Dance And Digital Color: 
The Development Of A Kinetic Visual Vocabulary
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Abstract
This paper discusses a technique and a visual vocabulary called “Digital Kinetic Color Traces” developed by a new media artist/designer in collaboration with dancers and choreographers. This ongoing project investigates both choreographed and improvisational dance performance in the context of computer-generated color projection systems. From a visual literacy standpoint this paper aims to explicate the vocabulary that emerged from the digitally-enhanced method used to “paint” dancers live. It was in the latest collaboration, namely Projections, created for a concert entitled Dances We Don’t Know Yet, that the visual vocabulary was more fully refined and formalized.

Introduction
The use of computer technology to investigate the expressive potential of projected kinetic images and the environment (e.g., architecture) has been explored by Petronio Bendito in works such as his Technology Side Effects (Bendito, 2004; Mix, 2005b) and Digital Habitat solo exhibitions (Mix, 2005a). It was Bendito’s interest in digital aesthetics and his observation of how participants interact with projected kinetic images that led to the development of the Digital Kinetic Color Traces vocabulary.

The challenge in combining technology with dance is always in finding how to make the technological innovations improve the dance, or whatever one wants to call this hybrid art product, as opposed to being superimposed upon, or overwhelming the dance.

There has been an increased hybridization of computer generated technology and dance performance as there has been in most art forms. For example, well known choreographers Merce Cunningham and Bill T. Jones have created works using motion capture technology (Dils, 2002). Cunningham started to explore this hybridization in 1997 with a first performance in 1999.

More recently related methods have also been explored by the Dance Division in the Patti and Rusty Rueff Department of Visual and Performing Arts at Purdue University in projects led by Carol Cunningham (Meador, Rogers, O’Neal, Cunningham, 2004) and computer graphics specialists (Meador, Kurt & O’Neal, 2003). In these works, a “virtual dancer” or dancers joined the dance, which were created in real time from the movement of the live human bodies dancing in the space.

Improvisation mixed with computer-generated technology sends artists into a realm reminiscent of video games, where the player constantly feeds new choices into the game’s paradigm. Dancers and new media artists are more frequently exploring this conceptual relationship. For example, Marlon Barrios Solano has explored related intersection of dance and technology in his work at The Ohio State University (Solano, 2004).

Collaborations’ Overview
This interdisciplinary project investigates a technique and a visual vocabulary called Digital Kinetic Color Traces developed by designer and new media artist/designer Petronio A. Bendito in independent collaborations with dancers and two choreographers, Holly Jaycox and Hilary McDaniel-Douglas. These collaborations took place separately. McDaniel-Douglas previously worked with motion capture and video, and Jaycox had incorporated video into her works before coming into this collaboration.

The collaboration with McDaniel-Douglas and Project IN Motion started in 2004 and produced three works (Untitled Solo Choreography, 2004; Untitled Duet Choreography, 2004-2005; For DeBuffet, 2005). The collaboration with Jaycox and her dance company Public Dance started in January of 2005. It produced a single improvisational work: Projections (See Figure 1).

Figure 1
Projections, 2005, Improvisation.
Photo by Michael Xun Chi

One of the goals of these collaborations was to develop a kinetic visual vocabulary that emerged from the dialog between a new media artist/designer and dancers/choreographers while taking into consideration the development of the Digital Kinetic Color Traces system. These collaborations investigated both choreographed
and improvisational dance performances in the context of a computer-generated color projection technique. Digital Kinetic Color Traces first appeared in 2004 as “performance art” in a gallery space (Brouk, 2004). In 2005, Digital Kinetic Color Traces was incorporated into two concerts: Dances We Don’t Know Yet and Project In Motion Dance Concert 2005 (Brouk, 2005; Gregory, 2005; Wolf, 2005).

Finally, the collaborations sought to find new languages derived from the intersection between technology and dance performance. Essentially the goal was to explore structures in which visual design and dance became a system of interaction, sometimes responding to each other, and at other times working independently. In both the choreographed work, and in the improvisational work, there was a search for balance between the visual elements.

Scope Of The Paper
This paper describes the visual vocabulary that emerged from the collaborations and its implementation in four live performances. However, in this paper a greater emphasis will be given to the latest collaboration, namely Projections, which was developed for the concert Dances We Don’t Know Yet, an all-improvisational dance concert presented at Purdue University in February of 2005. It was in the latest collaboration that the visual vocabulary for Digital Kinetic Color Traces was fully elaborated and formalized.

Projections: Improvisational Dance Collaboration
To create the work Projections, Bendito, the new media artist/designer, and Jaycox, director of Public Dance, and her dancers had weekly rehearsals as well as several meetings. Jaycox’s dance company Public Dance works primarily with site-specific improvisational dance.

Jaycox had used video in both choreographed and improvisational works previously, and used both pre-filmed footage and video made in the moment using the dance in progress as its subject. Jaycox’s approach to improvisation reflects the work of jazz musicians who are trained in an art form, and then can move freely inside of the structure of the piece. In conjunction with Public Dance, Jaycox strives to create dances that do not exclude the audience, but invite the audience into the dance, and allow them to see the inner sense of the works on some level.

Interdisciplinary Views
Early in the process it became clear that the new media artist/designer and the dancer spoke different languages, and used different creative processes. For example, the dancer spoke in the language of dance and improvisation, which includes the elements of time and space, an awareness of relationship, and an understanding of how to make decisions in the moment. These elements are not addressed in most two- or three-dimensional art expressions (e.g., painting, drawing). The new media artist/designer, while also interested in time and space, was speaking about time in terms of storyboards, composition, color schemes and other terms that are used in his art form. It took repeated discussions to find a mutual vocabulary to use when discussing design strategies that would become relevant to the structures of the performance. With the development of a vocabulary, it became much easier to move forward with creating a structure for the work.

The other element that made the work especially challenging was the improvisational aspect of Projections. Bendito had worked primarily with choreographed work. When he started to work in an improvisational format there were many new challenges inherent in this unfamiliar art form. For example, the controlled use of the computer to paint the dancers live following a predefined sequence was replaced by spontaneous movements of the dancers.

The dancers were skilled improvisers, experienced in performing improvisational dance works for an audience. Through many trials and experiments, Jaycox had determined elements of successful improvisations, which she wanted to be part of this work as well. Much of her approach to improvisation is based on a style of performed improvisation developed by choreographer and dancer Sally Wallace (1997). This included such elements as a structure with a sense of a journey, use of space and time, and variation in qualities through the course of the piece. Finally, the visual design components created by the new media artist/designer were to be incorporated live.

Data (video and still images) collected in digital format at the rehearsals were analyzed and visual annotations and storyboards were developed. A set of visual parameters was developed, creating a kinetic vocabulary of expressive relationships. During the collaboration process, discussions were followed by documenting ideas and insights via visualization techniques, such as diagrams and visual annotations, helping the artists find strategies of varying success.

The Music
Another important element that had to be handled was the sound. Due to the improvisational nature of the concert Projections was to be part of, the artists (dancers and new media artist/designer) envisioned the sound also being improvisational. After several rehearsals where the musician improvised with the dancers and new media
artist/designer, it was determined that there were too many variables, leaving the artists feeling ungrounded, and disconnected from each other. There needed to be one element that would carry the dance, and the multiple artists involved, on one journey.

There was also a need for a way to determine the beginning and ending of the work, which did have time limitations. After discussions and experiments, it was decided that both these challenges could be handled by having a set sound score. Jamie Newman, musician/sound designer, was asked to create a work that would help the dancers and new media artist/designer to stay together, and to be able to follow the simple structure of the piece. Out of the weekly rehearsals, Newman created a work that came from the experience of the group and the structure that had emerged, which helped give the piece more form. A twelve-minute musical piece was especially composed for Projections.

Digital Kinetic Colors And Performance Parameters

A laptop computer was used and command functions assigned to change colors in real time and create “drawing-like” luminous traces that were projected on the dancers and the scrim and floor. The luminous color traces were created live by the new media artist/designer during the performance of the work.

Bendito ‘painted’ on the screen of the computer with a wand, while watching the dance unfold in front of him. Colors for the performances were defined based on perceptual relationships presented in the structure of the RGB color cube (see also Bendito, & Guigue, 2005). In addressing the color scheme, Bendito defined it as "a progression from inside the RGB cube with the brightest and mathematically specific color choices" (quoted in Brouk, 2004, pg. 11).

The dancers, as we said, were a group with extensive past experience in improvisational dance for performance. However, the addition of the color painting element drastically changed the dance, calling for skills the dancers had not developed before. There were four major parameters that had to be worked out in order to effectively integrate Digital Kinetic Color Traces and the dance component of the project: (1) Light/Dark Areas of the stage; (2) Rhomboid Stage Space; (3) Anonymous Costumes; and (4) Lack of Visual Cues.

1. Light/Dark

Dancers not in the light were basically invisible. There was no light on the stage space other than the light from the computer projector. This light came only from one source, at the front of the stage, while normal dance lighting comes primarily from side light.

Any time a dancer was “painted on,” she/he left a shadow of a shape on the screen at all times. This affected both the sense of when a dancer’s movement was visible to the audience, and when a dancer might obscure another dancer that was further upstage, and therefore in the shadow.

2. Rhomboid Stage Space

Due to the nature of the projector, the performance space was a rhomboid shape defined by the pattern of the projected light. In order for the dancers to remain in a position where they could be “painted,” or even be visible due to the light, they had to remain in this funnel shaped stage space. It was difficult for the dancers to know when they were inside the actual stage space, and visible to the audience.

3. Anonymous Costumes

In order to allow for the painting to show best, the costume created was made of white elements that covered the dancers’ bodies and heads, leaving only their faces, hands and feet exposed. This made the dancers completely anonymous, and at times even the dancers were barely able to tell who was whom. The dancers were accustomed to being unique individuals in most performances.

4. Lack Of Visual Cues

The dancers had to learn to watch the back screen in order to remain connected to what was happening with the painting— since that was such a major part of what the audience was experiencing. This was difficult to do without spending all of their time with their backs to the audience.

In a typical improvisational dance situation the dancers rely upon their ability to sense where their dance partners are in space when making decisions about movement. But in this work, the visuals were so important to the overall experience of the work that it was important for the dancers to have a strong awareness of them. However, without using the eyes, it was difficult as dancers to even know if they were being “painted on” at any given moment.

In summary, the added visual element of the painted colors, and the lack of other light, radically changed the experience of the dancers. Rehearsal with all the elements of this work in place was essential in preparing for the performance of Projections.

Developing a Kinetic Visual Vocabulary

In using Digital Kinetic Color Traces, colored lights were projected onto the dancer or dancers as live drawings generated by the new media artist/designer as the performance occurred. For example, one of the results of kinetic drawings is captured movements and gestures...
of the dancers frozen in space. Studying videos of experimental works done in rehearsal, and discussing what types of interactions between dancers and the Digital Kinetic Color Traces were successful during these works, helped the collaborators to begin developing a vocabulary for how the visuals were created, and how the dance would interact with the painting. There were several “happy coincidences” throughout the process of discovering the ideal vocabulary for the performance. There were moments when the movement and painting were very successful—i.e., they created a visual that was unusual, aesthetic, or simply pleasing to the eye. These “moments” were then incorporated into the structure of the dance. For example, the dancers could do large sweeping movement with their limbs, which looked beautiful when combined with large swaths of paint color moving across the screen.

The Visual Vocabulary

Several approaches that integrate space, time and visuals were developed. After the rehearsal process led the artists to a common vocabulary, and decisions were made about what elements were desirable in the performance, a structure was created that would enhance the experience of this collaborative work. The following are the primary visual vocabularies:

Kinetic Sculptural Spot Light

The body of the dancer was partially lit by a kinetic color trace, creating a sculptural effect. The dancer moved slowly or stayed still. We found this very simple technique to create a dramatic effect. The colored, lit portion of the dancer created a fragmented body in space (see Figure 2).

Minimalist Movements

Sometimes the dancer improvised simple minimalist and repetitive movements in order for the kinetic color traces to flow with their movements. Furthermore, the minimalist movements enhanced the notion of the dancer as a living canvas for the new media artist/designer (see also Figure 2).

The Morphing Mountain

The screen at the back of the performance space for Projections was 15 feet tall. In order to utilize the full...
space with both dance and kinetic color traces, the dancers explored movement in the high space by climbing on each other and bringing movement to the higher portion of the stage. The effect created a strong interlocking composition, in which figure and ground were blurred (see Figure 3).

Concurrent Magnetic Movement
As the dancer moved, kinetic color traces were created simultaneously on his/her body. This technique left a trace of kinetic color initiated by the dancer. In Figure 4, the hand of the dancer triggered the color to flow downward.

Shake
The entire environment created by the kinetic color trace shook, creating a strobe light type of effect. This effect contrasted with the fluidity of the color traces
previously made, suggesting a moment of instability and over excitement in the performance (see Figure 5).

Independent Movement
The kinetic drawing and the dancers were independent from each other, creating visual tension in the space. The audience assumed an active role as they were invited to make choices regarding where to redirect their attention (see Figures 6 and 7).

Follow Up (Space)
A kinetic color trace was created in space, which was followed by the dancer’s movements towards it. The change in leader and follower kept the work from becoming predictable.

Highlight (Dancer)
A kinetic color trace was created on the dancers’ bodies after a sculptural pose (whether it was choreographed or improvisational) was established. This allowed the new media artist/designer to accentuate the movement, or make it more three-dimensional, with color. It was also used to create a camouflage effect, blending figure and ground relationships: the dancers and the space (see Figure 8).

Anticipated Movement
The dancer created a movement that generated a kinetic color trace. For example, a movement may suggest a color trace in space that is actually drawn after the dancer completes the movement. This type of “listening” and response happened between dancers, as well as between the new media artist/designer and the dancers.

Erase
The drawings on the background were erased, revealing only the dancer or starting a new cycle of drawing. This effect can create abrupt visual transition.

Draw/Erase/Draw
A kinetic drawing was created and deleted immediately. A new kinetic drawing emerged. This technique created high visual impact, movement and energy in the space, even if the dancers stayed still or moved slowly.

Projections: The Performance
The piece was divided into sections, with a closing moment at the end. The sections were completely improvisational within a structure. Conceptually, it was decided that this framework would allow dancers and the new media artist/designer to negotiate “live” the nuances and expressive potential of the vocabulary in this twelve-minute work. The two sections would also allow the performance to develop and change within a predefined expressive system over the course of the unfolding of the work.

The piece opened with three bodies (dancers) in the space, which were gradually and gently revealed by the addition of kinetic color traces upon them. This was accomplished by combining minimalist movements and kinetic sculptural spot light. The dancers moved in the canals of light, allowing the audience’s eyes to become familiar with a gentle intersection of light, fragmented body (created by the kinetic sculptural spot light) and movement.

A fourth dancer entered the space, and the dancers began to move in a sculptural fashion, using as much high space as possible. At this point a mix of independent movement, follow up movement, and concurrent magnetic movements, for example, were employed. At one point, the new media artist/designer would fragment the dancers by not painting the lower halves of their bodies, so the upper bodies appeared to float in the space. Following that the morphing mountain technique occurred.

The dance began to fully evolve after this, with both dancers and kinetic color traces moving faster and with increasing complexity, until suddenly one lone dancer was left on the stage (techniques used in this segment included erase, draw/erase/draw, and shake). The new media artist/designer used the lone dancer as a focus, playing with the body and the space.

The remaining dancers began to enter the space, moving in slower, simpler movements, as the new media artist/designer followed them (i.e., follow up and anticipated movements), “painting” in long strokes. Finally, the dancers left the space, leaving the record of the kinetic color traces—a collection of movements frozen in space, a lasting image in the eyes of the audience.

Summary And Conclusion
This paper described an interdisciplinary project that investigated the intersection of dance and technology mediated by a technique called Digital Kinetic Color Traces. Four pieces were developed and performed. This project investigated both choreographed and improvisational dance performances in the context of computer-generated color projection systems. The integration of the two art forms, dance and “digital painting,” created new concepts and approaches to performance for the artists involved. The need to foster discussions among parties involved in this project was important in order to find common ground and to develop an expressive vocabulary based on dance and technology. Consequently, this process allowed the development of new techniques and visual approaches that integrate
dance and technology.

Improvisational dance created many challenges that could be explored in greater depth in the future. For example, some ability to work in the improvisation format could be augmented by the development of software based on the vocabulary developed during the project. The dancers could also benefit from further work in the confines of this format, providing them with familiarity with the developed vocabulary. In upcoming papers the authors plan to discuss aesthetic and philosophical implications of the approach described here.

Finally, this project sought to explore the notion of visual literacy by attempting to provide an understanding of the visual vocabulary that emerged as part of the collaborations. In this respect, the language of motion was transformed into information. This transformation is meant to serve as a building block for the understanding of the vocabulary from which dancers and a new media artist/designer aimed to construct poetic relationships. These relationships could not be experienced apart from the realm of digital technology. Consequently, this work also contributes to our understanding of aspects of digital aesthetics and digitally mediated expressions.

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References


