"O, body swayed to music... (and vice versa)"

Robert Wechsler
Palindrome Inter.media Performance Group
Nürnberg, Germany
robert@palindrome.de

Abstract

ABSTRACT: Dance maybe the art form closest to the organism. But does its primal nature make it inherently resistant to computerization? Many dancers feel apprehension -- if not antipathy for the encroachment of the computer into their world. From the author's perspective, as a choreographer working with computers, this is not without some justification. Yet he can also see the computer as a champion to the cause, re-introducing elements of interactively which, while common to its primitive forms, have largely disappeared from dance. He describes his work in the context of a field reticent to embrace evolving technologies.

Dance the dance
Dancing boasts an ageless tradition of undermining the intellect. Therein, it is said, lies its power. From this perspective, the computer, as the ultimate tool of the intellect stands diametrically opposed to the art of dance. Dancers are, if nothing else, a group united by their faith in the inherent wisdom of the body. I wouldn't say we look askance at the intellect exactly. Conceptual abstractions are enjoyed, but they are mistrusted. Look at the process of our work: the movements created by the choreographer are transferred physically to the dancer. There is rarely much discussion, nor are there typically any scores involved. The process is kinesthetic -- the feeling of the movement in one body becomes the feeling of the movement in another. Formal codification systems, movement scores, do exist(1), as does choreography software(2), but they are rarely used. Despite evolving technologies in the world around us, our process has not changed since antiquity.

Why not?

To the extent in which it involves structures in both time and 3-D space, dance is distinctive among art forms. Rhythms, shapes, dynamic qualities and interactions between dancers constitute an immense amount of information. With such inherent complexity, dance is not easy to assimilate - and not only for audiences, but for choreographers and dancers as well! With so much information to process in real-time one might imagine that the power of computers would find a place in at least some part the choreographic process. Typical professional dancers may know a score of dances, not all at "performance-level", but the steps are basically there. This adds up to hours of movement material. How do we remember it all? The answer is that we do not. Our muscles do. This answer may not be scientific, but it is what we call it, and it is how it feels. It is, for example, next to impossible for us to remember our movements while sitting in a chair. It is a uniquely physical kind of memory.

Dancers do, of course, eventually forget steps.
When I choreograph I’ve learned that I can retain newly created material for about a day. By the end of the following day, holes begin to form. I could use a notation system to plot out exactly what I have done, or I could simply take some descriptive notes on the movements. Alternatively, I could pull out a video camera. But the easiest and fastest way to retain the material is just to run through the damn thing every day or so.

It is also easy to be cynical about developments in new presentation formats for dance. Videos of dance are hardly analogous to musical recordings. Music can in some cases be accurately simulated, dance, at least with existing technologies, cannot. The primal nature of the form -- the urge for movement and the desire to see where it leads us -- remains at the center of our art. And neither in the creation of new material, its storage, nor its transferal between dancers, is dance significantly supported by technology. With some rare exceptions, this is generally true for its presentation as well.

**Interactive Systems**

Together with Frieder Weiss, a computer engineer, I have been focusing on the use of computers in dance performances since 1994 -- not as choreographic tools, but rather for their ability to facilitate interactions between media. We have developed a number of systems which allow the movement of dancers, and in some cases that of the audience, to control stage-lighting, music, sounds, and projections. In a sense, interactivity is nothing new to dance. To a great many ethnic dance and music traditions, interactivity is crucial to their life and liveliness. There are, for example, African dance and drumming traditions in which these two activities are so closely intermingled that even their language reflects this: there is only one word for both activities. In classical ballet, no one would deny that the music can affect the way the ballerina dances, and perhaps the action of the dancers on the stage can also affect the way the musicians in the orchestra play. Nevertheless, it is clear that the role of interaction is diminished. Indeed, by far most ballets and modern dance pieces today are performed to recorded music. To me this trend underscores the importance of finding new ways to invigorate the art form. Our concept has been to design multi-media movement-based works which are neither improvised nor completely fixed, but which allow a sharing of control over musical and movement parameters. In addition, we are experimenting with new ways to involve audiences in our work.

The 12 works in our repertory use 2 basic technologies:

1. Systems based on "frame-grabbing", the capturing of video images in the computer.

Changes in those images are then used to induce changes in other media. TouchLines, is the name we gave to one of our computer programs. With it, one can draw lines on a video picture which are sensitive to minute changes. That is, if one of these on-screen lines is touched by any part of a dancer's body, changes in sound, music, lighting, or projections can be triggered. A single TouchLine can be programmed to initiate entire spectrums of sound, like a keyboard. These can be scaled according to need: one line may be controlled with the tiniest of finger movements, while another may require the dancer to run the entire length of the stage to play all of its notes. Additionally, some TouchLines can be used to control others, adding new lines and deleting old ones as they are called for in the course of the dance. When two or more cameras are used, 3-dimensional touch-sensitive "objects" can be defined. In our current program, Press ESCAPE, one camera is positioned high above the stage, two face the stage from the front corners, and one faces the public, allowing them input into some parts of the performance. Press Escape is divided into separately titled sections. Abstände and Game employ a more sophisticated variation of TouchLines where the computer tracks each dancer separately by locking-on to the color of their costume. We use this program to control projections, music and sampled text according to two different parameters: 1. The absolute positions of the dancers on the stage, and 2. the positions of the dancers relative to one another. Each dancer can control a different musical instrument according to where they go on stage,
or with the second variation, the distance between the dancers can be used, for example, to control the loudness of the music. In S.E.T.I. a 3-part chord is "bent", or pitch-shifted into different musical shapes according to where each of 3 dancers go on the stage. Minotaur is our most sophisticated use of this system. It involves four dancers playing a composed musical score entirely by their movements in 3-D space. In this case, the distinction between dancer and musician is rendered meaningless.

2. Systems based on body-worn electrodes.

In Heartbeat Duett dancers wear chest electrodes and transmitters while they dance. Each dancer's heartbeat is heard as a separate musical note. The resulting rhythm, a counter-point between the two heart beats, becomes part of a composed musical score. The piece Elektroden allows the public to hear the electrical impulses generated by the muscle contractions of a dancer. As different muscles tense and relax a kind of body symphony results. For dancers the computer may indeed have a special significance. Through the rapid popularization of human movement as a performed art form, which in the West began only in the early 1900's, dance has remained, with a few important exceptions, a form viewed as largely subordinate to others. Make this test: the next time you have just seen a dance performance, ask your neighbor what they thought of it. In most cases, they will describe the music. The music usually dominates the audience's overall reaction. Dance is thus perceived to "follow" the music, or a story, or both. Interactive media, such as those I have described, provide an opportunity to make this relationship dynamic. Now the music or lights can, for example, also follow the dance. Although this by itself may seem revolutionary to some, since the 1950's Merce Cunningham has lead a revolution in the dance world which has done precisely this: separated the art form of movement from its dependency on music and story.

To me, and to all those who accept this separation as self-evident, the real significance of the work we are doing may lie one step further. In interactive dances, the way in which the music, for example, "follows" the movement, is not really a reversal of the traditional situation. Rather, it introduces a new kind of relationship. In the traditional case, there are always fractions of seconds separating the dancer's movement from accents in the music. These are particularly pronounced at the start of a phrase, or in cases where the music is not particularly rhythmic, but whether obvious or not, this temporal separation is always there. In an interactive environment, the linkage between cause and effect -- in this case movement and sound -- is automatic and, moreover, instantaneous. This may seem like a small point, but in the way in which we respond to a performance the effect can be profound.

Musician as dancer, dancer as musician

When a musician performs before us, only a part of our experience is the actual sound of the notes. Another part of the experience is the sight of the artist before us working to make the music come to life. Perhaps they are struggling with it, or perhaps it is sheer elation for them, in any case they work it out physically -- through their body -- and this is not incidental to the event. This is clearly one reason that many people do not find recorded or broadcast music particularly entertaining. Computer music, as an imitation of acoustic sources, underscores this point: High-end synthesizers and sequencers can easily play even the most difficult scores at levels which can fool all but the most trained ears, yet few people would pay for such a rendition.

If the movements of the musicians are indeed a key element in the way we experience music, then could other sound-movement relationships engender similarly strong responses? In Minotaur our task is to play a composed score, one which was written for a more or less traditional orchestra. We play virtual instruments, but this doesn't mean that our movements -- the ways we physically work out the sounds -- are any easier to do, less refined or less "human" than those of the traditional musician. There are, of course, differences, but the critical issue is what effect such a piece has on an audience? Does it touch them, and if so, are they moved in the same way as if an
orchestra were to play the piece? From the perspective of a choreographer, what are the new possibilities for expression? While working on dances which create their own music, we face at every turn a myriad of interesting options whose effects we are only just beginning to understand.

**Audience Interaction**

To give the viewer an active role in a performance is an attractive challenge. In one section of Press ESCAPE, TouchLines drawn over the heads of the public allow them to contribute sounds (the accompaniment to the dance) by gesturing over their heads or by standing up and making shapes with their bodies. The result, as you might imagine, is pretty chaotic, but it is a popular piece! Once a few brave souls have tried it, virtually everyone wants to see what sounds are waiting above their heads.

Of course when many people are jumping up and gesturing at the same time, it quickly becomes unclear who has created which sound, and, although the composite sound may be interesting to listen to, the feeling the participants have of controlling their environment is lost. How do you design a system which is sophisticated enough to allow some input on an artistic level, but which is still simple enough for people to be able to follow what the heck is going on?

That the audience has at least a better-than-even chance of grasping how the interactive system functions -- i.e., which cause has which effect -- is of paramount importance to us. The tricky part is finding ways to effect an understanding without resorting to pedagogy? Direct explanations, by nature, interpolate our experiences and in the context of a work of art they can be just as distracting as a lack of understanding.

We use a variety of strategies. One approach is to have a piece build-up slowly, step-by-step, starting with the simplest kinds of interactions first. In this way a piece can "explain itself" as it goes along. Another possibility is to affect an explanation using other media, for example, projections of graphics and text, program notes and different forms audience involvement. And, personally, I have no particular objection to an occasional verbal explanation, though this may come during or after a piece rather than before, giving the audience the chance to react "innocently" to a work, at least as they first experience it.

Resistance to the use of computers in the dance world is deep-rooted and, being a dancer, not hard for me to understand. In contrast to some professions, computers are not making our lives any easier. For one thing, in its present state of development, work such as ours requires an inordinate amount of patience, something dancers are not generally blessed with. Moreover, to many they represent a denial of, or at least a distraction from, that which is most essential to dance: the expression of the sensual and "primitive" aspects of human life. For these reasons the role of crusader does not sit well with me. In our performances we seek to draw attention to this and other dilemmas surrounding the increasing computerization of our world, even as we succumb to the irresistible attraction of new possibilities.

Notes:

1. The best known of these is "Labannotation" which was developed by the German dancer and "Tanztheorethiker" Rudolf Laban in the early part of this century. It allows a remarkably complete record of human movement in all its detail and even includes notation for the qualities with which a movement is made. It is not uncommon to find it taught in university dance programs in the United States though few dancers become fluent in its use. For simply recording choreography the video camera is certainly the method of choice.

2. "LifeForms" is a human movement animation program used by some dancers. It was developed by Thecla Schiphorst and her colleagues at Simon Fraser University. Information under: http://fas.sfu.ca/lifeforms

3. I go into some more detail in an earlier paper, "Computers and Art: a Dancer's Perspective"; accepted for publication in Technology and Society a publication of IEEE, (anticipated in the Fall 1997 issue).
4. A good overview of the field can be obtained from The Dance & Technology Zone (D&TZ, at www.art.net/~dtz). It is an excellent resource for artists and others who are particularly interested in using new media and information technologies in the creation and performance of dance, dance theater and related live performance works. Their "upcoming events" section and "artist links" are particularly interesting. It is maintained by Mark Coniglio.

5. The Palindrome Dance Company was founded in New York City in 1982, and has been based in Nuremberg, Germany since 1987. Palindrome has an unusual focus: to make dance works, interactive performance pieces, installations and workshops which correlate concepts and phenomena from science and technology with human movement. Sometimes, as in the case of the dance DNA... (1981), the connection is literal. The dance is a scale model of DNA, the molecule. Other pieces, such as Möbius Band (1995) and TRIO A (1989) combine symmetries in time and space and function like puzzles which the audience solves as they watch. Since 1994, they have focused on the use of computers and other technologies to generate new kinds of interaction between performing media, as well as new ways of involving the public. The current Palindrome Troupe consists of 4 German, Swiss and American artists and scientists, although for given performances the size swells to include additional dancers, athletes, musicians, visual artists, computer engineers, and so on. Palindrome always performs with live music. More information under: http://ourworld.compuserve.com/homepages/palindrome