the program. This visual aspect of the program is one of its key features, making it easily accessible to those who may lack sophisticated programming skills. In this video clip, Coniglio and Stoppiello describe how Isadora assists the dancer as both a compositional tool and as a collaborative partner in live performance:

In addition to its easy-to-learn user interface, Isadora offers the following features:

**Live Video Input** – to mix or manipulate live video with your prerecorded digital video

**Snapshot Feature** - to create, store and instantly recall the settings within a scene

**Record Output** - to record Isadora's output to QuickTime movie

**Sound Input** - to modulate sound volume

**DV Camera Transport Control** - to instruct up to 8 cameras to play, stop, start, record

**MidiDancer**

MidiDancer is a wireless sensory system (or input device) that "watches" what a performer is doing on stage and converts that information to digital signals. Sensors
worn on the body of a dancer measure the flexion of up to eight joints on the dancer’s body and then transmit the position of each of those joints to a computer off stage. Once interpreted by software running on the computer, the information can be used to control a variety of computer-controllable media including digital video or audio files, theatrical lighting, robotic set pieces or any number of other computer controllable devices. This picture illustrates how a Midi sensor (attached to the elbow) triggers a video segment each time the dancer straightens her arm.

![Image of dancer using MidiDancer](image)

**Figure 5.** Troika Ranch Dancer utilizes *MidiDancer* sensory system.

The idea for a *MidiDancer*-like apparatus grew out of necessity: dancers required a device that permitted them freedom of movement and, at the same time, greater flexibility in manipulating visual and sonic elements of the performance (not typically under their control). The *MidiDancer* corresponds to the company’s desire to expand the vocabulary of the dancer, by providing a practical (and easy to operate) means of expanding the range of media choices from which to interact with on stage.

In performance *Isadora* and *MidiDancer* work together in the following way: First, *MidiDancer* tracks a performer’s movement and gestures and transmits that information into digital signals. Second, *Isadora* looks at the sensory information, interprets it in a predefined way and sends signals to the media devices being controlled to achieve the desired result. Finally, the media devices present the media as instructed by *Isadora*.

*Isadora* and the *MidiDancer* enable Troika Ranch dancers to determine when and at what intensity media elements are introduced into the performance and to directly respond to the media improvisationally. Further, the immediacy of the reaction of the computer (to both *Isadora* programming commands and *MidiDancer* signals from a dancer’s body) allow for expressive possibilities that may be unavailable by any other means.

4. **Traversing the Digital Divide: Corporeal/Techno Connectivity**
Central to Troika Ranch’s mission of integrating digital media into live performance is the conviction that technology needs to serve the dance’s narrative structure. In order to facilitate a story or unify a sequence of events, technology must be both useful (i.e. easily accessible) and purposeful (artistically). Throughout the workshop, Coniglio and Stoppiello reiterated their company’s mantra: know technology before need. In other words, technological instruments must be mastered before they can be implemented in a live-performance setting. In this video Coniglio and Stoppiello respond to a workshop participant’s final project, underlying the importance of technological mastery:

Coniglio and Stoppiello, drawing from diverse artistic backgrounds, offer distinct (though complimentary) perspectives on the complex interweaving of organic (bodily) and electronic (computer generated) elements of their work. Coniglio (schooled in electronic musical composition) likens the connection between a Troika Ranch dancer manipulating media on stage to that of a musician playing his/her instrument in concert with others. He remarks, ‘The dancer becomes the conductor and directs the music, as opposed to reacting to it’ (Megna, 2001:1). Stoppiello’s training in dance composition informs her view that interactive technology is able to broaden a performer’s physical limitations (bodily constraints) on stage. In this video, Stoppiello and Coniglio discuss why technology plays such an integral role in their work, both as an instrument of self-expression and as a tool for expanding corporeal possibilities:

Coniglio and Stoppiello characterize the unique techno/human interplay on stage as reactive, in that it allows for a mapping of gesture to another media in their works. Terming such a relationship interactive would imply that the technology possesses sentience qualities (having the ability to think and act autonomously). Modeling their creations on jazz sessions (where a defined, yet malleable structure allows for individual interpretations of the score), they look to reactivity in techno/human relations as a means of provide improvisatory opportunities for the dancers in performance.

Improvisation also plays a pivotal role in shaping a performance text. Stoppiello’s choreography is derived from improvisational sources, games and exercises that generate raw material which can then be finessed and manipulated to fit the piece being developed. Improv exercises shape abstract physical phrases, sounds and gestures and relationships between the dancers. Such exercises are especially helpful in working to adapt a dense literary text. The company often, for example, often experiments with a process called “rap”, in which a performer speaks extemporaneously for an hour while being recorded on video. Later, the group reviews the footage and selects the parts that are the most dramatically engaging, linking them together into monologues for performance. The source text (most often derived from fictional works) forms the outline for the pieces, but the content of the work is developed improvisationally.

5. Current Artistic Works
Coniglio’s and Stoppiello’s goals of making technology both easily accessible and artistically purposeful, of media serving the narrative and the importance of promoting improvisation opportunities via techno/human reactivity, are evidenced in the company’s most recent projects.

The Chemical Wedding of Christian Rosenkreutz utilizes movement, sound and spoken word performance to explore the transformation process undertaken by two characters, one set five hundred years in the past and the other fifty years in the future. The work examines the writings of a (fictitious) seventeenth-century alchemist who is summoned by an Angel to partake in a chemical wedding (a mysterious festival that bears very little resemblance to actual nuptial proceedings). The story is a journey of discovery, rejuvenation and rebirth. In exploring the theme of transformation, Troika Ranch dancers attempt to unearth the richness gained from transitory moments and the sadness and confusion resulting from letting go.

The cast of The Chemical Wedding of Christian Rosenkreutz consists of seven dancers (3 men, 4 women) and one live musician (who provides cello accompaniment throughout). In terms of technology, the work offered an intriguing combination of pre-recorded and live visual and auditory stimulus, including: algorithmically edited video imagery, electronic music scoring and digitally controlled lighting and sound effects. Performers manipulate media in a number of ways: a dancer’s movement controls wind sounds and video speed, another dancer manipulates video imagery and projected text sound by bending and straightening her arm, a head mounted, wireless camera projects live-video capture on designated projector when the performer bends his neck.

The performance is rich and complex, introducing often times competing organic and electronic elements. In one of the most striking scenes, Stoppiello (as the Angel) visits Rosenkreutz (Coniglio) to invite him to attend the chemical wedding.
The Angel, at once frightening and surreal, glides, pounces and crawls across the stage, igniting bursts of light and sound from strategically placed laser beams. When Stoppiello crosses a certain spot on the stage, a video, comprised of dozens of pairs of eyes is projected onto the back screen (an image emerging directly from the text). The lighting/sound effects and video, triggered by Stoppiello’s jarring movements, work in partnership to reconfigure her presence on stage, altering her human form into a mystical, ghost-like apparition. In this moment, techno/human reactivity allows for the theme of transformation to be elegantly and powerfully expressed.

Figure 7. Dawn Stoppiello demonstrating portions of the "Angel" solo

Stoppiello provides the details of the creation process:

Mark’s character comes from the ideas in that book about humans evolving into machines. We used the idea of transformation that seemed to be the moral of the story and were struck mostly with some of the images from the book and wanted to find ways to create them theatrically. The visitation of the Angel was one example another was the invitation which transformed into the projection surface. We used the story as an outline for the piece but didn’t use any of the actual text from the book. The two speaking moments around the door were an improvised structure where the performers try to tell the same story at the same time and know what points they need to hit but can get there however they like (2002: personal interview).

Dance critics have responded favorably to performances of The Chemical Wedding of Christian Rosenkreutz (it has been traveling across the country for the past few years). They most often comment on the intriguing techno/human dimensions of the work. ‘The technology of the computer-generated music allowed moments of serendipity whereby the dancers could forge an improvisational, jazz like score’ (Cruz, 2001:25). Further, despite, the common reaction that there is, perhaps, at times too much happening on stage, critics universally applaud the
dancer’s dedication to the work and mastery of the media tools. One writer remarks, ‘It’s not always clear exactly what is happening to the cast of eight, but it really doesn’t matter; they remain compelling due to their uniform strength and clear commitment to the material, and their ease with the demands of dancing and speaking’ (Dohse, 2000:12). Finally, ‘The satisfying blend of technology and organic movement was every bit as magical, spiritual and chemical as the alchemy they evoked’ (Cruz, 2001).

Reine Rien

Reine Rien, (French for "queen of nothing"), is a work-in-progress created and performed by four Troika Ranch dancers (one male, three female) which investigates physical, mental and environmental isolation.

In the work the stage is stark, except for three large projection screens surround the performers on stage, serving to dwarf their size. The performers, wearing potable MIDI devices (sensors) that, when activated, transmit data to Isadora which in turn interprets the information, creating an improvisatory musical score. The video projected on the screens depicts vast prairie landscapes. The sense of loneliness and desolation introduced by the video imagery is mirrored in the dancers’ movements that remain slow, methodical and limp throughout. Towards the end of the piece the dancers come together, forming a unified group, only to separate again in the final moments.

This video clip, a rehearsal of Reine Rien, show how the dancers’ slow, methodical movements set against the bleak, yet jarring video imagery work in unison to craft the solemn tone of the piece:

Figures 8, 9, 10. Troika Ranch dancers rehearsing Reine Rien.
The media, in this work, by abruptly interrupting the performers’ slow, dense movements, serves to emphasize their physical detachment on stage. The techno/human reactivity in the piece yield a cold, fairly austere stage picture. Critics have picked up on the work’s austerity and the contrast imposed by the forcefulness of the techno/human connections in the piece. For example, Peggy Cheng, having viewed a workshop presentation of the dance, remarked, ‘The direct link between the body and the creation of the soundscape and video images were very interesting to observe, although I felt my observations were cold; I interpreted the dance as careful and plotted’ (2001:25).

Reine Rien was conceived of differently than The Chemical Wedding of Christian Rosenkreutz. The work began with no guiding images, text or thematic content (such as transformation). According to Stoppiello, telling a cohesive story was less important than developing physical relationships and thematic movement material (abstract and with no intention to convey anything in particular). Again, drawing on improvisation exercises, a certain tone began to develop in the piece that suggested a sense of space, horizon and open landscape (an open prairie). When the idea of physicalizing an empty space emerged, the company happened to be performing in Nebraska. They shot video of the landscape and recorded audio material from a dramatic rainstorm.

Even though the piece lacks a coherent story (though a definitive narrative structure is apparent), Stoppiello hopes the mood of the piece evokes strong, visceral responses in the audience.

6. Troika Ranch’s Methods Applicability to Theatre

Isadora and MidiDancer, as a media manipulation tools, could be effectively utilized in theatre production as a means of promoting techno/human interactivity in live performance. Isadora, unlike other "plug and play" programs, offers building blocks that can be linked together to intelligently respond to the live performer. The creative possibilities are endless.

An actor, by digitally manipulate his/her stage environment, would, undoubtedly, engage with a performance text (physically, emotionally, intellectually) differently. To what effect? If characters in The Tempest, for example, could conger the furious thunderstorm by bending and twisting their arms and legs (generating the sound and videoscapes of the scene), would their embodiment of Shakespeare’s words be more forceful and dynamic? What are the dramaturgical considerations of employing interactive media tools/ techniques in live theatrical performance? How does technology serve the narrative?

Another directorial consideration is the additional rehearsal and set-up time interactive technologies require. A standard three or four week production schedule may not allow for technological training or opportunities to freely experiment with equipment in live-performance settings. Finally, the digital instrumentation (the MIDI...
sensors, particularly) necessitates daily testing and set-up (to achieve balanced calibration), necessitating flexible nightly rehearsal sessions.

Cost of the equipment is, naturally, another concern. *Isadora* software, priced at approximately three hundred dollars, can be purchased from Troika Ranch’s Web site (www.troikaranch.org), but hardware expenses (i.e. cost of a state-of-the art-computer) must also be factored in. The *MidiDancer* system, constructed by Coniglio for Troika Ranch productions, is, unfortunately, unavailable, though sensor systems can be purchased for a few hundred dollars on the open market.

**7. Future Directions of the Research**

Digital dance theatre represents a robust, hybridized performance genre: part movement, part spoken word, part digital interface. In terms of contemporary performance scholarship, it crosses multiple disciplinary and methodological boundaries, allowing for the investigation of the amalgamation of the human body and the conflicts imposed on it by digital interventions, from varied perspectives.

What Troika Ranch brings to the study of digital performance is a set of tools and techniques that not only promote technological interactivity and improvisational opportunities, but allow dancers the ability to spontaneously express themselves within temporal performance environments. As their work becomes more widely known, and as the use of interactive technology in performance becomes more common, a codified language and set of procedures, specifically designed for this artistic platform, will begin to emerge. In the meantime, it is integral that scholars continue to document the work of pioneering artists, in order to better comprehend the complex interplay between the human body and digital technology in contemporary performance practices.

**References**


Author’s Bio

Kathryn Farley is doctoral candidate in the Department of Performance Studies at Northwestern University where she is completing a dissertation entitled: Theatre in the Digital Age: Interactive Technologies, Virtual Spaces and Aesthetic Transformations. For the past year Kathryn has held an artistic residency at Studio Z, a Chicago theatre company dedicated to experimenting with digital technologies in live performance. At Northwestern she teaches courses which explore contemporary Irish drama and performance and the adaptation of fiction. An accomplished stage director and producer, Kathryn began experimenting with video and digital media in her recent production, Away with the Fairies, an examination of the dramatic possibilities of utilizing historical narrative as the basis of a performance text. Please refer to the production's Web site, www.awaywiththefairies.org, for a detailed description of the project. A digital portfolio of Kathryn’s academic and artistic work can be found at www.kathrynfarley.org.

Rehearsing in front of Projection Screen at Studio Z, Chicago.